

A Study on the Presence of the Information Management Division and its Effect on the Digital Divide among Different Regions of Korea

Woo-seok Park, Cheul Rhee

Abstract With the confirmation of the Free Trade Agreement (FTA) and as cheap foreign agricultural products are beginning to be freely distributed in Korea, the government has taken a greater interest in securing the competitiveness of domestic agriculture. Accordingly, the Korean government has presented plans to advance the interests of 'small but strong farmers' and secure their competitiveness in line with the agricultural conditions in Korea. The government also announced that it will focus on leading these efforts in rural areas. The main thrust of this plan to support 'small but strong farmers' focuses on utilizing advanced peripheral technologies such as IT and BT; however, there are only a few Information Management Division centers currently operating across the nation, and these are mainly in the IT-related divisions of the Agricultural Research and Extension Services and

Agricultural Technology Centers. Therefore, in this study, we used the responses from a survey of farmers to identify regional differences in informatization levels and the digital divide among 'small but strong farmers' according to the presence or absence of an Information Management Division center. As a result, we found that the 'small but strong farmers' in regions with an active Information Management Division center received more IT services and had a higher level of informatization. Thus, to increase the use of IT-related peripheral technology by these 'small but strong farmers', it is important to maintain or increase the number of Information Management Division centers.

Keywords Information Management Division, digital divide, informatization level, 'small but strong farmer'

1 Introduction

The size of farms in the rural regions of Korea, in which small farms occupying less than 1 ha account for 76.7% of the overall agricultural operations, is very small when compared with those of other countries (Rural Development Administration, Extension Planning Division, 2011). Given these size limitations, the most effective strategy to ensure competitiveness in the Korean agricultural sector is to strengthen the competitiveness of our agricultural technologies (Sang-dae Lee & Kwon-jeep Kim, 2011). Therefore, the Rural Development Administration announced the 'small but strong farmer' development program to improve the capabilities of Korean agricultural operations with size limitations and produced a plan to support the development of 100,000 'small but strong farmers' by the year 2015. The essential content of this 'small but strong farmer' development is to make farmers capable of utilizing information technology effectively in farming and agricultural management so that they have access to knowledge that is relevant to the solutions to various agricultural problems. Although Information Management Divisions perform the most essential role in expanding the informatization abilities of these farmers, there are currently only approximately 15% of the original Information Management Division centers remaining nationwide; the number of these centers has gradually decreased as they have been closed or integrated into provincial Agricultural Research and Extension Services or city and county Agricultural Technology Centers. Therefore, in this study, we compare and analyze regional informatization levels from multiple angles to evaluate possible differences in the performance of informatization support for local farmers in relation to the presence or absence of an

W. S. Park · C. Rhee(✉)
Department of e-business School of Business Administration
Ajou University, South Korea
e-mail : crhee@ajou.ac.kr
Phone : +82-31-219-3640

W. S. Park
e-mail : youth18@ajou.ac.kr
Phone : +82-31-219-3627

Information Management Division center in the area, and in this context, we demonstrate a need for the presence of an Information Management Division.

2 Definition of Terms and the Evaluating Indicators

2.1 Information Management Divisions and the ‘Small But Strong Farmer’

Information Management Divisions, which specialize in the development of informatization and IT skills for farmers, consist of departments internal to either provincial Agricultural Research and Extension Services or city and county Agricultural Technology Centers, which are agencies founded by local governments to disseminate agricultural technology and information.

‘Small but strong farmer’ is a term that combines ‘small farmer’, representing the characteristic of Korean farms as small in comparison with the sizes of farms in rival countries, and ‘strong farmer’, which implies small-scale agricultural operations that continuously achieve their management goals by using innovative capabilities such as creating value for customers and securing a customer base (Rural Development Administration, Extension Planning Division, 2011).

2.2 Performance Evaluation and Comparison

To compare the performance of various informatization support methods, first, we must determine whether a digital divide exists between two regions. A digital divide is defined herein as a difference in information competence that impacts socioeconomic activities between the classes and refers not only to differences in the opportunity and the means to access information but also to differences in the ability to use the obtained information and generate useful information (Mi-ok Shim & Hwa-nim Kim, 2001). In this study, we compared the digital divide between two regions, excluding the components related to the opportunity and the means to access information, which are outside the scope of this work.

2.3 Evaluating Indicators for the Informatization Level of the ‘Small But Strong Farmer’

The conceptual framework for developing a questionnaire to evaluate the informatization levels of ‘small but strong farmers’ considered four major aspects. First, to evaluate business performance and the extent of its improvement due to the informatization project, we utilized the measurement factors and the key measurement indicators of Kaplan and Norton’s (2001) business performance and the balances scorecards (BSCs) for the financial perspective, the customer perspective, the internal process, and the learning and growth process.

Table 1 Measurement Tool for Support Performance: Informatization Level.

Classification	BSC Perspectives	Key Measurement Factors	Key Measurement Indicators	Tool (References)	
Support Performance: Informatization Level	Learning & Growth Process	Informatization Training	Level of Informatization Training	BSC (Balanced scorecard) Measurement Tool	
			Utilization of Training Information		
			Satisfaction		
	Internal Process	Utilization of Information	Distribution		Production Efficiency
					Production Quantity
		Distribution	Distribution Efficiency		
			Inventory Level		
			Order Fulfillment Rate		
	Customer	Customer Care	Advertising and Other Effects		New Customers
					Management of Customer Relations
		Advertising and Other Effects	Transaction Volume		
			Product Promotion		
Financial	Business Management		Asset Management		
			Return on Investment		

Second, the measurement indicators previously used by Byoung-ho Jun, Pil-koo Han, and Byung-goo Kang (2006) to evaluate the performance of informatization support were reorganized to fit the characteristics of this study;

these measures consisted of e-commerce-related benchmarks and indicators such as the detailed factors for measurement.

Table 2 Measurement Tools for Support Performance: Application of Informatization.

Classification	Key Measurement Factors	Key Measurement Indicators	Tool (References)
Support Performance Application of Informatization	E-Commerce	Use of E-Commerce	Massetti&Zmud, 1996; McGowan&Madey, 1998; Suk-in Lee, 1998; Gwang-ho Jun, 2002; Ki-bong Lee, 2002; Jae-wookIm, 2003
		Method of Using E-Commerce	
		E-Commerce Transaction Volume	
		E-Commerce Sales	

Third, as a measurement of IT support satisfaction related to the provision of IT services, the measurement indicators used in the study by Jung-hyeon Yoon (2007) and the factors and indicators related to activities intended to provide information, ensure its reliability, and maintain in-

formation systems were selected as the detailed factors used to identify the characteristics of the farmers and user satisfaction with the support provided by the Information Management Division.

Table 3 Measurement Tools for IT Support Satisfaction.

Classification	Key Measurement Factors	Key Measurement Indicators	Tool (References)
IT Support Satisfaction	Activities to Provide Information	Relevancy of Information	Delone& Mclean, 1992; Mirami&King, 1994
		Accuracy of Information	
		Reliability of Information	
	Activities to Provide Information Reliability	Service Performance of the Support Personnel	Parasuraman, Zeithaml& Berry, 1988
Activities to Provide System Maintenance	IT Infrastructure Support	Karahanna& Straub, 1999; Thong, Hong & Tam, 2000	

Fourth, based on interviews with the staff at the Knowledge & Information Office of the Rural Development Administration, we organized the contents of

the ‘small but strong farmer’ interviews related to the various aspects of providing information services.

Table 4 Measurement Tool for Aspects of Information Services Provision.

Classification	Key Measurement Factors	Key Measurement Indicators	Measurement Method
Aspect of Providing Information Services	Informatization Training	Highly Applicable Educational Content	Interview
		Most Helpful Training	
		Lectures by External Instructors	

Aspect of Providing Information Services	Utilization of Information	Major Areas of Application	Interview
		Difficulties in Utilizing Information	
	Customer Care and E-Commerce	Blog or Social Networking Service (SNS) Use	
	Direction of Future Development	Expected Components of Informatization	
		Measures to Improve the Quality of Information	
		Most Appropriate Institution for Training	
		Expectations	
Information Service with Smart Phones			

3 Research Methodology

The detailed items in the questionnaire distributed to the 'small but strong farmers' were based on the above four types of conceptual frameworks for the evaluation of their informatization level, and through interviews with the farmers and researchers at the Knowledge & Information Office of the Rural Development Administration, we derived new items that were customized for the current study.

This study enrolled 67 subjects based on the recommendations of the Rural Development Administration for

30 'small but strong farmers' in regions with an Information Management Division center and 37 'small but strong farmers' in regions without an Information Management Division. The study results are based on the responses of 57 farmers because 10 farmers declined to respond. There were 27 respondents from regions with an Information Management Division, which is the independent variable in this study, and 30 respondents come from regions without an Information Management Division. The demographic characteristics of the respondents are listed in Table 5.

Table 5 Demographic Characteristics of the Respondents.

Item	Classification	'Small But Strong Farmers' in Regions WITH an Information Management Division		'Small But Strong Farmers' in Regions WITHOUT an Information Management Division	
		Frequency	Percentage (%)	Frequency	Percentage (%)
Age of the Owner	30-39 years old	4	15	0	0
	40-49 years old	10	37	14	47
	50-59 years old	10	37	8	27
	Over 60 years old	3	11	5	17
Agricultural Experience	1-9 years	7	26	6	20
	10-19 years	8	30	11	37
	20-29 years	8	30	4	13
	Over 30 years	3	11	6	20
Cultivation Area	Under 1000(sq.m)	6	22	6	21
	1000-2000(sq.m)	6	22	14	48
	2000-3000(sq.m)	2	7	6	21
	Over 3000(sq.m)	12	44	3	10

4 Comparison of Informatization Levels for Each Diagnostic Area

4.1 Information Utilization

In the area of information utilization, there were differ-

ences in the degree of information utilization and the use of SNS and in the degree of the helpfulness of information training between the ‘small but strong farmers’ in regions with an Information Management Division and the ‘small but strong farmers’ in regions without an Information Management Division.

Table 6 Differences in Information Utilization.

Information Utilization		‘Small But Strong Farmers’ in Regions WITH an Information Management Division	‘Small But Strong Farmers’ in Regions WITHOUT an Information Management Division
Degree of Information Utilization		High	Average
Use of (SNS)	Blog	100%	93%
	Twitter	63%	60%
	Facebook	67%	47%
Problems in Information Utilization		Difficulties in investing time in informatization training	
Main Help Center		City or County Agricultural Technology Centers	
Contribution of City or County’s Agricultural Technology Centers to Improving the Level of Information Utilization		Very high	

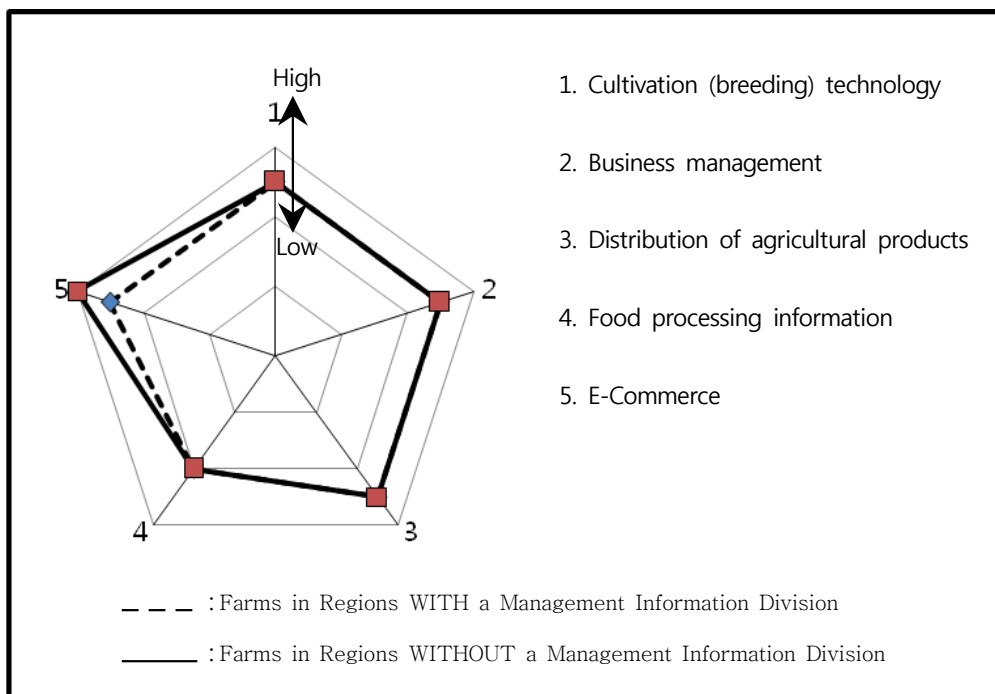


Fig. 1 Differences in the Degree of Helpfulness of Information Training.

Comparing the present and future contributions ranked according to information utilization, both regions responded that e-commerce presently provides the most assistance,

whereas food- processing information provides the least help. For the future, however, the ‘small but strong farmers’ in regions with an Information Management Division

considered the food processing information to be very important, after e-commerce, but the 'small but strong farmers' in regions without an Information Management Division considered the business management information second in importance behind e-commerce.

4.2 Farm Management Software

In the area of farm management software, a large number of 'small but strong farmers' (65%) in regions with an Information Management Division responded that they currently use farm management software, whereas a relatively smaller number of 'small but strong farmers' (49%) in regions without an Information Management Division responded that they currently use management software. In both regions, a lack of knowledge of the relevant program was the most common reason for not using farm manage-

ment software, and farmers in both regions agreed regarding the future needs and the details of the intended use of such software (transaction management was the most important, whereas financial management had the lowest importance). Moreover, farmers in both regions responded that they require farm management software that is compatible with smart phones because they cannot access a computer frequently due to their work patterns at the farms.

4.3 E-Commerce for Agricultural Products

The proportions of homepage operations in both regions were similar at approximately 70%, but the farmers in the two regions responded differently about the difficulties or their satisfaction regarding the role of technology centers for the vitalization of e-commerce.

Table 7 Differences in E-Commerce for Agricultural Products.

Classification	'Small But Strong Farmers' in Regions WITH an Information Management Division	'Small But Strong Farmers' in Regions WITHOUT an Information Management Division
Business Performance	Facilitated performance improvement in both regions	
Difficulties	Difficulty in modifying information content	Lack of products for sale throughout the year
Role of City or County Agricultural Technology Centers in the Vitalization of E-Commerce	Highly Sufficient	Average

4.4 Agricultural Informatization Training

The experience of informatization training was similar for the respondents in both regions, with an average experi-

ence of 18 encounters in the past three years, but several differences were observed in the responses to individual questions.

Table 8 Differences in Agricultural Informatization Training.

Classification	'Small But Strong Farmers' in Regions WITH an Information Management Division	'Small But Strong Farmers' in Regions WITHOUT an Information Management Division
Most Beneficial Training	E-Business Training	Blog, Marketing Training
Level of Training Difficulty	>	
Satisfaction in Training	>	
Supervising Authorities	City or County Agricultural Technology Centers	
Diversity of Supervising Authorities	Many (Korea Information Center for Agriculture, Forestry & Fisheries, Commissioned Training, Rural Development Administration, etc.)	Few (Only City or County Agricultural Technology Centers)

The 'small but strong farmers' in regions with an Information Management Division expressed a stronger need for the strengthening of rational, agricultural decision-making methods in future training.

5 Conclusions and Limitations

To compare the performance of informatization support for the 'small but strong farmers' in regions with an Information Management Division and for those in regions without an Information Management Division, we surveyed farmers in four areas using the measurement indicators described above and collected expert opinions. As a result, five types of differences were found.

First, information utilization by the 'small but strong farmers' in regions with an Information Management Division is higher than in those in which one is not present. Second, there was a similar level of the five main types of training conducted by the city and county Agricultural Technology Centers (i.e., cultivation and breeding technology, business management, the distribution of agricultural products, food processing information, and e-commerce), but the farmers in regions with an Information Management Division receive more assistance in the area of e-commerce. Third, farm management software is more often used by the 'small but strong farmers' in regions with an Information Management Division. Fourth, the reported level of difficulty for informatization training is higher for the 'small but strong farmers' in regions with an Information Management Division, but their satisfaction with the training is also higher. Fifth, the authorities supervising the informatization training are more diverse for the 'small but strong farmers' in regions with an Information Management Division.

Regarding the last point, one reason for this difference may be that the city or county Agricultural Technology Centers in the regions with an Information Management Division invite more supervising authorities to present complex and helpful new information to the farmers. Such proactive activities may lead to the provision of supplemental information that is not typically offered by the city or county Agricultural Technology Centers themselves, with the result that farmers in the region with access to such information may use SNS media more often. Furthermore, as reported in a prior study by Yi-jong Suh (2000), the means of accessing and utilizing information in an informatized society that is formed by the use of information technology is related to the media and the network used. Thus, we expect to find differences in the de-

gree of information utilization between those farmers who use such media frequently and those who do not. In this case, a digital divide would occur. In addition, having more new information could resolve the issue of unfamiliarity with the relevant software, which was the most commonly cited cause among the surveyed farmers for not using farm management software. This difference can be interpreted to have a direct impact on increasing the frequency of farm management software use by farmers in the regions with Information Management Division centers. However, the positive activities of an Information Management Division such as external lectures still tend to be limited in IT technologies related to e-commerce. Therefore, with regards to the degree of helpfulness due to training sessions, we can interpret that the 'small but strong farmers' in regions with an Information Management Division and the 'small but strong farmers' in regions without an Information Management Division both feel as if they are getting similar assistance for everything other than e-commerce. Together, these five differences led us to conclude that the 'small but strong farmers' in regions with an Information Management Division receive more IT services, display higher performance following informatization support, and show a high degree of information utilization. Accordingly, the above differences can be used as the basis for the vitalization of informatization management systems. The limitations of this study include the fact that the overall statistical significance was not established because the surveys and interviews were conducted using selected farmers who were referred to us by researchers at the Rural Development Administration. This selection was implemented to improve survey accuracy with a minimal number of participants; however, we are unable to provide a clear reason for the difference in the present and future contribution rankings according to the information utilization. In future studies, the above limitations must be remedied.

References

- Sung-joo Kang. (2006). A Study on the Introduction of the BSC Method to Improve the Performance of Informatization Policies. *Korean Association for Public Administration*, 68-80.
- Rural Development Administration Extension Planning Division. (2011). *Small But Strong Agriculture: The Rural Farmer With A Dream, the Small But Strong Farmer*.
- Yi-jong Suh. (2000). Structuring of the Digital Divide and the Social Problematization. *The Korean Association for Information Society* 2, 68-87.
- Mi-ok Shim & Hwa-nim Kim. (2001). A Study on the Effect of the Women Farmer Information Project. *Journal of the Korean*

- Association of Agricultural Extension 8(1)*, 107-119.
- Jung-hyeon Yoon. (2007). A Study of the Effect on End-User Satisfaction for the End-User Supporting Activities in Information Center. *Journal of the Korean Society for Information Management 24(3)*, 5-19.
- Ki-bong Lee. (2002). A Study on the Utilization of E-Commerce by Small Businesses and its Effectiveness. Master's Dissertation, Korea University.
- Sang-dae Lee, &Kwon-jeep Kim. (2011). The Study on Strategies to Vitalize Local Agricultural Extension Service. Master's Dissertation, Chungnam National University.
- Suk-in Lee. (1998). A Study on the Impact of Electronic Commerce on the Inter-Organizational Partnership. Doctoral Dissertation, Chonnam National University.
- Jae-wookIm. (2002). An Empirical Study on the Implementation and Performance of Internet Electronic Commerce of Korean Trading Firms. Doctoral Dissertation, Korea University.
- Gwang-ho Jun. (2002). A Study of On-line B2B Usage : Classifications, Antecedents, and Outcomes of On-line B2B Usage. Doctoral Dissertation, Korea University.
- Byoung-ho Jun, Pil-koo Han, &Byung-goo Kang. (2006). The Effect of EC Utilization on Business Performance in SMEs(in the point of BSC). *Journal of Information Technology Applications & Management 13(3)*, 99-113.
- Karahanna, E. & Straub, D.W. (1999). The Psychological Origins of Perceived Usefulness and Ease-of-Use. *Information & Management 35(4)*, 237-250.
- Masseti, B., &Zmud, R.W. (1996). Measuring the Extent of EDI Usage in Complex Organizations: Strategies and Illustrative Examples. *MIS Quarterly 20(3)*, 331-345.
- Mcgowan, M.K., &Madedy, G.R. (1998). The Influence of Organizational Structure and Organizational Learning Factors on the Extent of EDI Implementation in U.S. Firms. *Information Resources Management Journal 11(3)*.
- Mirani, R. & King, W.R. (1994). Impacts of End-User and Information Center Characteristics on End-User Computing Support. *J. Manage. Inf. Syst. 11(1)*, 141-166.
- Parasuraman, A., Zeithaml, V.A., & Berry, L.L. (1988). SERVQUAL: A Multiple-Item Scale For Measuring Consumer Perceptions. *Journal of Retailing 64(1)*, 12-40.
- Thong, J.Y.L., Hong, W., & Tam, K.-Y. (2002). Understanding User Acceptance of Digital Libraries: What are the Roles of Interface Characteristics, Organizational Context, and Individual Differences? *International Journal of Human-Computer Studies 57(3)*, 215-242.