



# The Impact of Accounting Information Systems on Firm Performance: Empirical Evidence in Turkish Small and Medium Sized Enterprises

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## ABSTRACT

This study is based on empirical evidence at measuring the relationship between the use of the accounting information systems (AIS) by the Small and Medium Sized Enterprises in Kayseri-Turkey, and firms' improved performance indicators. Kayseri is one of the most successful furniture-making centers in Turkey and it earned more than a billion dollars in export revenues in 2007. The data obtained from interviews with 60 firms in the organized industrial zone is analyzed by generalized least squares. It is found that there is positive and statistically significant relation between the use of AIS and educational status of managers. Moreover, as the number of employees rises, the use of AIS also increases. Furthermore, a positive relation is found between the use of AIS and growth (Sale, Customer and Revenue).

**Keywords:** Accounting Information Systems, Small and Medium Sized Enterprises, Generalized Least Squares

**JEL Classifications:** L00, M

## 1. INTRODUCTION

Performance measures like profit are an important criterion for evaluating the success of a company. However the study of performance is difficult because of measurement problem and the large number of the variables which effect performance (Ronan and Prien, 1973:78). One of the most important systems is accounting information system (AIS) to measure firm performance.

Before defining AIS, it should be better defined information and information system: In its simplest form, information is the completeness of processed data or consequence of data which is made meaningful and useful (Sürmeli, 1996: 14).

Information system is a system which collects and evaluates the data and distributes it to the users when needed. Information systems are artificial systems and are designed to help in the process of decision (Akgün and Kılıç, 2013: 26). Many studies have emphasized the need to develop a fit between business strategy and information system strategy.

The presentation of necessary knowledge in business when needed and as required is the subject of management information system (MIS). "In a medium size business, MIS is generally formed of sub-systems of production, marketing, personnel, finance and accounting" (Sürmeli, 1996: 27). The sub-systems which form the MIS naturally interact constantly both with MIS and with each other. For this reason: The information system is designed to accomplish one or more goals (Pornpandejwittaya and Pairat, 2012:86).

MIS is formed in order to reduce the cost, to prevent the probable confusion and confliction, and to provide coordination among the activities of sub-systems in its structure (Alagöz, et al., 2013: 29). In order to achieve these purposes MIS acts in accordance with the knowledge which comes from AIS. The main purpose of AIS is to provide usable information to managers in decision-making. Accounting information is sometimes expressed as financial accounting information and it provides information to the interior departments of a business (Akgün and Kılıç, 2013:22).

The data about all the financial cases in business is gathered in MIS eventually and the efficiency of MIS determines the value of produced information about the whole business (Dinç and Abdioğlu, 2009: 163).

A lot of definitions have been made on AIS. Some of these definitions are as below: AIS is a system which provides the past and future financial information about financial accounting, cost accounting, responsibility accounting, cash and capital budgeting, assets, debts, capital and expense and income of businesses (Sürmeli, 1997: 27).

AIS can be defined as the integration of accounting with technology, information and managerial approach (Gökdeniz, 2005:89).

AIS are considered as important organizational mechanisms that are critical for effectiveness of decision management and control in organizations (Sajady, et al., 2008: 50).

AIS deals with (Knežević and Tepevac, 2012: 63):

1. Input: Measurement or quantification of business events in monetary forms (by recording in accounts)
2. Process: Data processing in business books and drawing account reports
3. Output: Publication of financial statements with which the accounting communicates with internal and external users thus giving them information necessary for business and financial decision-making.

AIS is the most important system of MIS and it is the most different system among the sub-systems because as mentioned above its input is mostly monetary data and naturally its output is formed with monetary data; these outputs affect directly the internal and external users.

By AIS past, recent and future information can be reached. This information is used by the internal and external users and this creates an opinion about the businesses.

It is an undeniable fact that the developments in computer technology have a great influence on every aspect of live as well as in information system. With this point of view AIS is defined as "AIS is generally a computer-based method for tracking accounting activity in conjunction with information technology resources." (Belfo and Trigo, 2013: 537)

Kayseri is a large and developed city in Central Anatolia, Turkey. According to the Turkish Statistical Institute, in 2011 Kayseri had a population of 844,656 in the city center while Kayseri Province had a population of 1,234,651.

The speed of growth of the city was so fast that in 2004 the city applied to the Guinness Book of World Records for the most new manufacturing industries started in a single day: 139 factories. Kayseri also has emerged as one of the most successful furniture-making centers in Turkey earned more than a billion dollars in export revenues in 2007. Kayseri free

zone established in 1998; today has more than 43 companies with an investment of 140 million dollars. The Zone's main business activities including; production, trading, warehouse management, mounting and demounting, assembly-disassembly, merchandising, maintenance and repair, engineering workshops, office and workplace rental, packing-repacking, banking and insurance, leasing, labeling and expiation facilities. Kayseri FTZ with cost of \$8 per square meter is one of the lowest cost land free zones in the world (Wikipedia).

The aim of this study is to find out the ideas and levels of knowledge of Small and Medium Sized Enterprises (SMEs) managers on AIS in Kayseri, one the most important trade and industry centers in Turkey as mentioned before. Also this study aims to show the differences of knowledge of AIS depending on age, gender, education and etc. of the managers. Besides in this study the knowledge and the use of computer based accounting system is aimed to be shown. The second section provides literature review. The following section describes the literature. Section 3 presents data and methodology. The last section is conclusion.

## 2. LITERATURE REVIEW

Due to its importance in economy there are plenty of studies on SMEs and AIS which is the oldest and most important sub-system of MIS. Dağar, et al., (2014) search to what extent AIS is used in production companies and they carry out a questionnaire in production companies which are in West Mediterranean Region. In this study, it is seen that in production companies every data which is needed in AIS is recorded; the information technology is used effectively in these companies; stock companies use AIS more efficiently than other companies. Akgün and Kılıç (2013) discuss AIS and MIS in conceptual basis in their study. They carry out a questionnaire to determine the efficiency of AIS in Tuz Lake (Salt Lake) businesses. According to the result of this questionnaire AIS provides information for internal and external users. It is also seen that AIS has a positive effect on the efficiency of the business management. Yazıcı (2010) makes a research about the effects of AIS on managerial decisions in SMEs in the Erzurum Organized Industry Zone. According to his research results when businesses get larger, the number of personnel and the level of technology use increase, AIS is used more efficiently in managerial decisions. Gökdeniz (2005) states that AIS is the most important sub-system of MIS. The input of AIS is recorded more easily by computerized system and the output is reliable and certain. Also AIS education provides many advantages to the businesses. Mizrahi (2011) focus on the effective use of AIS in SMEs. According to her study the SMEs in İzmir only use 35% of their AIS knowledge in their managerial studies. In their study Allah, et al., (2013) aim to show to what extent small businesses use AIS and states that small businesses are unwilling to use new technology in their businesses. Gray (1991) in his study emphasizes on subjective preferences and states that in traditional IS/AIS selection approaches; they do not consider personal preferences. In his study Fink (1996) finds out that some businesses use

**Table 1: GLS analysis results**

AIS	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	5.446*** (4.86)	3.862*** (3.77)	1.178*** (2.96)	1.119*** (7.76)	4.621 (0.19)
DES	0.350*** (2.86)				
Number of employees		0.224** (2.37)			
Growth (sale trend)			0.466** (2.04)		
Growth (customer trend)				0.731*** (3.62)	
Growth (revenue trend)					0.555** (2.65)

\*\* and \*\*\*Denotes 10%, 5%, and 1% level of significance, respectively. Figures in parentheses denote t-statistics. Average interitem covariance: 0.14; Number of items in the scale: 7; Scale reliability coefficient: 0.76, GLS: Generalized least squares, DES: Director of educational status, AIS: Accounting information systems

accounting software packages but they face problems during the installation of these packages because they are not well managed. They lack some important features and because of this they fail to function properly. Fink suggests that better documentation is needed and user education is important in order to solve the problems. Ismail, et al. (2009) aims to show the use of accounting information computerized AIS among non-manufacturing SMEs in Malaysia. They find out that AIS usage is minimal in these businesses. Some businesses use AIS but most small businesses have difficulty in understanding the importance of accounting information. Muhindo et al. (2014) state that AIS has an important role in business especially in its management. They find out that AIS is not used in small scale businesses. They state that AIS has an important role in economic and social system. Grande et al., (2011) carry out a survey among small and medium-sized firms to find out to what extent the development and installation of AIS take place in these firms. They find out that there is a positive relationship among the SMEs which use AIS for fiscal and bank management and better performance measures.

### 3. DATA AND METHODOLOGY

In this study, the data is obtained from 60 companies. Companies are randomly selected and suited to the SME definition.

A longitudinal, or panel, data set is one that follows a given sample of individuals over time, and thus provides multiple observations on each individual in the sample. Panel data have become widely available in both the developed and developing countries. A panel data set for economic research possesses several major advantages over conventional cross-sectional or time series data sets (e.g., Hsiao 2014) such as:

1. More accurate inference of model parameters. Panel data usually give researchers a large number of data points, increasing the degrees of freedom and reducing the collinearity.
2. Greater capacity for constructing more realistic behavioral hypotheses. By blending inter individual differences with intra individual dynamics, longitudinal data allow a researcher to analyze a number of important economic questions that cannot be addressed using cross sectional or time series data sets.
3. Uncovering dynamic relationships. Because of institutional or technological rigidities or inertia in human behavior, "economic behavior is inherently dynamic".

4. Controlling the impact of omitted variables (or individual or time heterogeneity).
5. Generating more accurate predictions for individual outcomes. Pooling the data could yield more accurate predictions of individual outcomes than generating predictions using the data on the individual in question if individual behaviors are similar conditional on certain variables.
6. Providing micro-foundations for aggregate data analysis.
7. Simplifying computation and statistical inference. Panel data involve at least two dimensions, a cross-sectional dimension and a time series dimension. Under normal circumstances one would expect that the computation of panel data estimator or inference would be more complicated than estimators based on cross-sectional or time series data alone. However, in certain cases, the availability of panel data actually simplifies computation and inference.

Ordinary least squares (OLS) is a technique for estimating unknown parameters in a linear regression model for panel data. It attempts to estimate the vector  $\beta$ , based on the observation  $y$  which is formed after  $\beta$  passes through a mixing matrix  $X$  and has noise  $\varepsilon$  added.

$$y = X\beta + \varepsilon$$

OLS gives the maximum likelihood estimate for  $\beta$  when the parameters have equal variance and are uncorrelated, and the noise  $\varepsilon$  is white, uncorrelated and follows a Gaussian distribution (homoscedasticity).

$$\beta = (X'X)^{-1}X'y$$

Generalized least squares (GLS) allows this approach to be generalized to give the maximum likelihood estimate when the noise is colored (heteroscedasticity).

The GLS estimator is a weighted average of the between-group and within-group estimators. The GLS estimator is unbiased, consistent, efficient, and asymptotically normal:

$$\sqrt{n} \left( \hat{\beta} - \beta \right) \rightarrow N \left( 0, (X' \Omega^{-1} X)^{-1} \right)$$

GLS is equivalent to applying ordinary least squares to a linearly transformed version of the data. To see this, factor  $\Omega = BB'$ , for instance using the Cholesky decomposition linear algebra.

Then if we multiply both sides of the equation  $Y = X\beta + \varepsilon$  by  $B^{-1}$ , we get an equivalent linear model  $Y^* = X^*\beta + \varepsilon^*$ , where  $Y^* = B^{-1}Y$ ,  $X^* = B^{-1}X$ , and  $\varepsilon^* = B^{-1}\varepsilon$ . In this model  $\text{Var}[\varepsilon^*] = B^{-1}\Omega(B^{-1})' = I$ . Thus we can efficiently estimate  $\beta$  by applying OLS to the transformed data, which requires minimizing.

$$(Y^* - X^*b)'(Y^* - X^*b) = (Y - Xb)'\Omega^{-1}(Y - Xb)$$

This has the effect of standardizing the scale of the errors and “de-correlating” them. Since OLS is applied to data with homoscedastic errors, the theorem applies, and therefore the GLS estimate is the best linear unbiased estimator for  $\beta$ . Therefore, GLS technique is employed to obtain  $\beta$  parameters.

$$\text{AIS} = \beta_0 + \text{Educational status} + \text{Et (Model 1)}$$

$$\text{AIS} = \beta_0 + \text{Employees} + \text{Et (Model 2)}$$

$$\text{AIS} = \beta_0 + \text{Growth trends in sales} + \text{Et (Model 3)}$$

$$\text{AIS} = \beta_0 + \text{Growth trends in customer} + \text{Et (Model 4)}$$

$$\text{AIS} = \beta_0 + \text{Growth trends in revenue} + \text{Et (Model 5)}$$

According to the Table 1 model 1 illustrates that there is positive and statistically significant relation between the use of AIS and educational status of managers. As the education level of corporate managers improves, the use of AIS increases. Model 2 shows the relationship between the number of employees and the use of AIS. When number of employees is taken into account, we can see positive relationship between employees and AIS. This means that as the number of employees rises, the use of AIS also increases. Furthermore, a positive relation is found between the use of AIS and growth (sale, customer and revenue) as the line with Model 3-4-5. The strongest positive relation is seen by model 4. A 1% increase in the number of customers' growth, the use of AIS will be increased 0.731%.

#### 4. CONCLUSION

AIS are an instrument which, when integrated into the field of information and technology systems (IT), were considered to help in the management and control of topics related to firms' economic-financial area. SMEs are now recognized worldwide to be a key source of dynamism, innovation and flexibility. From the results of the statistical analysis, it can be deduced that there is positive and statistically significant relation between the use of AIS and educational status of directors. This result can be explained as follows; the use of information systems becomes more common when advanced level of education is increasing. Moreover, a positive relation between the number of company employees and the use of AIS has been found.

As company grows, it is difficult to follow input-output-sales-inventory accounts then the use of AIS is spreading. In addition, a positive relation is found between the use of AIS and growth (sale, customer and revenue).

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