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The Relationship between Knowledge Acquisition and Knowledge Dissemination: Mediating Role of ISO 9001 Key Factors

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This research aims to examine the impact of ISO 9001 factors on knowledge acquisition and knowledge dissemination to determine the key success elements for organizations. A questionnaire survey method is employed to identify and analyze the relationship between knowledge acquisition, knowledge dissemination, and ISO key factors within organizations. In addition, the research adopts factor analysis to determine key factors of ISO 9001 management system, knowledge acquisition and knowledge dissemination. Moreover, the correlations of these dimensions are examined with correlation analysis and hierarchical regression analysis. The research reveals that the three dimensions (i.e., key factors of ISO 9001, knowledge acquisition, and knowledge dissemination) show significant correlations. Feasible suggestions and corresponding action plans are put forward to provide new directions for knowledge management and serve as a reference for future research. These findings can contribute to promoting knowledge management, revealing behavioral intentions, and providing strategic advice for business operations.

Keywords: Knowledge acquisition, knowledge dissemination, ISO 9001 control system, correlation analysis, regression analysis

JEL: A20, A30

The 21st century is an era of knowledge economy and fierce competition. With the rapid shifts in the globalized economic environment, knowledge is critical to the competitiveness of enterprises, and quality knowledge plays a vital role in strengthening the core competency of enterprises. Organizational sustainability plays an important role in an ever–changing market, and research shows continuous learning and knowledge management are positively related to organizational sustainability (Carayannis *et al.*, 2015; Chiabrishvili and Zaim, 2018). As demonstrated by Oztekin *et al.* (2015) and Dzenopoljac *et al.* (2018), there is a significant positive correlation between knowledge management and business success. In 1965, management guru Peter Drucker mentioned that knowledge will replace machines, equipment, capital, raw materials or labor, and become the most significant production factor for organizational management. In 1993, he further put forward the concept of "kno-

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wledge society" and highlighted the importance of knowledge. He also believed its importance would surpass resources such as capital or land in the new economic system. Nonaka *et al*. (2000) indicated that Japan's success and its competitive advantages primarily come from knowledge creation and continuous innovation, and knowledge management plays a critical role in organizations. Nonaka *et al*. (1995) considered that knowledge is formed through the interactions between implicit and explicit knowledge, and that new knowledge can be generated from the process of knowledge conversion. Grant (1996) pointed out that knowledge dissemination is related to the amount and level of mutual knowledge. If the amount and level of mutual knowledge are getting higher, it will be easier to share knowledge. Factors such as common language, symbolic communication, professional and common knowledge base, shared meaning, and domain-specific understanding all play a key role in the formation of mutual knowledge.

ISO 9001 quality management system is a set of standardized process control and operation management system, which can enhance the organization's international image, standardization and rationalization, thereby strengthening the internal management of the organization and improving the quality of employee education. Zaim *et al*. (2018) conducted comparative research on ISO 9001 certified and non-certified companies to understand their knowledge management and organizational sustainability performance. They discovered that (1) knowledge management could affect enterprise performance and (2) knowledge acquisition, knowledge sharing, knowledge storage, and knowledge utilization constitute the main processes of knowledge management. Thus, these processes are the key factors to enterprise performance. Therefore, how to quickly understand and effectively leverage quality knowledge is an important issue for companies to remain competitive. Nowadays, organizations are investing many resources to obtain and maintain its ISO 9001 certification. However, in a long run, the certification did not directly bring as much profit as they expect. This study intends to investigate how to leverage ISO 9001 quality knowledge from the following three dimensions:

1. Understand the elements and implementation of knowledge management to identify the key factors and successfully drive knowledge management in organizations.
2. Understand the behavioral motivations that affect knowledge acquisition and knowledge dissemination.
3. Put forward strategic suggestions to promote knowledge management in organizations.

This research conducts an empirical analysis on questionnaires collected from supervisors at all levels to identify the key relationships among knowledge acquisition, knowledge dissemination, and ISO factors within organizational sectors. Furthermore, the research also examines the relationship between each variable set and provides feasible plans, trying to establish a new direction for future

quality knowledge, and provide a reference for promoting knowledge management across relevant industries.

The remaining sections of the research are outlined below. Section 2 contains a review of relevant literature and research hypotheses. Section 3 presents the research methodology. Section 4 demonstrates the data analysis and findings. Section 5 discusses the research findings. Section 6 provides conclusions and directions for future research.

LITERATURE REVIEW

ISO 9001 Management System

After its release in 1987, ISO 9001 Quality Management System (QMS) posed several difficulties on dimensions such as software, services, and production materials when adopting this QMS system because it focused too much on hardware products. With the advancements and requirements in this evolving era, ISO 9001 released its second edition (ISO 9001:2000) in 1999. The most updated version of this system (i.e., ISO 9001: 2015) was announced and took effect in 2015, aiming to strengthen the spirit of improvements and focus more on customers' satisfaction. With the implementation of this system, all employees of the company will be included into the quality improvement cycle and the company will be provided with a vision to stride toward the 21st century. This system adopts customer-centered management approaches and thus drives the overall quality for companies. Customers' requirements are of top priority in this system. Thus, companies have to deliver products or services that can satisfy customers' expectations, and improve their deliveries and track the root causes of product defects based on customers' satisfaction and feedback. The analysis results will be provided to the administrative level and serve as references for decision-making so the quality of companies' products and services can be enhanced and meet customers' true needs (Magd, 2006).

The ISO 9001 Standards clearly specify that companies' quality management system must be able to satisfy customer needs. These comprehensive quality management standards can be applied to all the requirements, objectives, products and services in organizations. The successful implementation of the ISO 9001 system relies on carrying out these standards in the following areas, because each of them are critical to companies' success: (1) Support from senior executives, (2) Quality system, (3) Employee participation, (4) Internal audit system, (5) Document management, (6) Professional consultants, (7) Education and training, and (8) Expertise. A successful quality management system must be designed with a simple and feasible workflow (Magd, 2006).

One of the primary features of ISO 9001 management system is documentation. In other words, all

the company's quality management processes should be kept in written form to ensure that it can provide high-quality products to win customers' confidence in purchasing its products. Besides, the ISO 9001:2000 standards outline clearer definitions for the documents of the entities which should comply with relevant requirements (Garver and Lucore, 1994).

According to Zaim *et al*. (2018), organizational sustainability performance is closely related to knowledge management for both ISO 9001 certified and non-certified companies. It is shown that knowledge management exercises positively affect business performance; besides, knowledge acquisition, knowledge sharing, knowledge storage, and knowledge utilization are the primary processes of knowledge management. Consequently, these aforementioned processes are essential to enterprise performance. Tozzo *et al*. (2018) applied ISO 9001 to manage clinical ethics consultation and training sessions to improve quality and safety in healthcare agencies.

Knowledge Management

In ancient times, knowledge involved all the skills and abilities to handle things in our daily lives, and human beings managed to survive in the natural world based on limited knowledge. Nowadays, people have understood the inner meaning and importance of knowledge, so knowledge and knowledge management have become important research topics.

According to Laurie (1997), knowledge management is usually related to two types of activities: the first is to document personal knowledge and spread knowledge through the company's database, and the other is to use group software, e-mail, and the Internet to help people communicate and disseminate knowledge, and further create new knowledge. Zaim (2006) defined knowledge management as "the systematic management of all activities and processes" which involves generating and developing, coding and storing, transferring and sharing, and leveraging knowledge to enhance an organization's competitive advantage. Knowledge sharing is the process of exchanging knowledge among company employees, which can upgrade the company's innovation ability (Ismail *et al*., 2019; Dzenopoljac *et al*., 2018). From Sara and John's (2017) perspective, knowledge management involves the integration of people, processes and data, and the use of technologies to optimize information, value creation and application.

Zack (1999) considered that knowledge management consists of five steps, including acquisition, improvement, storage/search, dissemination and presentation. Nonaka et. al (1995) pointed out that knowledge creation derives from the interactions between tacit and explicit knowledge. In other words, knowledge creation has to go through the knowledge conversion processes such as socialization, externalization, combination, and internalization. Leonard-Barton (1995) believed that organizations are the knowledge repositories which can help themselves to cultivate unique abilities via four primary

learning activities (i.e., share solutions, implementation and integration, experimental prototyping, and knowledge input) in order to create and spread knowledge. Regarding knowledge dissemination, Grant (1996) showed that the ease of knowledge dissemination is related to the amount and level of common knowledge. When the amount and level of common knowledge are greater and higher, it would be easier to disseminate knowledge. This highlights the significance of having common knowledge. Thus, the current research defines knowledge management as the organizational activities such as creating, storing, and sharing knowledge which can increase the value of knowledge and improve the organization's business performance. As stated by Dzenopoljac *et al.* (2018), effective knowledge management encourages organization members to share their experiences that can transform tacit knowledge into explicit knowledge. Research showed that continuous learning and knowledge management have positive influences on organizational sustainability (Carayannis *et al.*, 2015; Chiabrishvili and Zaim, 2018). Further, studies have shown that there is a significant positive correlation between effective knowledge management and business success (Dzenopoljac *et al.*, 2018; Oztekin *et al.*, 2015).

Knowledge Dissemination

Grant (1996) described how the amount and level of mutual knowledge affect the ease of knowledge dissemination. The more mutual high-level knowledge, the easier it is to share knowledge. Regarding the formation of mutual knowledge, the following factors all play a critical role: common language, symbolic communication, professional and common knowledge base, shared meaning, and domain-specific understanding.

Research indicated that the dissemination of knowledge requires effective strategies, and that customized and specific information can enhance the effectiveness of knowledge dissemination (Chapman *et al.*, 2020; Chapman *et al.*, 2021).

ISO 9001, Knowledge Management and Knowledge Dissemination

This section presents the relationship between ISO 9001:2000 Quality Management System, knowledge acquisition, and knowledge dissemination. Organizations can use their quality handbooks to manage knowledge and directly connect with their overall quality control system. As indicated by Zetie (2002), organizations' quality handbooks store their procedural knowledge, which is the documentable knowledge. In this regard, the quality handbooks emphasized by ISO 9001: 2000 can be considered as one type of the documentable knowledge, and can encourage the generation, sharing, and application of knowledge.

According to the appended requirements in ISO 9001:2015, organizations should adopt knowledge

management policies to improve performance and grow their business (Brito *et al.*, 2020). Ahmet (2021) demonstrated that ISO 9001 certification contributes to an organization's performance and that knowledge management has a significant impact on organizational sustainability. Jayawarna and Pearson (2003) investigated four organizations that adopted ISO 9001 design control flow to understand the roles of ISO 9001 in research and design process, such as developing strategies and processes, performing personnel development, and learning. The research results show that organizations can continuously establish shared practices and keep improving through activities such as document control, record control, and internal auditing. These activities are helpful for organizations to form the background of knowledge creation.

Moreover, the case study results from Benezech *et al.* (2001) also showed that ISO 9001 could provide guidance for the development of efficient quality control systems. As they pointed out, a well-established document system that can facilitate the knowledge conversion process by documenting tacit knowledge (i.e., explicitation). In summary, we can see that ISO 9001 and knowledge creation are intertwined. Based on above arguments, the following hypotheses have been proposed:

H_1: Knowledge acquisition positively impacts ISO 9001 key factors.

H_2: ISO 9001 key factors positively impact knowledge dissemination.

H_3: Knowledge acquisition positively impacts knowledge dissemination.

H_4: ISO 9001 key factors mediate the relationship between knowledge acquisition and knowledge dissemination.

METHODOLOGY

Sample and Design

This research conducted a closed anonymous survey, and 500 questionnaires were distributed. The main sampling elements included consulting units and work units, and the questionnaires were distributed to employees working as management, business staff, on-site supervisor, and staff member.

Respondents were required to answer questions based on their own perspectives and experiences, so that the results of the study would not be influenced by personal subjective opinions. This questionnaire adopted a 5-point Likert scale to tap study variables in which respondents can numerically express how much they agree or disagree with a statement: Strongly disagree (1), Disagree (2), Neither agree nor disagree (3), Agree (4), and Strongly agree (5).

The questionnaire tapped the key factors of ISO 9001, knowledge acquisition, knowledge dissemination, and basic personal information (including five items: gender, age, education level,

years of service, and position). Table 1 (see Appendix-I) shows the questionnaire design and references of each variable.

Data Analysis

First, this research conducted a factor analysis to identify the conceptual factors for each research dimension. The adopted statistical analysis methods include factor analysis, reliability testing, correlation analysis, and regression analysis. The research mainly used Statistical Package for the Social Science (SPSS) for analysis.

RESULTS

Questionnaire Recovery Rate

This research took an organization as a case study. A total of 500 questionnaires were sent out and 403 questionnaires were returned with the recovery rate of 81 percent. Before analyzing the questionnaire data, the invalid questionnaires were filtered out to ensure the validity of the analysis results. If the responses showed a fixed pattern, the questionnaire would be considered invalid. Besides, incomplete answers were also removed. After the invalid 108 questionnaires were screened out, a total of 295 valid questionnaires were available for final analysis, with an effective recovery rate of 59 percent.

Descriptive Statistics

The collected basic information of respondents includes gender, age, education level, years of service, and job title. The descriptive statistics of sample are shown in Table 2 (see Appendix-II).

Gender: Male respondents accounted for 78.6 percent of replies, much higher than the female respondents (21.4%), showing that the gender of the sample in this study is dominated by male workers. Age: Respondents aged 26 to 30 accounted for the highest proportion (32.9%), followed by those aged 31 to 35 (30.5%), and the sum of the two accounted for 63.4 percent of the overall proportion, indicating that the age group of the sample in this study is mainly young workers. Education level: Respondents with university education accounted for the highest proportion (44.1%), followed by those with young college education (31.9%), showing that the subjects in this study is dominated by those with higher education. Years of service: Those with 8–11 years of service and 12–19 years of service accounted for 60.0 percent (24.1% and 35.9%, respectively), indicating that the questionnaire samples are mainly people with higher technical experience. Position: The proportion of staff is the highest (50.5%), showing that the sample is mainly composed of maintenance workers.

Factor Analysis

This research employed factor analysis to investigate factor structure of study variables (see Appendix-III). For the "ISO 9001 key factors" variable, a total of 23 questions were used for measurement. The factor analysis showed that the factor loading values of 12 questions were lower than 0.4, so these questions were excluded. The factor loading values of the other 11 questions were above 0.4 (0.596-0.733), and the cumulative explained variance is 61.069 percent. The names of the three formulated factors are as follows:

1. Factor A: Supervision and integration system (6 questions: Q8, Q9, Q16, Q20, Q21, Q22)
2. Factor B: Standards and audits (3 questions: Q1, Q3, Q18)
3. Factor C: Goals and training level (2 questions: Q7, Q11)

After testing, the item-total correlation values and the Cronbach's α values all meet the criteria of reliability and validity of the following factors:

(1) Supervision and integration system: Its item-total correlation values are higher than 0.5 (the minimum value was 0.60, and the maximum value was 0.80), and the overall Cronbach's α of variables was 0.93.

(2) Standards and audits: Its item-total correlation values are higher than 0.5 (the minimum value was 0.64 and the maximum value was 0.73), and the overall Cronbach's α of variables was 0.89.

(3) Goals and training level: Its item-total correlation values are 0.56 (higher than 0.5), and the overall Cronbach's α of variables was 0.72.

For Knowledge acquisition, after testing, the item-total correlation values and the Cronbach's α values all meet the criteria of reliability and validity of the following factors:

(1) Tacit knowledge: Its item-total correlation values are higher than 0.5 (the minimum value was 0.59 and the maximum value was 0.67), and the overall Cronbach's α of variables was 0.85.

(2) Explicit knowledge: Its item-total correlation values are higher than 0.5 (the minimum value is 0.51 and the maximum value was 0.680), and the overall Cronbach's α of variables was 0.826.

For Knowledge dissemination, after testing, the item-total correlation values and the Cronbach's α values all meet the criteria of reliability and validity of the following factors:

(1) Factor A (Documentation): Its item-total correlation values were higher than 0.5 (the minimum value was 0.55 and the maximum value was 0.64), and the overall Cronbach's α of variables was 0.76.

(2) Factor B (Interpersonal transmission): Its item-total correlation values were higher than 0.5 (the minimum value was 0.51 and the maximum value was 0.59), and the overall Cronbach's α of variables is 0.686.

(3) Factor C (Work team): Its item-total correlation values were higher than 0.5 (the minimum value was 0.67 and the maximum value was 0.74), and the overall Cronbach's α of variables was 0.84.

Correlation Analysis

Table 6 (see Appendix-IV) shows the correlation between knowledge acquisition (KA), knowledge dissemination (KD), and ISO 9001 key factors (ISO9001KF). The research results showed that the correlation coefficients between ISO9001KF and KA, KD and ISO9001KF, and KD and KA were r=0.60, r=0.54, and r=0.47, respectively, indicating that these variables were moderately correlated. The three key factors of ISO 9001 ("supervision and integration system", "standards and audits" and "goals and training level") are significantly correlated to the factors of knowledge acquisition ("tacit knowledge" and "explicit knowledge"). More specifically, the key factors of ISO 9001 ("supervision and integration system" and "standards and audits") highly correlate with the knowledge acquisition factor "explicit knowledge". Besides, "goals and training level" is the most relevant ISO 9001 key factor for "tacit knowledge".

The two key factors of ISO 9001 ("supervision and integration system" and "standards and audits") are significantly related to the factors of knowledge dissemination ("documentation", "interpersonal transmission" and "work team"). Additionally, "goals and training level" significantly correlates with "interpersonal transmission". More precisely, the key factor of ISO 9001 ("supervision and integration system") highly correlates with the knowledge dissemination factors "documentation" and "work team", and followed by "interpersonal transmission". Moreover, "standards and audits" is the ISO 9001 key factor highly relevant with the knowledge dissemination factor, "interpersonal transmission". The two key factors of knowledge acquisition ("tacit knowledge" and "explicit knowledge") are extremely correlated with the factors of knowledge dissemination ("documentation", "interpersonal transmission" and "work team"), indicating the knowledge acquisition factor, "explicit knowledge", highly correlates with the knowledge dissemination factor "documentation", and followed by "work team" and "interpersonal transmission".

The analysis results above can prove the factors of ISO 9001 are obviously relevant with knowledge acquisition and knowledge dissemination.

Regression Analysis

The research primarily adopted regression analysis to assess the influences of independent variables on dependent variable. Simple regression and multiple regression were employed to analyze each variable in order to understand and examine their influences (see Table 7, Appendix-V). The results are as follows:

The Impact of Knowledge Acquisition on ISO 9001 Key Factors

The research performed an impact analysis to reveal the impact of knowledge acquisition on ISO 9001

key factors. Knowledge acquisition was regarded as independent variable, and ISO 9001 key factors was considered as dependent variable. The causal effect of knowledge acquisition dependent variable were examined. The results of the impact analysis show that knowledge acquisition has a significant impact on ISO 9001 key factors. In combination with the correlation analysis results, the Hypothesis 1 i.e., knowledge acquisition has a positive impact on ISO 9001 key factors holds.

The Impact of ISO 9001 Key Factors on Knowledge Dissemination

The research conducted an impact analysis to examine the impact of ISO 9001 key factors on knowledge dissemination. ISO 9001 key factors was used as independent variable, and knowledge dissemination was regarded as dependent variable. The causal effect of ISO 9001 key factors on dependent variable were investigated. The results of the impact analysis show that ISO 9001 key factors have significant impact on knowledge dissemination. Besides, in combination with the correlation analysis results, Hypothesis 2 i.e., ISO 9001 key factors have a positive impact on knowledge dissemination is established.

The Impact of Knowledge Acquisition on Knowledge Dissemination

The research performed an impact analysis to understand the impact of knowledge acquisition on knowledge dissemination. Knowledge acquisition was considered as independent variable, and knowledge dissemination was used as dependent variable. The causal effect of knowledge acquisition on dependent variable was examined. The results of the impact analysis show that knowledge acquisition has significant impact on knowledge dissemination. In combination with the correlation analysis results, Hypothesis 3 i.e., knowledge acquisition has a positive impact on knowledge dissemination holds.

The Intermediary Effects of ISO 9001

As indicated by the three sections above (section 1-3), either ISO 9001 key factors or knowledge acquisition significantly affect the dissemination of knowledge. In order to understand the impact of ISO 9001 on knowledge acquisition and knowledge dissemination, an impact analysis was conducted to examine the intermediary effects of ISO 9001 key factors. After analyzing the total effect and the direct/indirect effect, the current research obtained the indirect effect analysis table of the intermediary model (see Table 8, Appendix-VI). This table shows that in the total effect of KA→KD, where $p < 0.05$ and the confidence interval exclude 0 [0.336 0.639], indicating that the total effect holds; in the total indirect effect of KA→ISO9001KF→KD, where $p < 0.05$ and the confidence interval do not contain 0 [0.151 0.389], showing that the total indirect effect and intermediary effect exist; in the direct effect

of KA→KD, where $p < 0.05$ and the confidence interval exclude 0 [0.102 0.388], showing that the direct effect and intermediary effect exists. That is to say, Hypothesis 4 i.e., ISO 9001 key factors have a positive and significant intermediary impact on the knowledge acquisition and knowledge dissemination relationship is established.

DISCUSSION

Table 6 shows the correlation between knowledge acquisition (KA), knowledge dissemination (KD), and ISO 9001 key factors (ISO9001KF), and the results show that these variables are moderately correlated. These findings correspond to the study of Carayannis *et al*. (2015), and Chiabrishvili and Zaim (2018), which demonstrate that continuous learning and knowledge management have a positive impact on organizational sustainability. Besides, the results of this study are consistent with Dzenopoljac *et al*. (2018), and Oztekin *et al*. (2015), which pointed out that knowledge management is positively correlated to organizational success. Additionally, Zaim *et al*. (2018), and Tozzo *et al*. (2018) show similar findings.

Table 7 presents an analysis of the impact among knowledge acquisition, knowledge dissemination, and ISO 9001 key factors (ISO9001KF), and the findings show these variables have a positive impact on each other. These results are consistent with those of Ahmet *et al*. (2021), which demonstrated that ISO 9001 certification can boost organizational performance and that knowledge management has a significant impact on organizational sustainability.

Table 8 is an indirect effect analysis examining the mediating effect of ISO 9001 key factors. The results show the relationship between knowledge acquisition and knowledge dissemination is mediated by ISO 9001 key factors. Consequently, identifying the key elements of ISO 9001 is necessary for successful knowledge management.

CONCLUSION

This research examined the key factors of successful knowledge management through a literature review and presented a case study to illustrate how a domestic company applies ISO 9001 standards to its business in order to determine successful knowledge management. Besides, the research analyzed the data obtained from the questionnaire to discover and investigate the relationship between organizational variables (such as ISO 9001 key factors, knowledge acquisition, and knowledge dissemination) and to provide feasible plans. Additionally, the research integrated the ISO management system (including the overall management system operation, document control, and audit system) with knowledge acquisition and knowledge dissemination to enhance innovation ability

and drive knowledge value. Moreover, acquiring and disseminating ISO international quality certification knowledge and personnel knowledge can establish a good image, reduce costs, and improve the document control system.

The research intended to examine how key factors of ISO 9001 management system affect knowledge acquisition and knowledge dissemination, and how knowledge dissemination channels influence knowledge acquisition.

It is suggested that researchers and scholars who want to discuss the key factors of ISO 9001 in the future can probe into the following two dimensions.

1. As pointed out in some literature, education and training is also one of the most important intervening variables. If researchers are interested in education and training, they can pay more attention to this field in the future.

2. Informationization and paperlessness are important development trends in recent years. For knowledge dissemination, this research chose to spread knowledge via documentation, interpersonal communication, and work teams. However, future research can adopt different channels (i.e., informationized channels) to spread knowledge to adapt different trends.

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Appendix–I

Variables	No. of questions	Reverse questions	References
ISO 9001 key factors	23	N/A	Magd, 2006; Yun, 2016; Garver ＆Lucore, 1994
Knowledge acquisition	12	N/A	Nonaka and Takeuchi (1995); Ismail *et al*., 2019; Dzenopoljac *et al*., 2018
Knowledge dissemination	9	N/A	Evelina *et al*., 2020; Evelina *et al*., 2021

Source: Authors' Presentation

Table 1. References for the Questionnaire Design

Appendix-II

Variables	Type	Count	%
Gender	Male	232	78.6
	Female	63	21.4
Age	20 – 25	53	18
	26 – 30	97	32.9
	31 – 35	90	30.5
	> 36	55	18.6
Education level	High school	46	15.6
	Junior college	94	31.9
	University	130	44.1
	Graduate schools	25	8.6
Years of service	< 3 years	50	16.9
	4~7 years	56	19
	8~11 years	71	24.1
	12~19 years	106	35.9
	> 20 years	12	4.1
Position	Staff member	149	50.5
	On-site supervisor	64	21.7
	Business staff	69	23.4
	Managerial level	13	4.4

Source: Authors' Computation

Table 2. Descriptive Statistics

Appendix–III

Factors and Questions	Item-total Correlation	Cronbach's α
Factor A (Supervision and integration system)		0.937
21. The leader of your organization's ISO 9001 promotion team has strong coordination skills.	0.721	
20. Your organization has built a team to promote the ISO quality assurance system.	0.805	
16. When your organization promotes ISO 9001, the senior executives will attend ISO meetings in person and join in discussions actively.	0.736	
22. Education and training in your organization starts from senior executives and managers and extends to all employees.	0.701	
8. Your organization systematically evaluates defects in the software development process, continuously improves quality, and reduces product development time.	0.602	
9. All the entry-level employees in your organization have received complete education and training.	0.624	
Factor B (Standards and audits)		0.894
1. After implementing ISO 9001, your organization's development processes are standardized.	0.730	
3. After implementing ISO 9001, your organization will continue to perform internal audits across sectors.	0.738	
18. Your organization's senior executive will clearly announce quality policies.	0.643	
Factor C (Goals and training level)		0.725
11. Your organization's ISO goals are determined by a small group of people.	0.569	
7. Your organization lacks a full set of training for managers.	0.569	

Source: Authors' Computation

Table 3. The Reliability and Validity Analysis of ISO 9001 Key Factors

Factors and Questions	Item-Total Correlation	Cronbach's α
Factor A (Tacit knowledge)		0.852
3. Your work experience is hard to put into words.	0.628	
4. The corporate culture of your organization is hard to explain to colleagues and requires them to experience it by themselves.	0.650	
7. It takes a lot of time for colleagues to absorb your work experience.	0.679	
8. When you change positions, your personal experience goes with you and is not easily stored for your successor.	0.594	
9. Your organization's corporate culture takes a lot of time to understand.	0.616	
12. The corporate culture of your organization is hard to put into words.	0.657	
Factor B (Explicit knowledge)		0.826
1. The information of your organization can be easily stored in the organization's files and will not be lost when employees leave their posts.	0.513	
2. The general documents of your organization can be understood in a short time.	0.653	
5. Most information about your organization is communicated to colleagues in writing.	0.519	
6. The knowledge in your organization's general documentation is easy to understand.	0.680	
10. Your organization's customer information can be understood in a short time.	0.568	
11. The knowledge in your organization's general documents is easy to explain to your colleagues.	0.636	

Source: Authors' Computation

Table 4. The Reliability and Validity Analysis of Knowledge Acquisition

Factors and Questions	Item-Total Correlation	Cronbach's α
Factor A (Documentation)		0.761
3. Your organization will create workbooks to help employees familiarize themselves with work operations.	0.645	
5. Your organization will build a customer database for employees to know more about customers.	0.556	
8. Your organization designs workflow diagrams to help employees familiarize themselves with their jobs.	0.618	
Factor B (Interpersonal transmission)		0.686
1. Your organization will assign experienced staff to lead new hires.	0.573	
4. Your organization offers mentoring mechanisms to pass on the experience of senior employees.	0.595	
7. Your organization hosts various activities from time to time to facilitate the exchange of experiences among colleagues.	0.514	
Factor C (Work team)		0.842
2. Your organization has established a cross-functional team to communicate new knowledge.	0.671	
6. Your organization's project team members will communicate with each other.	0.702	
9. Your organization's various professional teams will communicate with each other.	0.749	

Source: Authors' Computation

Table 5. The Reliability and Validity Analysis of Knowledge Dissemination

Appendix–IV

Variables	KA	ISO9001KF	KD
KA	1.00		
ISO9001KF	0.60***	1.00	
KD	0.47***	0.54***	1.00

Source: Authors' Computation
Note: ***p <0.001

Table 6. Correlation Matrix

Appendix–V

Dependent Variable	Independent Variable	Unstandardized Coefficients		Standardized Coefficients	*t*-value	*p*-value	R^2
		B	Std. Error	β			
ISO9001KF	Constant	2.657	0.219		12.154	0.000***	0.376
	KA	0.532	0.038	0.615	13.849	0.000***	
KD	Constant	2.061	0.324		6.359	0.000***	0.283
	ISO9001KF	0.64	0.057	0.534	11.225	0.000***	
KD	Constant	2.948	0.294	0.466	10.04	0.000***	0.215
	KA	0.484	0.052		9.368	0.000***	

Source: Authors' Computation
Note: ***p<0.001

Table 7. Regression Analysis

Appendix–VI

Effect	Point estimate	Coefficient product			Bootstrap 1000 Times	
		Std. Error	z-value	*p*-value	lower limit	Upper limit
Total effect						
KA→KD	0.484	0.077	6.263	0.000***	0.336	0.639
Total indirect effect						
KA→ISO9001KF→KD	0.252	0.058	4.340	0.000***	0.151	0.389
Direct effect						
KA→KD	0.232	0.074	3.146	0.002**	0.102	0.388

Source: Authors' Computation
Note: **p<0.01, ***p<0.001

Table 8. Indirect Effect Analysis

Appendix–VII

ISO 9001

1. After implementing ISO 9001, your organization's development processes are standardized.
2. Your organization has applied quality measurement methods to quality management.
3. After implementing ISO 9001, your organization will continue to perform internal audits across sectors.
4. The design of products and service workflows in your organization is based on the analysis of actual customer needs.
5. Your attribute your organization's success in promoting ISO 9001 to the implementation of quality measurement.
6. Your organization's operations and management procedures have been documented.
7. Your organization lacks a full set of training for managers.
8. Your organization systematically evaluates defects in the software development process, continuously improves quality, and reduces product development time.
9. All the entry-level employees in your organization have received complete education and training.
10. Your attribute your organization's success in promoting ISO 9001 to the implementation of internal audit.
11. Your organization's ISO goals are determined by a small group of people.
12. Your organization has a complete ISO 9001 implementation plan.
13. Documentation in your organization is finalized after the discussions with the relevant responsible persons.
14. Most of your employees are actually involved in ISO 9001 activities.
15. Your organization develops training programs for employees every year.
16. When your organization promotes ISO 9001, the senior executives will attend ISO meetings in person and join in discussions actively.
17. Your organization hires professional counseling agencies when promoting ISO 9001.
18. Your organization's senior executive will clearly announce quality policies.
19. Your organization has implemented all ISO procedures accurately.
20. Your organization has built a team to promote the ISO quality assurance system.
21. The leader of your organization's ISO 9001 promotion team has strong coordination skills.
22. Education and training in your organization starts from senior executives and managers and extends to all employees.
23. All employees of your organization perform their work as required by ISO 9001.

Knowledge Acquisition

1. The information of your organization can be easily stored in the organization's files and will not be lost when employees leave their posts.
2. The general documents of your organization can be understood in a short time.
3. Your work experience is hard to put into words.
4. The corporate culture of your organization is hard to explain to colleagues and requires them to experience it by themselves.
5. Most information about your organization is communicated to colleagues in writing.
6. The knowledge in your organization's general documentation is easy to understand.
7. It takes a lot of time for colleagues to absorb your work experience.
8. When you change positions, your personal experience goes with you and is not easily stored for your successor.

9. Your organization's corporate culture takes a lot of time to understand.
10. Your organization's customer information can be understood in a short time.
11. The knowledge in your organization's general documents is easy to explain to your colleagues.
12. The corporate culture of your organization is hard to put into words.

Knowledge Dissemination

1. Your organization will assign experienced staff to lead new hires.
2. Your organization has established a cross-functional team to communicate new knowledge.
3. Your organization will create workbooks to help employees familiarize themselves with work operations.
4. Your organization offers mentoring mechanisms to pass on the experience of senior employees.
5. Your organization will build a customer database for employees to know more about customers.
6. Your organization's project team members will communicate with each other.
7. Your organization hosts various activities from time to time to facilitate the exchange of experiences among colleagues.
8. Your organization designs workflow diagrams to help employees familiarize themselves with their jobs.
9. Your organization's various professional teams will communicate with each other.