Information and Communication Technology (ICT) Utilization Assessment from the Scope Perspective: The Case of Small and Medium-sized Enterprises (SMEs) in Akita Prefecture

Shuhei KUDO*

工藤　周平*

Department of Business Administration, Faculty of Business Administration, Ishinomaki Senshu University, Miyagi 986-8580, Japan

Abstract

The purpose of this study is to assess ICT utilization for SMEs in Akita prefecture from ICT scope perspective and to explore a critical factor to improve the ICT utilization level. This study employs five ICT types: (1) backbone system, (2) production and distribution management system, (3) manufacturing management system, (4) information sharing system, and (5) customer relationship management system. These ICT are assessed by using four levels: Level 1 = The system is not introduced, Level 2 = The system is used in a company function, Level 3 = The system is used in a company-wide level, Level 4 = The system is connected with other organizations. This study categorizes enablers and inhibitors of strategic use of ICT into six enablers constructs: (1) business environment, (2) ICT strategy, (3) top management leadership, (4) ICT operation, (5) ICT resource, and (6) information system. A mail questionnaire survey is used to gather data. The survey is conducted from mid-August in 2013 to early September in 2013. A list of companies is built by using the directory of Tokyo Shoko Research in 2011. 1008 companies in Akita prefecture are selected. The questionnaire is sent to 1008 persons in charge of business planning or information system. 303 complete sets of valid responses including various industry types are received. The result of the current ICT use level shows the backbone system and the information sharing system are used in a company-wide level. The percentage of level 1 is comparatively high in the production and distribution management system and the manufacturing management system. Customer information might not be sufficiently shared and utilized in a company-wide or interorganizational level. Results show that the construct scores of strategic use of ICT enablers in a company group introducing information system are higher than those of the enablers in a company group not introducing the system. The results of this study indicates that top management leadership, ICT strategy, and information system enablers might be especially important for ICT introduction in a Japanese local enterprise. Results show that the construct scores of the strategic use of ICT enablers in level 3 are higher than those of enablers in level 2 in all the information systems. The construct scores of the enablers in level 4 are higher than those of enablers in level 3 in the information systems other than manufacturing management system.

1　Introduction

Small and Medium-sized Enterprises (SMEs) must enhance their corporate management level to deal with various environmental changes for businesses including intense global competition, a declining population, aging society, diversified customer value, and everyday use of Internet and smartphone. One of the key issues to enhance their management is to utilize Information and Communication Technology (ICT) as a means of efficient and effective management of business data and information.

ICT originally supports a specific business operation such as development of production scheduling and automation of payroll calculation. These ICTs are used for individuals or business functional units. Company's business strategy and an external organization are not directly

*石巻専修大学経営学部経営学科

affected by these ICTs.

The scope of ICT influence on business stretches beyond the individual and functional level in the 1980s. Because of ICT development, ICT becomes an important tool to enhance company's competitiveness. The real cases such as American Airline and American Hospital Supply which gain competitive advantage by using ICT strategically are reported in United States in the 1980s[(1)]. Similarly, companies such as Seven-Eleven Japan and Yamato Transport are introduced as the company which gains or maintain advantage by using ICT as important foundation for competition. ICT utilization for gaining or maintain competitive advantage is conceptualized as "strategic use of ICT" or "Strategic Information System (SIS)" based on these real company's cases.

One of the characteristics of strategic use of ICT is the connection with an external organization by using telecommunications. Cash and Konsynski[(2)] suggests the concept of IOS (interorganizational system) and argues that using connected information system between companies is the most powerful for competition. These connected information systems affect building entry barrier, increasing switching costs, and changing the power balance with customer or supplier, and therefore, a company can gain or maintain competitive advantage. Strategic importance of ICT is increased with the expansion of ICT scope beyond a company's boundary. ICT affects not only business strategy but also company-wide business processes. In the early 1990s, the concept of BPR (business process reengineering), which a set of processes improving dramatically cost, quality, and delivery by radically transforming company-wide business processes, widely draws attention among researchers and practitioners.

The role of ICT changes from just for efficiency to for gaining competitiveness in association with the spread of ICT scope from a specific business function to company-wide and external organization. This study focuses on the ICT scope and explores a factor affecting ICT scope expansion.

Figure 1 shows the survey result for introduction of information system in SMEs[(3)]. Although more than 70% SMEs introduce information system in finance/accounting and payroll/personnel matters areas, the percentage of the number of

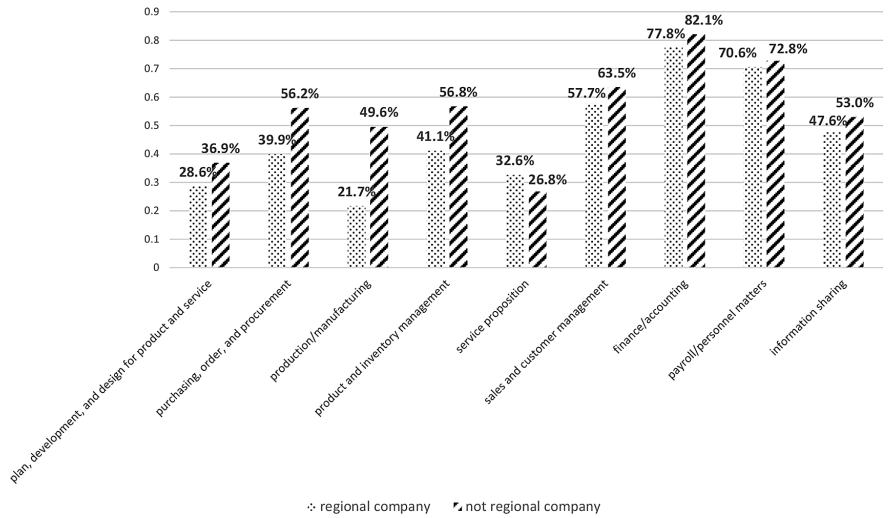

Figure 1 Current Status of Information System Introduction in SMEs (Ministry of Internal Affairs and Communications[(3)], p.114.)

SMEs introducing information system in purchasing, shipping order, procurement, and service proposition area is below 50%. ICT is not sufficiently utilized in business areas other than finance/accounting and payroll/personnel matters in SMEs. It is necessary for SMEs to encourage ICT application to business and to acquire high business value from ICT use by expanding ICT scope.

The purpose of this study is to assess ICT utilization for SMEs in Akita prefecture from ICT scope perspective and to explore a critical factor to improve the ICT utilization level. This study provides a new insight into a way to improve ICT utilization level in SMEs by clarifying a critical issue to encourage ICT utilization in SMEs.

2 Research Framework

Figure 2 shows the research framework of this study.

Ministry of Economy, Trade and Industry (METI)[4] shows five types of ICT in their study: (1) backbone system, (2) production and distribution management system, (3) manufacturing management system, (4) information sharing system, and (5) customer relationship management system. Backbone system is the information system used for transaction management such as accounting, financial, and enterprise resource planning software. Production and distribution management system is used for management of product and payment flow in production and distribution processes. Manufacturing management system is the information system to design and manufacture product on site such as CAD/CAM and manufacturing equipment control system. Information sharing system is used to share information such as groupware and integrated document management system. Customer relationship management system is the information system to collect and share customer information such as customer relationship management software. Also, METI[5] assesses company's ICT management level by using the four stages: Stage 1 = ICT is not used or just introduced in a company function, Stage 2 = ICT is used in a company function, Stage 3 = ICT use is optimized within a company, Stage 4 = ICT use is connected with computer network of other organization including customers and suppliers. Based on these studies, this study employs five types of ICT and measures the ICT use level in a SME by using four levels: Level 1 = The system is not introduced, Level 2 = The system is used in

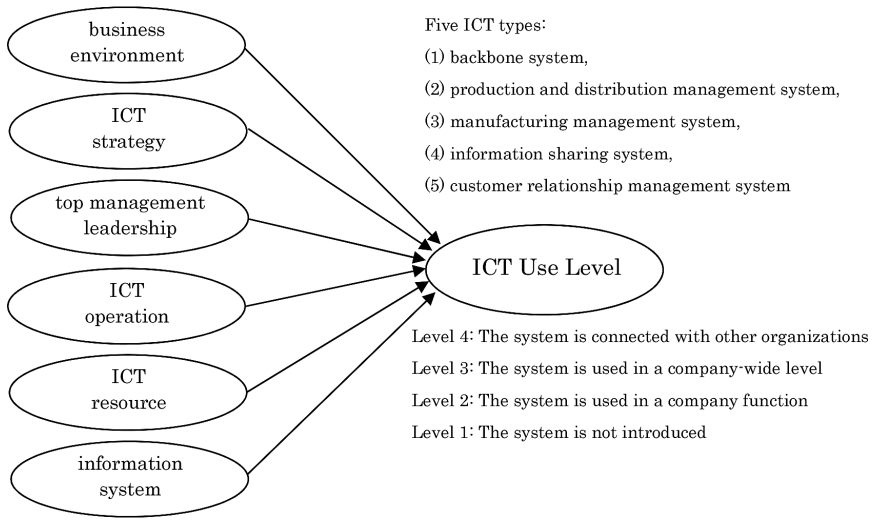

Figure 2 Research Framework

a company function, Level 3 = The system is used in a company-wide level, Level 4 = The system is connected with other organizations.

Many enablers and inhibitors of strategic use of ICT are suggested in the previous study on management information system (Table 1).

Lederer and Sethi[6] indicates "sophisticated business plan," "Information System (IS) manager's involvement in business planning," "IS manager's understanding of the aim of top management," "commitment by top management," and "effective business planning" as enablers of strategic use of IT. Earl[7] shows "top management commitment," "top management support," "effective business strategy," "business analysis for ICT use," and "excellent IS manager" for the enablers. On the other hand, Earl[7] suggests "resource constraints," "imperfect SIS implementa-

Table 1 Enablers and Inhibitors of Strategic Use of ICT

Enablers	Researchers
● sophisticated business plan ● IS manager's involvement in business planning ● IS manager's understanding of the aim of top management ● commitment by top management ● effective business planning	Lederer and Sethi[6]
● alignment between IT and business strategies ● clarification of IT role for business strategy ● competitive pressure ● analysis of internal business needs ● analysis of market/customer needs ● strength for IT ● external-oriented information system ● vision and support by top management	Neo[9]
● IS skill for strategic application use ● business strategy level ● major competitive factors targeted by applications ● competitive advantage provided by applications ● the level of application success	King and Sabherwal[10]
● top management commitment ● top management support ● effective business strategy ● business analysis for IT use ● excellent IS manager	Earl[7]
Inhibitors	Researchers
● lack of SIS planning ● lack of top management support for SIS development ● lack of capability for evaluating SIS effect	Huff[11]
● lack of top management's commitment ● lack of continuous SIS planning improvement	Lederer and Sethi[6]
● conflict between IT and business managers ● conflict between IT managers and business users ● conflict among group members with diversified background	Lederer and Nath[12]
● lack of awareness of SIS importance ● lack of capability for evaluating SIS validity ● organizational political issues ● lack of resources for SIS development and deployment	King and Grover[8]
● resource constraints ● imperfect SIS implementation ● lack of top management support ● time period for SIS implementation ● weak relationship between IS and business users	Earl[7]

tion," "lack of top management support," "time period for SIS implementation," and "weak relationship between IS and business users" as inhibitors of strategic use of IT. King and Grover[8] indicates "lack of awareness of SIS importance," "lack of capability for evaluating SIS validity," "organizational political issues," and "lack of resources for SIS development and deployment" as the inhibitors. This study categorizes these enablers and inhibitors into six enablers constructs for strategic use of ICT: (1) business environment, (2) ICT strategy, (3) top management leadership, (4) ICT operation, (5) ICT resource, and (6) information system. This study assumes these six constructs affect ICT use level in a Japanese SME.

3 Research Methods

3.1 Data Collection

A mail questionnaire survey is used to gather data. The survey is conducted from mid-August in 2013 to early September in 2013. A list of companies is built by using the directory of Tokyo Shoko Research in 2011. 1008 companies in Akita prefecture are selected. Akita prefecture is located at the northern part of Japan. It takes about 10 hours by car from Tokyo (Figure 3). The questionnaire is sent to 1008 persons in charge of business planning or information system. 303 complete sets of valid responses including various industry types are received.

Table 2 shows the distribution of Industry Type. Manufacturing industry has the largest number of sample size (N＝98), followed by construction (N＝73), and wholesale and retail (N＝57).

Table 3 shows the distribution of company size. Most of the companies in the sample are categorized into the employee size is below 300 employees and the annual sales size is below five billion yen. Companies categorized into the employee size is between 20 and 50 and the annual sales size is between 0.5 and 5 billion yen has the largest number in the sample (N＝91).

Figure 3 The Location of Akita Prefecture

Table 2 Distribution of Industry Type (N＝303)

Industry	Frequency
agricultural, forestry and fishing/mining	7
construction	73
manufacturing	98
utilities	2
information and telecommunications	9
transportation	18
wholesale and retail	57
finance and insurance	5
service and others	34

Table 3 Distribution of Company Size (N＝303)

yen(billion) / employees	＜0.5	0.5－5	5－10	10－30	30－50	Total
＜20	6	6				12
20－50	47	91	2	1		141
50－100	16	61	2	2		81
100－300	2	40	8	3		53
300－1000		4	3	4		11
＞＝1000		1		1	3	5
Total	71	203	15	11	3	303

Table 4 Correlation coefficients among the six constructs

	Business environment	ICT strategy	Top leadership	ICT operation	ICT resources	Information system
Business environment	1.00					
ICT strategy	.78	1.00				
Top leadership	.67	.73	1.00			
ICT operation	73	.76	.73	1.00		
ICT resource	.63	.71	.75	.80	1.00	
Information system	.65	.73	.74	.77	.84	1.00

3.2 Measures

The five information system types (backbone system, production and distribution management system, manufacturing management system, information sharing system, and customer relationship management system) are assessed using the following four-point scale:

1: The system is not introduced
2: The system is used in a function
3: The system is used in a company-wide
4: The system is connected with other organizations

To measure the strategic use of ICT enablers constructs, total 30 measurement items are placed in the six enablers constructs. Each item is measured using five-point scales, ranging from 1 = this does not fit the organization to 5 = this strongly fits the organization.

Six factors CFA (confirmatory factor analysis) using maximum-likelihood method, which assumes covariance among six constructs, is conducted. Amos version 18.0.0 of SPSS Inc. is used for the analysis. "The value of factor loading is below 0.6" is often used as criterion for removing the measurement items from the analysis[13]. Two items ("business is operated in unstable competitive environment (env1)" and "Information system is connected with information systems of suppliers and customers by a communication network (info3)") are removed because the factor loading is below 0.6. Appendix A shows the results of six factors CFA.

Table 4 shows the correlation coefficient of the six constructs. All of the values are positive and of sufficient size. This means that the six constructs in measuring strategic use of ICT enablers are valid.

3.3 Data Analysis

This study calculates construct scores by using factor scores coefficients, which is calculated by the six factor CFA (Amos version 18.0.0 of SPSS Inc. is used for the analysis). The calculation method is based on the Toyoda's study[14]. Firstly, the mean deviations of each measurement item (subtract score of each measurement item given by a respondent from average of each measurement item) are calculated. Secondly, the mean deviation is multiplied by the factor scores coefficients. Finally, these values for each IT management construct are aggregated.

4 Results

Figure 4 shows the current ICT use level for each ICT type. More than 50% companies use the backbone system and information sharing system in a company-wide or a beyond company level (Level 3 and 4). About 40% companies do not introduce the customer relationship management system in Akita prefecture. The percentage of the companies using manufacturing management system at level 4 is the lowest (8.56%).

Table 5 shows the differences of strategic use of ICT enablers constructs scores between a company group introducing backbone system and a company group not introducing the system. The results show that all constructs scores in a group introducing backbone system is higher than a group not introducing the system. Differences of top management leadership, IT strategy, and information system constructs scores are comparatively high.

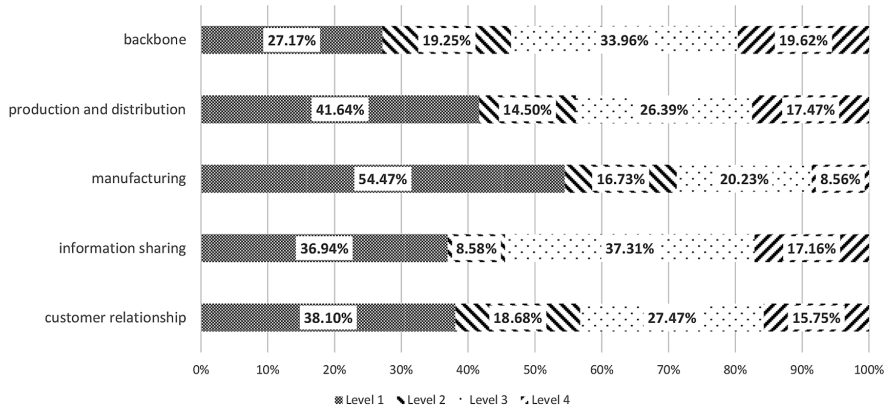

Figure 4 Current ICT Use Level for Each ICT Type

Table 5 Differences in Backbone System

ICT	Enablers Constructs	Construct Scores		Differences
		Introducing (n = 193)	Not introducing (n = 72)	
Backbone system	Business environment	.14	−.28	.42
	ICT strategy	.21	−.39	.60
	Top leadership	.23	−.40	.63
	ICT operation	.15	−.28	.43
	ICT resource	.18	−.27	.45
	Information system	.19	−.34	.53

Table 6 Differences in Production and Distribution Management System

ICT	Enablers Constructs	Construct Scores		Differences
		Introducing (n = 157)	Not introducing (n = 112)	
Production and distribution management system	Business environment	.16	−.16	.32
	ICT strategy	.21	−.20	.41
	Top leadership	.20	−.18	.38
	ICT operation	.16	−.16	.32
	ICT resource	.19	−.17	.36
	Information system	.23	−.21	.44

Table 6 shows the differences of the enablers constructs scores between a company group introducing production and distribution management system and a company group not introducing the system. All constructs scores in a group introducing production and distribution management system is higher than a group not introducing the system. Differences of the information system construct score has the highest number, followed by ICT strategy and top management leadership constructs.

Table 7 shows the differences of the enablers constructs scores between a company group introducing manufacturing management system and a company group not introducing the system. Although all constructs scores in a group introducing manufacturing management system is higher than a group not introducing the system, the differences between the groups are low compared with the other systems. Differences of top management leadership, IT strategy, and information system constructs scores are comparatively high.

Table 8 shows the differences of the enablers constructs scores between a company group introducing information sharing system and a company group not introducing the system. All constructs scores in a group introducing information sharing system is higher than a group not intro-

Table 7 Differences in Manufacturing Management System

ICT	Enablers Constructs	Construct Scores		Differences
		Introducing (n = 116)	Not introducing (n = 140)	
Manufacturing management system	Business environment	.15	−.07	.22
	ICT strategy	.21	−.11	.32
	Top leadership	.20	−.08	.28
	ICT operation	.13	−.06	.19
	ICT resource	.17	−.07	.24
	Information system	.22	−.10	.32

Table 8 Differences in Information Sharing System

ICT	Enablers Constructs	Construct Scores		Differences
		Introducing (n = 169)	Not introducing (n = 99)	
Information sharing system	Business environment	.20	−.25	.45
	ICT strategy	.31	−.40	.71
	Top leadership	.26	−.36	.62
	ICT operation	.22	−.29	.51
	ICT resource	.24	−.31	.55
	Information system	.28	−.35	.63

Table 9 Differences in Customer Relationship Management System

ICT	Enablers Constructs	Construct Scores		Differences
		Introducing (n = 169)	Not introducing (n = 104)	
Customer relationship management system	Business environment	.17	−.18	.35
	ICT strategy	.25	−.30	.55
	Top leadership	.26	−.33	.59
	ICT operation	.16	−.18	.34
	ICT resource	.18	−.19	.37
	Information system	.24	−.28	.52

Table 10 Differences in Backbone System Scope

ICT	Enablers Constructs	Construct Scores of each scope level			
		Level 2 (n = 51)	Level 3 (n = 90)	Level 4 (n = 52)	Differences (Level 3 and 4)
Backbone system	Business environment	.07	.14	.22	.08
	ICT strategy	.09	.14	.45	.31
	Top leadership	.15	.23	.31	.08
	ICT operation	.08	.14	.26	.12
	ICT resource	.09	.15	.32	.17
	Information system	.08	.13	.39	.26

ducing the system. Differences of the ICT strategy construct score has the highest number, followed by information system and top management leadership constructs.

Table 9 shows the differences of the enablers constructs scores between a company group introducing customer relationship management system and a company group not introducing the system. Similarly, all constructs scores in a group introducing customer relationship management system is higher than a group not introducing the system. Differences of top management leadership, ICT strategy, and information system constructs scores are comparatively high.

Table 10 shows the differences of the enablers constructs scores among IT use scope for backbone system. As explained in Chapter 2, level 2 means IT is used within a function, level 3 is IT is used in company-wide, and level 4 means IT is connected with other organizations. The enablers constructs scores increase with the expansion of ICT scope. Differences of ICT strategy and information system constructs scores between level 3 and 4 are comparatively high.

In production and distribution management

Table 11 Differences in Production and Distribution Management System Scope

ICT	Enablers Constructs	Construct Scores of each scope level			
		Level 2 (n = 39)	Level 3 (n = 71)	Level 4 (n = 47)	Differences (Level 3 and 4)
Production and distribution management system	Business environment	.07	.17	.24	.07
	ICT strategy	.12	.17	.35	.18
	Top leadership	−.02	.24	.32	.08
	ICT operation	.05	.15	.27	.12
	ICT resource	.02	.21	.31	.10
	Information system	.08	.20	.39	.19

Table 12 Differences in Manufacturing Management System Scope

ICT	Enablers Constructs	Construct Scores of each scope level			
		Level 2 (n = 43)	Level 3 (n = 52)	Level 4 (n = 22)	Differences (Level 3 and 4)
Manufacturing management system	Business environment	.12	.17	.15	−.02
	ICT strategy	.15	.25	.25	.00
	Top leadership	.20	.24	.09	−.15
	ICT operation	.05	.22	.10	−.12
	ICT resource	.04	.26	.24	−.02
	Information system	.15	.24	.30	.06

Table 13 Differences in Information Sharing System Scope

ICT	Enablers Constructs	Construct Scores of each scope level			
		Level 2 (n = 23)	Level 3 (n = 100)	Level 4 (n = 46)	Differences (Level 3 and 4)
Information sharing system	Business environment	.12	.17	.32	.15
	ICT strategy	.28	.25	.45	.20
	Top leadership	.12	.19	.49	.30
	ICT operation	.17	.20	.28	.08
	ICT resource	.03	.22	.38	.16
	Information system	.14	.23	.47	.24

Table 14 Differences in Customer Relationship Management System Scope

ICT	Enablers Constructs	Construct Scores of each scope level			
		Level 2 (n = 51)	Level 3 (n = 75)	Level 4 (n = 43)	Differences (Level 3 and 4)
Customer relationship management system	Business environment	.12	.18	.19	.01
	ICT strategy	.13	.23	.43	.20
	Top leadership	.15	.25	.41	.16
	ICT operation	−.01	.19	.33	.14
	ICT resource	−.01	.18	.41	.23
	Information system	.07	.23	.41	.21

system and manufacturing management system (Table 11 and 12), the differences of the enablers constructs scores between level 3 and level 4 are low compared with the other systems. In production and distribution management system, the enablers constructs scores increase with the expansion of ICT scope. On the other hand, although the scores in level 3 is higher than the scores in level 2, some strategic use of ICT enablers constructs scores including business environment, top management leadership, ICT operation, and ICT resource in level 4 are lower than the scores in level 3.

Table 13 shows the differences of the enablers constructs scores among IT use scope for information sharing system. The enablers constructs scores increase with the expansion of ICT scope. Difference of the top management leadership constructs score between level 3 and 4 has the largest number, followed by information system and ICT strategy constructs scores.

In the case of customer relationship management system (Table 14), the largest difference of

the scores between level 3 and level 4 is the ICT resource construct score. The differences of the information system and ICT strategy constructs scores are also comparatively high.

5 Discussions

The result of the current ICT use level shows the backbone system and the information sharing system are used in a company-wide level. However, METI[(5)] suggests general ICT management level in SMEs is categorized into Stage 2 (ICT is used in a company function). This implies that the company size in SMEs might affect the ICT use scope. The percentage of level 1 is comparatively high in the production and distribution management system and the manufacturing management system. This implies that the distribution of industry type might affect the result. The customer relationship management system is generally used in level 1 or 2. Customer information might not be sufficiently shared and utilized in a company-wide or interorganizational level.

This study analyzed the differences between a company introducing information system and a company not introducing the system in terms of strategic use of ICT enablers constructs scores. Results show that the construct scores of strategic use of ICT enablers in a company group introducing information system are higher than those of the enablers in a company group not introducing the system. This implies the strategic use of ICT enablers positively affect the introduction of ICT in SMEs in Japan. The results of this study indicates that top management leadership, ICT strategy, and information system enablers might be especially important for ICT introduction in a Japanese local enterprise. To increase the level of these enablers might be critical for SMEs in Japan to encourage the introduction of ICT.

A critical factor to raise the ICT use level in a Japanese SME was also identified in this study. Results show that the construct scores of the strategic use of ICT enablers in level 3 are higher than those of enablers in level 2 in all the information systems. The construct scores of the enablers in level 4 are higher than those of enablers in level 3 in the information systems other than manufacturing management system. This implies that the strategic use of ICT enablers might positively affect ICT use scope in the information systems other than manufacturing management system in a Japanese SME. In the case of the manufacturing management system, the enablers might positively affect ICT use scope in a company's internal ICT use, however, the other factor might be more important than the strategic use of ICT enablers in this study for the connection with other organization. When ICT in a Japanese SME is connected with other organization, the ICT strategy enabler might be critical in the backbone system. In the production and distribution management system, the information system enabler might be important. The importance of top management leadership might be comparatively high in the information sharing system. In the customer relationship management system, the ICT resource enabler might be critical to achieve the connection with other organization.

6 Conclusions and Future Work

This study assessed the current status of ICT use level in the scope perspective and identified a critical factor to increase the level in a Japanese SME. In the backbone system and the information sharing system is used in a company-wide or interorganizational level. Most of SMEs in Akita prefecture are categorized into level 1 or 2 in the customer relationship management system.

The strategic use of ICT enablers affect the ICT use level in a Japanese SME. There are still some limitations in this study. Firstly, this study uses the data collected in 2013 and focuses on only the enterprises in Akita prefecture to assess

status of ICT use level in a Japanese SME. To assess the ICT use level and to investigate the relationship between the strategic use of ICT enablers and the ICT use level in more detail, it is necessary to collect new data and to compare the ICT use level in companies of Akita prefecture with that of other areas. Secondly, this study shows that some construct scores of the enablers in level 4 are lower than that of the enablers in level 3 in manufacturing management system. To identify a factor affecting the connection of manufacturing management system with other organization is required. Finally, influence of other factors such as industry characteristics and company size on ICT use level and the strategic use of ICT enablers needs to be investigated.

Acknowledgments

This work was supported in part by Japan Society for the Promotion of Science (JSPS) Grant-in-Aid for Young Scientists (B) No. 15K17115.

References

(1) Wiseman, C., *Strategy and Computers: Information Systems as Competitive Weapons*, Dow Jones-Irwin, Homewood, IL, USA, 1985.

(2) Cash, Jr. J. I. and Konsynski, B. R. "IS Redraws Competitive Boundaries," *Harvard Business Review*, Vol. 63, No. 2, March-April 1985, pp.134-142.

(3) Ministry of Internal Affairs and Communications, *Information and Communications in Japan White Paper 2015*, July 2015 (*in Japanese*).

(4) METI, *About Results of the Field Survey on Information Processing in 2003: NewsRelease*, (2004) (*In Japanese*).

(5) METI, *Current Study on IT Utilization in a Company by Using IT Management Measurement: Report*, (Feburyary 2011) (*In Japanese*).

(6) Lederer, A. L. and Sethi, V. "The Implementation of Strategic Information Systems Planning Methodologies," *MIS Quarterly*, Vol. 12, No. 3, September 1988, pp.445-461.

(7) Earl, M. J., "Experiences in strategic information systems planning," MIS Quarterly, 17(1): 1-24, 1993.

(8) King, W. R. and Grover, V., "The Strategic Use of Information Resources: An Exploratory Study," IEEE Transactions in Engineering Management, Vol. 38, No. 4, November 1991, pp.293-305.

(9) Neo, B. S., "Factors facilitating the use of information technology for competitive advantage: an exploratory study," Information and Management, 15 (4): 191-201, November 1988.

(10) King, W. R. and Sabherwal, R. "The Factors Affecting Strategic Information Systems Applications," *Information & Management*, Vol. 23, No. 4, 1992, pp.217-235.

(11) Huff, S. L., "Supporting Competitive Strategy with Information Technology," *Business Quarterly*, Autumn 1988, pp.37-39.

(12) Lederer, A. L. and Nath, R. "Making Strategic Information Systems Happen," Academy of Management Executive, Vol. 4 No. 3, 1990, pp.76-83.

(13) Kearns, G. S. and Lederer, A. L., "A Resource-Based View of Strategic IT Alignment: How Knowledge Sharing Creates Competitive Advantage," Decision Sciences, Vol. 34, No. 1, February 2003, pp.1-29.

(14) Toyoda, H., Covariance Structure Analysis (Amos): Structural Equation Modeling, (TokyoTosho, 2007) (*In Japanese*).

Appendix A The Result of Six Factors Confirmatory Factor Analysis

construct	items	Factor loadings
Business environment	Pressure to gain competitive advantage against competitor is high	.78
	It is possible to develop an IT plan without influence of a supplier, a parent company, and a customer	.69
	Relationship with a supplier and a customer is close	.81
	It is easy to find and to do business with IT vendors which support IT utilization in a company	.69
ICT strategy	IT policy including technology and the utilization is closely connected with competitive strategy implementation	.81
	Competitive strategy and an action plan for dealing with competition are defined	.84
	Medium and long term plan or vision related to IT development and utilization exists	.84
	Competitive strategy includes a plan pertaining to relationship with a supplier or a customer	.87
	IT strategy includes a plan pertaining to relationship with a supplier or a customer	.86
Top management leadership	The person in charge of IT is concerned in business planning	.80
	A business manager is concerned in IT planning	.89
	A business manager communicates with the person in charge of IT	.94
	Top management leadership for IT utilization exists	.85
	Most of employees are used to dealing with IT	.60
ICToperation	Employees' resistance against IT utilization is not strong	.68
	A new IT development and utilization is suggested by employees and the person in charge of IT	.72
	Awareness of active IT utilization is strong	.81
	Motivation for competition is high	.75
	A company has risk-taking culture	.64
ICT resource	Cost for a new IT development and operation is ensured	.73
	Time for developing and learning a new IT is ensured	.76
	The person in charge of IT is concerned about gaining competitive advantage	.83
	Employees with high IT skills for IT planning and development exists in a company	.82
	Employees with technical knowledge for IT operation and maintenance exist in a company	.79
Information System	Existing information system is gradually improved	.82
	User-friendly information system is used	.84
	Information system able to respond flexibly to business needs is used	.68
	Unique information system differing from competitors is used	.64