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Research Paper

Study on Factors for Improving The Effectiveness Of ERP Within Korea Agricultural Products Processing Center

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ABSTRACT: *ERP implementation issues have been given much attention as the size of Agricultural Products Processing Center (APC) in Korea gets bigger and bigger. The goal of this study is to find the factors that influence the effect of Enterprise Resource Planning (ERP) adoption to help improve the business environment of the ERP users, especially in agricultural industry. This study tries to apply traditional IS theory into agricultural industry. By testing multiple aspects in different stages, the study derives more comprehensive factors that positively influence the adoption of ERP. By conducting a survey, the study observed hands-on ERP operators who work at APC which had previously adopted ERP. The study categorizes independent variables into three stages such as pre-adoption, adoption, and post-adoption. Satisfaction, system utility, work efficiency, professionalism, and standardization are examined as dependent variables. Cronbach's alpha is used to test the reliability of the survey questionnaires in each category and multiple regression analysis is used to derive factors that have an effect on ERP adoption. Discussions on the results of data analysis are made.*

Keywords: *ERP, implementation of ERP, APC, critical success factor*

I. INTRODUCTION

The growing trend of large retail stores in Korea has led the business to take a keen and active interest in Enterprise Resource Planning (ERP) in agricultural businesses. The need of government support on ERP adoption in agricultural industry has also been called on to improve their management process. ERP system allows managers to more effortlessly manage production, logistics, finance, accounting, sales, purchasing and inventory in an integrated process. It enables rapid decision-making by acquiring accurate data in real time. While many agricultural businesses seek to adopt ERP system to have its advantages including simplifying work processes, reducing extra expenses, and enhancing consumer response systems, the elements that are critical to successfully adopt ERP systems were seldom investigated especially in agricultural industry.

Different from other studies, this study focuses on agricultural sector to discover the factors strongly related to the agriculture industry and tries to derive more comprehensive success factors that positively influence the ERP adoption by testing success factors in three different stages—pre-adoption, adoption, and post-adoption. In addition, some of the past studies that investigated the expected effects of ERP adoption in agricultural field were limited to the cases of small-sized agricultural businesses. In this regard, the present study analyzes the Agricultural Products Processing Center (APC)—a free trade agreement (FTA) funded business that has the biggest ERP system in the agricultural field—to fully recognize the success factors in ERP adoption. This study will contribute to the development of agricultural industry in Korea by minimizing the difficulties usually learned by trial and error. In addition, the implications found from this study will be used as a baseline data in government institutions, ERP vendors, consulting firms, and other organizations to further cultivate ERP uses in local agricultural businesses and to vitalize their management system.

II. LITERATURE REVIEW

In the early 1970s, Material Requirements Planning (MRP) was introduced for well-organized production management. In 1980s, given the fast-growing computer science, the MRP II was later developed in 1980s to more effectively manage all resources and materials to reduce costs [6]. In the 1990s, with the growth of information and communications technology (ICT), ERP geared up with new functions—including production control, management support, finance, human resources management, etc.—that MRP II was not

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capable of. Since ERP systems' introduction in Korea, ERP systems have emerged as an important part of cost savings for the accurate accounting of stored produce since agricultural products have perishable characteristics.

To invigorate Korean economy in agricultural sector, the importance of ERP systems has begun to make a mark as a tool to enhance the management efficiency of overall agricultural businesses. Despite the large efforts by agricultural industry and government agencies to successfully implement ERP systems, the results have not been as fruitful as their expectation. This study aims to analyze Critical Success Factors (CSFs) in different ERP implementation stages to fully recognize the key issues related to ERP system adoption in Korean agricultural industry.

Analyzing segmentalized CSFs in each different stage is meaningful in that it helps to better examine CSFs in line with the diverse conditions and work environments that different companies can face while adopting ERP systems. Yoo and Yang's study on CSF in ERP system implementation classified four different introduction phases: Planning and Introducing ERP systems, Analyzing and Developing ERP systems, Establishing and Applying ERP systems, and Utilizing ERP systems [3]. We categorized the independent variables that affect ERP adoption are into three different levels: (1) pre-implementation stage, (2) implementation stage, and (3) post-implementation stage based on the analysis of our previous case study results.

Critical success factors are commonly known as the factors that must go well to ensure success for a manager or an organization, including issues vital to an organization's current operating activities and to its future success. CSFs often represent those managerial areas that must be given special and continual attention to bring about high performance [1]. To examine the CSFs from the management perspective, some of Somers and Nelson's comprehensive list of 22 CSFs for project/system implementation were selected as independent variables [8]. Several independent variables including existing system checkup and various operational test which were used in the previous study of Yoo and Yang were adopted in this study to collect more comprehensive information. Full list of the independent variables used in the survey method are listed in the table below:

Table 1. Critical Success Factors (CSFs) used in the study

		reference
Pre-Implementation	Existing system checkup	Yoo and Yang (2002), Cameron & Meyer (1998)
	IT infrastructure asset	
	Clear goals and objectives	
	Top management support	
	Practical hands-on use by employees	
	Sharing knowledge	
Implementation	Top management support	Yoo and Yang (2002), Jang, Seo and Lee (2000), Hwang, Nam and Han (1999)
	Construction of TFT	
	Participation of practitioners	
	Efficient communication	
	Project team competence	
	ERP customization	
	Various prior test	
Post-Implementation	Top management support	Yoo and Yang (2002), Kim, Jung and Lee (1999)
	training and education	
	Employee reward	
	Business process re-engineering	

III. METHODOLOGY

3.1 Data

The current study analyzed the Survey data of 31 managers. The managers were from the 7 different APCs which adopted ERP. The managers were highly related to ERP usage in each APC. The survey was conducted in written form. Managers were asked to answer the questions in 5 degree from highly disagree to highly agree. Table 2 shows the Descriptive statistics f the survey result.

Table 2. Descriptive statistics of the survey result

		CA	Mean	Min.	Max.	S.D
Pre-Implementation	Existing system checkup	.693	3.06	1.5	5	.854
	IT infrastructure asset	.779	2.87	2	3.5	.428
	Clear goals and objectives	.915	3.45	2	5	.810
	Top management support	.946	3.55	2	5	.768
	Practical hands-on use by employees	.901	3.42	2	5	.786
	Sharing knowledge	.841	3.23	2	5	.681

Implementation	Top management support	.972	3.53	2	5	.605
	Construction of TFT	.890	2.98	2	5	.612
	Participation of practitioners	.816	3.6	2	5	.638
	Efficient communication	.843	3.42	2	5	.797
	Project team competence	.902	3.51	2	5	.706
	ERP customization	.621	3.37	2.5	4	.532
	Various prior test	.911	3.37	2	5	.806
Post-Implementation	Top management support	.634	3.31	2	4	.573
	training and education	.700	2.89	1	3.5	.495
	Employee reward	.659	2.55	1.5	4	.582
	Business process re-engineering	.911	3.35	2	5	.709

IV. DATA ANALYSIS AND RESULT

Since our model is analyzed by survey data, Cronbach's alpha is used to test the reliability of the survey questionnaires in each category. All constructs' value of Cronbach's alpha were above 0.5. Therefore we can consider that all constructs are valid. Multiple regression analysis is used to derive factors that have an effect on ERP adoption. Each values of constructs are used with mean value.

4.1 Factors affecting on ERP adoption

We found that in each stages there are different important factors. In pre-implementation stage, Setting clear goals and objectives and support from top management are significantly affecting satisfaction of ERP system (Table 3). Second, project team competence and level of ERP customization are the success factor during implementation stage (Table 4). In post-implementation stage, top management support consistent business process re-engineering are the key to succeed (Table 5).

Table 3. Pre-Implementation

	Beta	**Standardized Beta**	**p-value**	**VIF**
Intercept	-.668		.724	
Age	**1.411**	**.686**	**.003*** **	**2.407**
Acquisition of license	.084	.033	.863	2.187
Position	-.001	-.001	.997	3.535
Existing system checkup	-.004	-.004	.985	3.492
IT infrastructure asset	.203	.113	.447	1.307
Clear goals and objectives	**.479**	**.505**	**.058***	**3.865**
Top management support	**.724**	**.723**	**.009*** **	**3.817**
Practical hands-on use by employees	-.054	-.056	.794	2.733
Sharing knowledge	-.303	-.268	.276	3.554

df = 30, R2 = .884, R2(adj.) = .795, F = 9.939, p-value = 0.000

Table 4. Implementation

	Beta	**Standardized Beta**	**p-value**	**VIF**
Intercept	-.974		.342	
Age	.245	.119	.436	3.262
Acquisition of license	-.254	-.099	.378	1.755
Position	-.099	-.063	.746	5.323
Top management support	.015	.012	.926	2.319
Construction of TFT	.141	.113	.410	2.597
Participation of practitioners	-.163	-.135	.431	4.112
Efficient communication	.099	.103	.501	3.282
Project team competence	**.501**	**.460**	**.025** **	**5.121**
ERP customization	**.570**	**.394**	**.008*** **	**2.566**
Various prior test	.145	.152	.239	2.272

df = 30, R2 = .710, R2(adj.) = .517, F= 3.680, p-value = 0.006

Table 5. Post- Implementation

	Beta	**Standardized Beta**	**p-value**	**VIF**
Intercept	.286		.788	
Age	**1.000**	**.486**	**.005** **	**1.817**
Acquisition of license	-.036	-.014	.927	1.823
Position	-.041	-.026	.888	2.623
Top management support	**.399**	**.297**	**.050***	**1.590**

training and education	.113	.073	.598	1.456
Employee reward	-.336	-.255	.148	2.240
Business process re-engineering	**.536**	**.494**	**.003*****	**1.691**

df = 30, R2 = .745, R2(adj.) = .618, F = 5.846, p-value = 0.000

V. DISCUSSIONS

Our interest in investigating the factors that influence the satisfaction of ERP was triggered by two facets of the ERP adoption process: The lack of studies, first, in agricultural sector and, second, considering multiple aspects in different stages of adoption. This study suggests to managers that before the implementation, managers planning to adopt ERP system to APC should not only specify the objectives of the adoption but also expand the knowledge and increase support from top management. During the implementation, it is need to establish thorough criteria to assess the project team in order to successfully proceed the implementation. In addition, because ERP customization is one of success factor, evaluating each of the own APC and classifying APC is important. After implementation, emphasis of the necessity of the ERP and the reward system by top management is highly recommended. Also, consistent maintenance to optimize ERP process is needed

Some policies are suggested as follows to improve the effectiveness of accepting ERP. First, business plan package which includes ISP consulting and education of employees of ERP is needed. Second, self-diagnosis and application of ERP manual need to be developed. Through these reinforcement of policies, many APCs can benefit by utilizing ERP. The limitation of this study is that only 7 APC was covered. According to Korea Agro-Fisheries & Food Trade Corporation, there are 396 APCs in Korea. Therefore, future study that contains more representative sample is needed.

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