

# EVALUATING THE EFFECTIVENESS OF INTEGRATED ACCOUNTING INFORMATION SYSTEMS (AIS) IN ERP ENVIRONMENT OF VIETNAMESE GARMENT COMPANIES

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(Received: November 03, 2018; Revised: January 17, 2019; Accepted: March 4, 2019)

## ABSTRACT

Identifying factors defining the effectiveness of integrated AIS in Enterprise Resource Planning (ERP) environment is really a challenging task. In our research, the effectiveness of integrated AIS in ERP is presented in the form of Balanced Scorecard (BSC) model. This study analyzes data collected from 178 Vietnamese garment companies with AIS in ERP environment. Then, Cronbach's Alpha test and exploratory factor analysis (EFA) are conducted to assess the reliability of variables. The result identifies 28 variables from Vietnamese garment companies' managers view grouped into 4 dimensional constructs of BSC model that define the effectiveness of integrated AIS in ERP environment. The conclusion on garment companies' AIS evaluation factors paves the way for future research on other Vietnamese industries' AIS evaluation in ERP environment.

**Keywords:** AIS effectiveness; AIS in garment; AIS-ERP in garment.

## 1. Introduction

While global business environment is more dynamic and complex, the level of competition among companies is becoming fiercer (Chanopas et al., 2006). Garment companies in Vietnam are not an exception. In the national development plan for the period between 2020 and 2030, garment and textile sector is classified as a key sector in Vietnam (VIRAC, 2018). Garment companies are currently facing various problems including difficulties in supporting information for decision-making, unreasonable use of economic resources and limited supply of input materials. The difficulties reduce their competitiveness and ability of international integration. On the non-financial aspect, information system (IS) in IT 4.0 environment is considered a tool to assist in improving the

competitiveness of garment companies (Huang et al., 2006; Lee et al., 2014). Unlike the 1990s, companies became more cautious in investing in IS and started to consider the benefits of ISs to their business goals during the 2000s (Carr, 2003). The benefits of these ISs cannot be adequately estimated because they cannot be measured in terms of qualitative and non-financial values generated by such information systems (Farbey et al., 1992). In the context of integrated information system – the ERP system application for large garment companies, it is necessary to conduct the effectiveness evaluation of integrated AIS in ERP environment. The AIS effectiveness is one of the indicators for added value that the information system contributes to an organization by helping the organization achieves its goals (Greenspan, 2000;

Santhanam and Hartono, 2003). Obtaining the evaluation result of AIS effectiveness helps to push the integrated AIS in ERP environment implementation by Vietnamese garment companies' managers.

This article constructs the model for evaluating the effectiveness of integrated AIS in ERP environment based on Balanced Scorecard (BSC) theory. By 2010, no research in Vietnam has applied the BSC theory to develop a model for evaluating the effectiveness of integrated AIS in ERP environment among Vietnamese garment companies. This paper has two objectives:

- 1) Evaluate the effectiveness of integrated AIS in ERP environment among Vietnamese garment companies; and
- 2) Identify factors defining the effectiveness of integrated AIS in ERP environment of Vietnamese garment companies.

The remainder of this paper is organized into four sections. First, literature review section looks at prior research that informs this study. Next, methodology section shows research model and measurement design. Then, third section presents the research findings. Finally, there will be conclusions and some recommendations for future studies.

## 2. Literature review

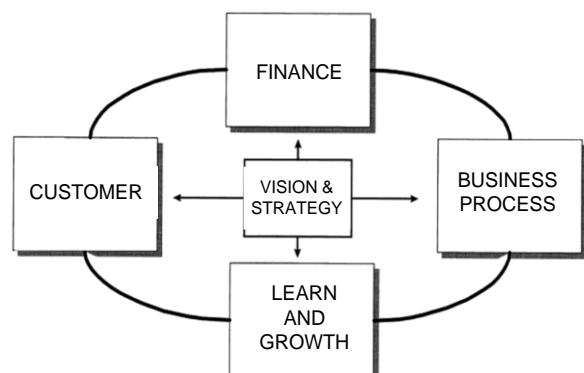
### 2.1. International research

The convergence of financial and management accounting in computer-based accounting environment is a striking finding discussed by Taipaleenmäki and Ikäheimo (2013). This disclosure has appealed much attention from researchers interested in AIS under the influence of Information Technology (IT). With the increasing impact of technology, the boundaries between technology and empirical behaviors from financial accounting and management accounting could be blurred when assessing the effectiveness of the entire AIS at organizational level. Lina and Edita (2014) continued to announce the impact of IT in the post-2010 period on the relevance of AIS

and business environment. In their research, they used qualitative methods to investigate the influences of AIS development from the business environment in the context of IT's assistance. Coyne et al (2017) published some skills needed by accountants to be able to handle ERP-accounting system. The result suggested that accountants should be on the standpoint of the managers to control and exploit accounting data from ERP environment. One of the reasons cited by Coyne et al (2017) was that users could pay more attention to exploit strategic accounting data if they have the same viewpoints with management board. These recently updated research helps the author recognize that the assessment of the effectiveness of integrated AIS in the ERP environment should be carried out at the entire company level and from perspective of its managers.

Presently, the measurement of IT impacts on the performance of enterprises should be considered in financial and non-financial aspects (Petter et al., 2012). This paper, therefore, focuses on *evaluating the effectiveness of integrated AIS in ERP environment under BSC model* from perspective of Vietnamese garment companies' managers.

The BSC theory was introduced by Kaplan and Norton (1992) with 4 theoretical constructs comprising of finance, customer, business process and learn and growth (Figure 1).



**Figure 1.** Balanced Score Card (BSC) theoretical model

BSC theory forms a foundation for building measurement scale for various managerial research targeting on business performance. The IS value depends on how IS assists enterprises in achieving their business objectives and implementing their business strategies (Lufman and Brier, 1999). Many IS researchers have applied BSC model to investigate the impact of IS on business organizations.

Researchers across the globe have conducted several studies on application of the BSC model to measure the effectiveness of information systems. Grembergen and Haes (2005) proposed specific criteria for the dimensions of BSC model to measure the effectiveness of Information Systems. Grembergen and Haes' (ibid) proposal indicated the *financial dimension* with criteria for increasing business profits, soaring return on equity, growing sales revenue, reducing operating costs and so on. Whilst the non-financial dimension of this model were delivery support, customer-interacting assistance included in customer dimension; or the norms for production capacity boost, working-process restructuring, support for cooperating with the suppliers for business-process dimension, listed as some examples. Some countries employed BSC models to evaluate information system. For examples, Thailand used BSC model to assess information system in Thai garment companies (Suanmali et al., 2011). Morocco also adopted BSC's criteria to value information system effecting on performance of textile firms (Chriyha et al., 2012). Italy used BSC model to assess the effectiveness of decision support systems in fashion companies (Felice and Petrillo, 2013). For Pakistani garment companies, Maqbool (2015) utilized the four-dimension BSC model to propose additional supply chain dimension to appraise the impact of information system on the entire company. Maqbool recommends that the application of the BSC model in assessing the effectiveness of the system should be widely

validated in other industries of various countries (Maqbool, 2015).

## **2.2. Domestic research**

Up to 2010, there has been no research on application of BSC-theory model for evaluating the effectiveness of information system on Vietnamese economic organizations at company level.

However, there are some interesting facts relating to this issue. There were some workshops held in Vietnam introducing and discussing the application of BSC for corporate management in 2005. Since then, some Vietnamese consulting firms such as Vietnam Marketing and Management Institute, BSC consultancy company - Toppion and so on discovered the potential for applying BSC in the company's evaluation system. Therefore, they invested in implementing training and consulting activities using BSC model. Some Vietnamese companies such as Phu Thai Group, FPT Corporation and Kinh Do Mondelez Company have started applying BSC model. However, initial survey results showed that the application of BSC model for assessing ISs was still vague and unpopular in Vietnamese garment companies. Based on the practical factors, the author acknowledges that the assessment of business's AIS by BSC model has some limitations. A few relevant research are in the themes of organizing, improving and proposing solutions to enhance the use of accounting software for companies. These include research done by Dao (2002), Tran (2007), Nguyen (2011), Nguyen (2012) and a recent study on AIS in ERP environment conducted by Nguyen (2013). Most of previous research has not been specialized in the field of evaluating AIS; particularly, no BSC model has been applied for evaluating AIS *in a specific industry* yet.

After reviewing international and local studies on the issue, we feel the need for researching on evaluation of Information System effectiveness in specific ERP-AIS context. This study, therefore, presents the

BSC-based model and the results of new factors defining the effectiveness of integrated AIS in ERP environment in Vietnamese garment companies.

### 3. Research methodology

Many researchers have proposed guidelines

for building research model including measurement scale for the model (Churchill, 1979; Dunn et al., 1994; Mac Kenzie et al., 2005). Referring to previous guidelines; the author defines step-by-step direction to implement this research (Table 1).

**Table 1**

Research direction summary

Step 1. AIS evaluation in garment companies	Synthesizing studies in relevant to AIS assessment in companies around the world and in Vietnam; mainly garment companies.
Step 2. Research model and observed variables	Cementing the research model based on the BSC theory in assessing AIS in ERP environment for garment companies. Notice: Select measurement criteria under the dimensions of the BSC model from previous studies.
Step 3. Conduct an in-depth interview	Conducting in-depth inquiry with some ERP-AIS experts to develop the survey: assessing the effectiveness of AIS in ERP environment.
Step 4. Conduct a pilot test	Reviewing the questionnaire constructed on the small sample and completing the whole questionnaire.
Step 5. Implement mass survey	Conducting extensive quantitative surveys with garment companies to assess the effectiveness of AIS in the ERP environment.
Step 6. Summarize and analyze data (descriptive study, Cronbach's Alpha testing and EFA analysis)	Aiming to reach two (02) research objectives: 1. Reporting on the evaluation status of effectiveness of integrated AIS in ERP environment among Vietnamese garment companies. 2. Identifying factors defining the effectiveness of integrated AIS in ERP environment of Vietnamese garment companies.

The following sub sections present in detail step-by-step implementation of this research.

#### 3.1. AIS evaluation in garment companies

Business' managers desire to measure the effectiveness of the organization in achieving the goals set by the company. For example, Palvia et al. (1992) studied the impact of strategic information systems on the effectiveness of the organization - the Federal Express Corporation.

A survey conducted by Silk (1998) in the United States reported that up to 60% of US companies performed evaluation of the effectiveness of the information system through the following criteria: quality of information, satisfaction from the users and use of the system. Hoque and Wendy (2000) studied the influence of company's size on the assessment of information systems supporting decision-making. Factors such as total revenue, total

assets and the number of employees represents the size of a business. Larger-scale companies tend to implement assessment of information systems clearly. In New Zealand, Blundell et al. (2003) carried out a survey on 40 large-scale companies to discover how they evaluated the efficiency of computer-based accounting systems. The study applied finance and learn and growth criteria to evaluate the effectiveness of the computer-based accounting system. In the garment field, the evaluation of information system was conducted to assess the supply chain management system of Thailand garment companies (Suanmali et al. 2011), evaluate how information systems affect the performance of Morocco garment companies (Chriyha et al., 2012) and measure the effectiveness of decision support systems for Italian fashion companies (Felice and Petrillo, 2013). Besides, another study also assessed the impact of comprehensive information systems in Pakistan garment companies (Maqbool, 2015).

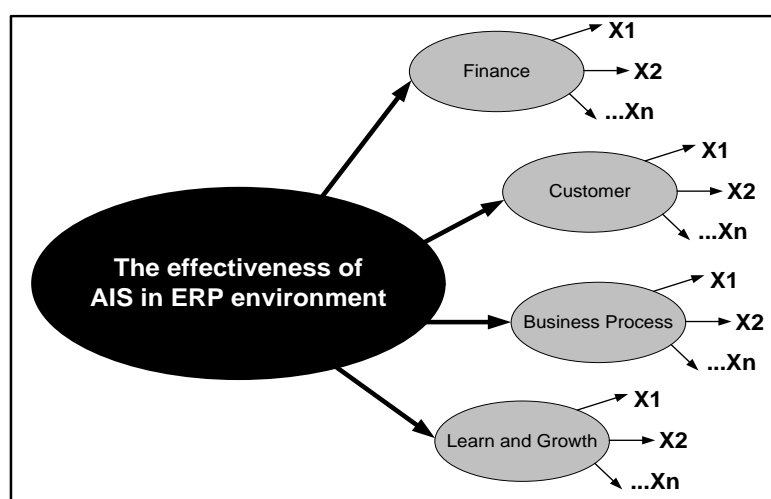
So far, there has been no consensus in measuring the effectiveness of ISs at the organizational level in a specific industry like garment. The choice of scales for this concept in previous research lacks of judgment from a theoretical foundation. Financial and accounting scales were widely applied to reflect the performance of an organization.

However, financial scale was not the sole measure due to the complex nature of the effectiveness of information systems in the ERP environment. The use of financial scale could merely result in inadequacy of research model's conclusion (Hitt, 1988). The effectiveness of AIS at organizational level are at stake if being separated from the ERP environment. The proposal for applying BSC model to measure the effectiveness of information systems in the ERP environment has been published in studies by Grembergen and Haes (2005) and Grembergen et al. (2017). For the garment industry, the application of the BSC model for evaluating information system has been initially applied in the world. In this article, the author proposes the BSC model to assess the effectiveness of AIS in ERP environment in the Vietnamese context.

The next section presents how we identify observed variables for measurement constructs.

### 3.2. Research model and observed variables

Based on results from previous research, we believe that to fully evaluate the effectiveness of integrated AIS in ERP environment; we need to build a model with both financial and non-financial factors (Hitt, 1988; Grembergen and Haes, 2005). In this paper, we propose the research model using BSC approach.



**Figure 2.** Proposed research model

The research model illustrates *the main measured concept – The effectiveness of AIS in ERP environment* – which is a second-order construct defined by 4 first-order constructs including *finance, customer, business process* and *learn and growth* (Figure 2). Although the second-order construct is multi-dimensional construct, the observed variables of each first-order construct needs to be uni-dimensional.

Observational factors in finance construct used in past studies are in different forms. Bryant et al. (2004) proposed a group of financial factors for evaluating organizational performance including the increases in revenue and return on investment. As proposed by Bhagwat and Sharma (2007), financial ratios include Return on cash flow, Revenue increase, Return on equity (ROE), Return on Sale (ROS), Return on Asset (ROA) and so on. In addition, ratios such as revenue to cost, number of e-transactions in total revenue, expansion of market share, employee redundancy and deduction in cost of wages are also added to the financial measures by Huang (2008).

The studies used some factors to determine customer construct including improvement in customer service and accuracy in order delivery (Velcu, 2007). Market share, customer retention, and customer satisfaction are found in studies by Chia et al. (2009) when identifying the definition of customer concept. Customer concept is also defined by capacities for obtaining contracts, market share, customer satisfaction, and corporate reputation in providing quality services (Chen and Mohamed, 2008). Applying integrated AIS is one of great ways to achieve the customer goals.

There are several determinants of business process construct found in past studies. For example, flexibility in delivery, responsiveness to emergency orders, accuracy in forecasting, and timely delivery of new products (Park et al., 2005). Throughout the business process, time is regulated for accounting tasks, access

to information and process management (Velcu, 2007). In addition, Huang (2008) also introduced measure factors such as transaction processing means, transaction processing procedures, order processing quality, problem solving, production capacity improvement, better provision of production management, product quality improvement, facilitation of e-commerce development, etc. Chia and colleagues' (2009) study identified factors to measure business process concept including working process restructuring, improvement of decision making, quality of service, support in working with suppliers, supporting good control, timely delivery and reduction of operating costs.

Although the determinants of learn and growth construct are less commonly recognized, the author also notes several measuring factors from past studies. For example, Huang (2008) suggested group coordination factors-coordination in working among departments and facilitating good coordination among businesses, which motivates employees to work with responsibility and participate in managing and improving self-capacity. In addition, other found determinants include employee satisfaction, productivity, staff skills, etc. (Chen and Mohamed, 2008); employee satisfaction, job change, and staff training (Chia et al., 2009).

### **3.3. Conduct an in-depth interview**

We review articles, case-study in garment companies context to collect relevant observed variables for the first-order constructs in the research model. After data collection, we obtain the list of 65 related variables. According to Churchill (1979), the list of variable needs to be sorted by discussing with ERP-AIS experts to check the content of variables and group them into a suitable measurement construct. There are 6 ERP-AIS experts invited to assist us in reviewing the variable list and put them into suitable construct. The variables should meet at least 3 expert expectations. This results in a short list

of 27 variables. The experts also suggest an additions list of variables to measure each construct. Then, similar-meaning variables suggested by at least 3 experts are selected

to make 14 extra variables. After that, we work with ERP-AIS experts in modifying description for each observed variable to improve clarification (Table 2).

**Table 2**

Variables list after conducting item purification

Research construct	Number of observed variables
Finance (FINx)	9 variables
Customer (CUSx)	7 variables
Business Process (BUSx)	14 variables
Learn and Growth (LEAx)	11 variables

The objective of conducting intensive interviews with AIS-ERP experts is to develop a survey assessing the effectiveness of the integrated AIS in ERP environment.

#### **3.4. Conduct a pilot test**

After conducting item purification, a draft version of survey was sent to 27 garment companies' managers which have implemented integrated AIS in ERP environment. After collecting data in the pilot test, we perform Explore Factor Analysis (EFA) to verify variables for each research

construct (Nguyen, 2013). Using EFA with Principles Components Analysis to evaluate measurement scale, we first ensure the scale items satisfy Bartlett's test of sphericity with  $p$  ratio  $< 5\%$  and KMO checking with KMO indicator  $> 0.5$ . Then, we follow the criteria to delete scale items for items loaded  $< 0.5$  or item loaded  $> 0.5$  (Hair et al., 2005).

In summary, there are 33 variables presented in the form of questions in the final survey (Table 3). The final survey is proven by the content validity and measurement reliability.

**Table 3**

Variables list after conducting pilot test

Research construct	Number of observed variables
Finance (FINx)	9 variables
Customer (CUSx)	6 variables
Business Process (BUSx)	11 variables
Learn and Growth (LEAx)	7 variables

#### **3.5. Implement mass survey**

Once completing the final questionnaire survey, we conduct the quantitative research with a mass survey distribution to 178 Vietnamese garment companies implemented integrated AIS in ERP environment. The

garment companies' managers are the target of survey respondents comprising of CEOs, CFOs, chief accountants, departments' managers, etc. The data collection process lasts 2 years from 2017 to 2018. Finally, we collect a sample of 91 valid responding (equivalent to

51% of sent surveys).

Using the collected data, we analyze processed data to answer the research questions. The research findings are presented in the following section.

#### **4. Findings**

##### ***4.1. Report on the evaluation status of effectiveness of integrated AIS in ERP environment among Vietnamese garment companies***

In past AIS studies, there have been some evaluating the company's AIS in the period of ex-ante and ex-post. However, there is no specific evaluation of the value of integrated AIS in ERP environment in garment companies in Vietnam. The evaluation of the AIS value is inspired by the question "Does the company carry out the evaluation of the integrated AIS in the ERP environment after implementation?". The results shows that only 38% of companies implemented the evaluation while the rest 62% did not. In terms of the evaluation of ISs, the results of this paper is similar to those of the study conducted by Sohal and Ng. (1998) (41% carried out evaluation and 59% did not). However, the results differed from those reported by Lin and Pervan (2003) (77% had the evaluation and 23% didn't) and the study by Seddon et al. (2002) (50% implemented it and 50% did not).

On examining the evaluation of integrated AIS in ERP environment in garment companies in Vietnam, the author collected data in the period when the company conducted its first evaluation. Results showed that around 38% carried out the first evaluation after 6 months, approximately 30% carried out the first evaluation from 6 to 12 months and about 17% conducted the evaluation in 3 years. In term of the evaluation of AIS in ERP environment, this has never been mentioned before in international research.

Sohal and Ng. (1998) also mentioned the frequency of AIS evaluation in companies but they did not specify the number of subsequent

evaluations from the first. This paper did the same. However, this study also mentioned the frequency of evaluation conducted by the company after the first and the awareness of the IS's value for the integrated AIS in ERP environment.

In addition, the evaluation of integrated AIS's value in the ERP environment is also inspired by previous studies of Ballantine et al. (1996) and Sohal and Ng. (ibid) on company senior managers and department heads. Due to a more specific context of integrated AIS, the number of managers of financial and accounting departments are different from those in of Sohal and Ng 's study with about 72%; this study get responses from all 91 managers of financial and accounting departments of the garment companies (100%) evaluating the integrated AIS participated in the survey.

##### ***4.2. Factors defining the effectiveness of integrated AIS in ERP environment of Vietnamese garment companies***

###### ***4.2.1. Cronbach's Alpha test***

The author evaluates the reliability of the scale by determining Cronbach's Alpha for each research construct: financial, customer, business process and learn and growth.

###### **Assessment on scale reliability for Finance construct (FIN)**

From the results of the scale evaluation, the authors exclude variables with a correlation coefficient  $< 0.3$  (Hackman et al., 2006; Sundin et al., 2008), which are *market share expanding variables* (with a correlation coefficient of 0.216) and staff reductions (with a correlation coefficient of 0.197). After excluding variables with small-sum coefficient correlates, the author continues to run Cronbach's Alpha again to assess the reliability. The second testing result shows the reliability of the Finance construct scale through the observation variables with the Cronbach's Alpha coefficient of 0.922 (satisfactory) and the correlation coefficient of the observational variables  $> 0.5$  (Table 4).



**Table 4**Cronbach's Alpha 2<sup>nd</sup> test result - Finance construct

## Reliability Statistics

Cronbach's Alpha	No. of variables
0.922	7

## Item-Total Statistics

		Scale Mean if Item deleted	Scale Variance if Item deleted	Corrected Item-Total Correlation
FIN1	Increase business profits	50.4652	66.669	0.631
FIN2	Increase Return on Equity (ROE)	50.5130	66.714	0.782
FIN3	Increase sales revenue	50.3696	67.435	0.669
FIN4	Minimize operating costs	50.3348	65.001	0.793
FIN5	Increase Return on Investment (ROI)	50.2826	72.728	0.532
FIN6	Increase Return on Assets (ROA)	50.5001	69.491	0.657
FIN7	Minimize labor costs	50.2783	67.643	0.524

**Assessment on scale reliability for Customer construct (CUS)**

With invalid variables of correlation coefficient  $< 0.3$ , all Customer construct

variables are considered to be reliable and not be removed. Cronbach's Alpha test results are shown in Table 5.

**Table 5**

Cronbach's Alpha test result - Customer construct

## Reliability Statistics

Cronbach's Alpha	No. of variables
0.911	6

## Item-Total Statistics

		Scale Mean if Item deleted	Scale Variance if Item deleted	Corrected Item-Total Correlation
CUS1	Support order delivery	18.8490	1.321	0.865
CUS2	Create better transaction value for customers	18.8824	1.206	0.781
CUS3	Support interactive services with customers	18.8470	1.307	0.813
CUS4	Improve customer satisfaction	18.7542	1.201	0.765
CUS5	Establish relationships with customers	18.8419	1.303	0.810
CUS6	Improve the quality of customer service	18.6324	1.108	0.741

### Assessment on scale reliability for Business Process construct (BUS)

From the results of the scale evaluation, the authors exclude variables with a sum correlation coefficient of  $<0.3$  (Hackman et al., 2006; Sundin et al., 2008), which are *support of the introduction of new products* (with a correlation coefficient of 0.118). After

excluding variables with small sum correlation coefficient, the author continues to conduct Cronbach's Alpha again to assess the reliability. The second test result demonstrates the reliability of the Business Process construct scale through the observational variables with the Cronbach's Alpha coefficient of 0.901 (Table 6).

**Table 6**

Cronbach's Alpha 2<sup>nd</sup> test results - Business Process construct

#### Reliability Statistics

Cronbach's Alpha	No. of variables
0.901	10

#### Item-Total Statistics

		Scale Mean if Item deleted	Scale Variance if Item deleted	Corrected Item-Total Correlation
BUS1	Improve productivity	28.7088	13.157	0.626
BUS2	Restructure the working process	28.8349	12.884	0.715
BUS3	Make changes in the working process	28.8175	13.056	0.706
BUS4	Improve the quality of decision making	28.8218	12.861	0.690
BUS5	Provide better production management	28.8349	12.352	0.775
BUS6	Support for introducing new services	28.8215	13.116	0.673
BUS7	Support inventory management	28.7301	12.650	0.708
BUS8	Improve management productivity	28.7608	12.749	0.636
BUS9	Assist in working with suppliers	28.7143	12.736	0.701
BUS10	Support for better control	28.8226	13.043	0.732

### Assessment on scale reliability for Learn and Growth construct (LEA)

For variables with a total correlation coefficient  $<0.3$ , the variables under *the Learn*

*and Growth construct* are creditable and not be eliminated. Cronbach's Alpha test results are shown in Table 7.

**Table 7**

Cronbach's Alpha test result - Learn and Growth construct

## Reliability Statistics

Cronbach's Alpha	No. of variables
0.837	7

## Item-Total Statistics

		Scale Mean if Item deleted	Scale Variance if Item deleted	Corrected Item-Total Correlation
LEA1	Improve employee motivation	20.9871	8.039	0.525
LEA2	Allow support services to be shared by all levels in businesses	20.9740	7.764	0.636
LEA3	Support the development of the business sector in the market	21.1262	7.353	0.608
LEA4	Encourage staff to actively solve problems	21.2393	7.485	0.594
LEA5	Allow employees to work independently	21.0436	7.658	0.592
LEA6	Support coordination among departments	21.0656	7.021	0.702
LEA7	Facilitate businesses to work with each other	20.8754	7.913	0.624

**4.2.2. Exploratory Factor Analysis (EFA)**

After Cronbach's Alpha test, 30 observational variables were retained for further analysis of the EFA process. During the first EFA running, *Minimize labor costs variable* and *Support for introducing new services variable*

presenting small load factors, respectively 0.389 and 0.378, were eliminated. The second EFA analysis outcome shows that the observational variables focused on 4 research constructs with the KMO = 0.827, which is satisfactory (Hair et al., 2005) (Table 8).

**Table 8**

Result of the EFA factor analysis

No.	Variables		Research constructs			
			Finance	Customer	Business Process	Learning and Growth
01	FIN1	Increase business profits	0.833			
02	FIN2	Increase Return on Equity (ROE)	0.812			
03	FIN3	Increase sales revenue	0.775			
04	FIN4	Minimize operating costs	0.754			
05	FIN5	Increase Return on Investment (ROI)	0.747			
06	FIN6	Increase Return on Assets (ROA)	0.722			
07	CUS1	Support order delivery		0.801		
08	CUS2	Create better transaction value for customers		0.793		
09	CUS3	Support interactive services with customers		0.785		
10	CUS4	Improve customer satisfaction		0.742		
11	CUS5	Establish relationships with customers		0.708		
12	CUS6	Improve the quality of customer service		0.694		
13	BUS1	Improve productivity			0.812	
14	BUS2	Restructure the working process			0.803	
15	BUS3	Make changes in the working process			0.774	
16	BUS4	Improve the quality of decision making			0.762	
17	BUS5	Provide better production management			0.751	
18	BUS6	Support inventory management			0.738	
19	BUS7	Improve management productivity			0.722	
20	BUS8	Assist in working with suppliers			0.667	
21	BUS9	Support for better control			0.657	
22	LEA1	Improve employee motivation				0.802
23	LEA2	Allow support services to be shared by all levels in businesses				0.797
24	LEA3	Support the development of the business sector in the market				0.705
25	LEA4	Encourage staff to actively solve problems				0.694
26	LEA5	Allow employees to work independently				0.656
27	LEA6	Support coordination among departments				0.649
28	LEA7	Facilitate businesses to work with each other				0.573

Rotation: Promax with Kaiser Normalization;  
Bartlett test <0.05;

General variance deduction: 54.722  
KMO index = 0.827

By EFA analysis, the author retains 28 variables grouped by 4 research constructs of the BSC model (Figure 8). These are significant observation variables for evaluating the effectiveness of integrated AIS in ERP environments of Vietnamese garment companies from managers' viewpoint.

### 5. Conclusions and future research

Focusing on the evaluation of integrated AIS in ERP environment from the managers' viewpoint, this paper proposes a research model based on the BSC theory. The author (1) examine the status of assessing the effectiveness of integrated AIS in the ERP environment in Vietnamese garment companies and (2) identify the factors that determine the effectiveness of AIS in the ERP environment in such companies from managers' view. The author studied to develop and test scales of four (04) BSC research constructs to determine the effectiveness

of integrated AIS in ERP environments in Vietnamese garment companies.

The results of the study presented evaluation status of the effectiveness of integrated ERP-AIS in Vietnamese garment companies. Furthermore, based on the BSC theory model with four research constructs, the author has published 28 *significant factors* for assessing the effectiveness of integrated AIS in ERP environment in Vietnamese garment companies from managers' viewpoint (Figure 8). Hopefully, initial results of this paper would become a reliable reference for future research in the field of integrated AIS in ERP environment in Vietnam in garment and other industries as well. In addition, more research must be done on the evaluation of integrated AIS's effectiveness from the perspective of other stakeholders including AIS academic researchers, ERP-AIS solution providers and so on■

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