

Internal Audit, Critical Success Factors and Data Quality in Indonesian Cooperative Enterprises

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ABSTRACT

The development of the information economy and highly publicised corporate scandals with far reaching effects and responses have highlighted the importance of high quality information for use by organisations and their stakeholders. To produce sound financial and other information, the quality of the data in the organisation's information systems must be high. This paper reports on a study designed to investigate the factors that lead to improved data quality in accounting information systems (AIS) in cooperative enterprises in Central Sulawesi Province of Indonesia. These organisations are a central element of the Indonesian economy. Analysis of survey data collected from directors of internal audit bodies suggests that the roles of internal auditors and the implementation of critical success factors are associated with AIS data quality. In particular, emphasis on system involvement and management reporting roles of internal auditors and greater middle management commitment, AIS suitability and teamwork are likely to improve data quality in these organisations.

Keywords: Information and knowledge management, quality management

In the 21st century, information is a key resource for organisations (Nord, Nord & Xu 2005; Levitin & Redman 1998; Marsh 2005) and this underlines the importance of the quality of the data that is used as an input to producing useful information (Redman 1998; Xu et al. 2003; Nord, Nord & Xu 2005). As Levitin and Redman (1998: 98) explain, '...bad data are like a virus. There is no way of telling where they will turn up or what impact they will have'. The impacts of poor data quality can be operational (such as decreased customer satisfaction, increased cost and decreased employee satisfaction), tactical (such as poorer and slower decision making, and difficulty in reengineering) and strategic (such as difficulty in setting and executing strategy and diverted managerial attention) (Redman, 1998). Consequently, data quality issues must become a critical concern of every organisation that wants to perform well, obtain competitive advantage and survive (Porter & Millar 1985; Scully & Fawcett 1993; Nord, Nord & Xu, 2005). Yet, while a large amount of research has been conducted on critical success factors for quality management generally, relatively little research has considered the factors that impact on data quality in the accounting information system (AIS), despite the significance of the information drawn from these systems to a wide range of organisational stakeholders.

This paper reports on a study designed to investigate the factors that lead to improved data quality in accounting information systems (AIS) in cooperative enterprises in Central Sulawesi Province of

Indonesia. Cooperative enterprises have a central role in Indonesian society, making a significant contribution to the economy (Sukarno 2005) and in 2003 having 27.3 million members (Ministry of Cooperative and Small-Medium Enterprises of the Republic of Indonesia 2004). Like other organisational types, cooperatives require high quality data from the AIS to produce credible financial information for management, directors, members and government.

LITERATURE REVIEW

Quality, defined as fitness for use (Juran 1979), can provide organisations with competitive advantage (Flynn, Schroeder & Sakakibara 1994; Badri, Davis & Davis 1995) and therefore quality management has been a major concern of business researchers and practitioners for many years (Motwani 2001). Deming (1982; 1986), Juran (1979; 1986) and Crosby (1979) provided seminal foundations for quality management and since then several attempts have been made to identify critical success factors for enhancing quality and quality management, first through qualitative research and then through quantitative studies. The critical success factors identified in those studies include the role of top management leadership and quality policy, the role of the quality department, training, product/service design, supplier quality management, process management, quality data and reporting, and employee relations (Garvin 1983; Saraph, Benson & Schroeder 1989; Flynn, Schroeder & Sakakibara 1994; Ahire, Golhar & Waller 1996; Zeitz, Johannesson & Richie 1997; Black & Porter 1996; Powell 1995).

At the more specific data quality management level, much of the literature consists of assertions about how quality can be achieved with little attempt to support these assertions with empirical evidence. Some of the critical success factors suggested include internal control, audit and review, and input controls (Cushing 1974; Fields, Sami & Sumners 1986; Nichols 1987; Yu & Neter 1973; Johnson, Leitch & Neter 1981; Ballou & Tayi 1999; Ballantine et al. 1996; Wang 1998). Wang (1998) argued that information manufacturing is similar to product manufacturing, an example being that the information output from an information manufacturing system has value that can be transferred to the information consumer. Therefore, like a physical product, an information product has quality dimensions. Using this analogy, Huang, Lee & Wang (1999) argued that the pattern of the relationship

between critical success factors and effective product quality management can be applied also to data quality management.

Few attempts have been made to identify and address critical success factors in data quality in an AIS context, although Xu et al. (2002), Xu (2003), Xu et al. (2003) and Nord, Nord and Xu (2005) made a start in this area. These studies, using case study and survey data, examined stakeholder perceptions of the importance of a wide range of factors for their influence on assuring high quality data in AIS and concluded that there are six critical success factors - top management commitment, middle management commitment, input controls, AIS suitability, teamwork, and personnel competence. Determination of these factors as “critical” was based on stakeholders’ ratings of importance and no empirical test of the association between data quality and the extent to which these “critical success factors” existed within an organisation was undertaken.

In addition to considering critical success factors in data quality drawn from prior research, the current study considers the roles of internal auditors. Highly publicised scandals in the corporate world early this century and resultant legislative and regulatory changes (for example, the 2002 Sarbanes-Oxley Act) have highlighted the important part that internal auditors are expected to play in improving data quality in AIS (Peurseem 2004). Furthermore, internal auditors have an important position in Indonesian cooperatives bestowed by legislation, the internal audit body being responsible to the annual general meeting of active members and not to the body of directors (Secretary Ministry of the Republic of Indonesia 1992).

Research on internal auditing has covered a broad range of areas including evaluations of internal audit quality, examinations of the factors that influence internal auditors’ judgments and decisions, and consideration of the nature of and factors affecting the relationships between internal auditors, external auditors, the audit committee and management (see Gramling et al. 2004 for a recent review of this extensive internal auditing literature). A number of studies have provided comparisons of the roles of internal auditors across countries (Cooper, Leung & Mathews 1996), cultures (Woodworth &

Said 1996), organisation types, industries and sizes (Goodwin 2004; Gramling & Myers 2006; Edwards, Kusel & Oxner 2003) and various internal auditor circumstances (Peursem 2004). However, the relations between the roles of internal auditors and data quality in AIS have not been empirically examined, despite the link being alluded to by many (Peursem 2004; Arlinghaus 2002; Bou-raad 2000; Staciokas & Rupsys 2005; Kothary 1988; Roubinek 1976; Edwards, Kusel & Oxner 2001, 2003; Quinn 2004).

Based on the preceding discussion, the following hypothesis was developed for testing in this study:

Hypothesis 1: The roles of internal auditors and the implementation of “critical success factors” are significantly associated with data quality in AIS.

METHOD

The survey method was used to collect data for testing the study's hypothesis. Data was collected from directors of internal audit bodies of cooperative enterprises in Central Sulawesi Province, Indonesia. A list of cooperatives was provided by the Local Government Office for Industry, Trade, Cooperative, Small and Medium Enterprise Affairs of the Central Sulawesi Province, Indonesia. Four districts in Central Sulawesi Province were the subject of security considerations associated with conflict during the time of this study and were not regarded as appropriate for safely collecting data. Therefore, they were excluded from the sample frame. The total number of cooperative enterprises in the remaining districts was 764.

A sample of 500 cooperatives was chosen using proportional stratified sampling, with the chosen sample size based on a consideration of requirements for data analysis techniques needed to test the study hypotheses (exploratory factor analysis followed by multiple regression) and the potential for non-response. Selecting the sample involved two steps. Firstly, the sample size of 500 was allocated to each of five areas in the sampling frame in proportion to each area's relative cooperative population size. Secondly, simple random sampling was used to choose the cooperatives within each of the areas. A total of 209 questionnaires, 2 being unusable, were returned, giving a useable response rate of

41.4%. The responding cooperatives reflected the population in terms of regional mix and a comparison of early and late respondents indicated no evidence of non-response bias.

The questionnaire used in the survey was developed from existing instruments. Four overarching roles of internal auditors were examined– system involvement, control oversight, management reporting and communication. These roles and the items measuring them were drawn from Peurseem (2004). Items measuring the six factors concluded to be “critical” to data quality in AIS by Xu (2003) were taken from that study. However, Xu’s (2003) instrument is limited in that several critical success factors are measured by only one item, increasing the possibility of measurement error (Hair et al. 1998). To address this limitation, the current study added items, with minor modifications for the present context, from studies of critical success factors in quality management and data quality management (Saraph, Benson & Schroeder 1989; Ahire, Golhar & Waller 1996; Yu & Neter 1973; Zeitz, Johannesson & Ritchie 1997). Finally, data quality in AIS was measured using an instrument developed by Xu (2003) consisting of an item measuring each of the dimensions of data quality delineated by Ballou & Pazer (1982, 1985, 1987), Ballou et al. (1998) and Ballou & Tayi (1999): accuracy, timeliness, completeness and consistency.

The draft questionnaire was subjected to academic expert review and ethical approval prior to being translated from English to Indonesian. The appropriateness of the translation was checked by six Indonesian doctoral students studying in Australia and one Australian language teacher specialising in Indonesian. The Indonesian version of the questionnaire was then provided for comment to two academics and two directors of internal audit bodies of cooperatives in Central Sulawesi Province, Indonesia. Following this, pre-testing was undertaken in six cooperatives prior to the main survey.

RESULTS

Prior to hypothesis testing, the multi-item measures employed in this study were subjected to exploratory factor analysis and reliability analysis. Following this, composite measures for each variable were used in a multiple regression to test the study’s hypothesis.

Exploratory Factor Analysis and Reliability

An exploratory approach to factor analysis was taken in this study because theoretical and empirical knowledge about the nature and measurement of the roles of internal auditors and critical success factors in AIS data quality is not well developed. Furthermore, although the measures in the study are based on items used in previous research, they were modified and were being applied in a different cultural context. Each major group of variables (internal auditor roles, critical success factors and data quality in AIS) was analysed separately using principal components analysis with varimax rotation. Analysis with oblique rotation was also performed to check the stability and robustness of the solution. In all cases, items loaded onto the same components.

Roles of internal auditors.

Four components with eigenvalues greater than one were extracted, accounting for 74% of the variance in the item set. The highest rotated loading for each item is shown in Table 1, along with Cronbach's alpha as a measure of internal consistency reliability. All items loaded onto the expected component based on Peursem's (2004) study. Items loading on component 1 represent *system involvement*, which involves direct participation in systems development, modification and oversight. Items on component 2, *control oversight*, involve testing whether adequate safeguards exist to protect the organisation from accidental or intentional destruction of data and compliance with law and regulation. Items on component 3, *management reporting*, involve the role of internal auditors in reporting directly any concerns regarding sensitive matters, including issues involving senior management, and following up on these matters. Items on component 4, *communication*, involve other reporting, support and consensus functions. All components had a Cronbach's alpha coefficient greater than 0.70, which is generally considered the lower acceptable limit (Hair et al. 1998).

Critical success factors

Six components with eigenvalues greater than one were extracted from the set of items measuring critical success factors, accounting for 71% of variance. The highest rotated loading for each item is shown in Table 2, along with Cronbach's alpha. All items loaded together as expected. Items loading on component 1 represent *AIS suitability*, which concerns the AIS characteristics meeting with the

needs of the organisation. Items on component 2 concern *top management commitment* to achieving data quality in the AIS. Items on component 3, *teamwork*, involve everyone involved with the AIS working together and communicating effectively. Items on component 4, *input controls*, involve getting data right during the input phase and ensuring input data controls are reliable and effective. Items on component 5, *personnel competence*, relate to the proficiency of the individuals working with the AIS. Items on component 6 concern *middle management commitment* to achieving data quality in the AIS. All components had acceptable Cronbach's alpha coefficients greater than 0.70.

Data quality in the AIS.

As expected from the literature, one component with an eigenvalue greater than one was extracted, accounting for 64% of the variance in the item set. The loading for each item is shown in Table 3, along with Cronbach's alpha. The component's alpha coefficient, at 0.81, was acceptable.

Regression Analysis

Regression analysis was used to test the hypothesis of this study. Composite variable scores were constructed for each of the components noted above, computed for each respondent as the mean of the summed item scores for the items included in the component. The data were analysed for outliers and consistency with the assumptions of multiple regression. Thirteen cases were determined to be multivariate outliers using mahalanobis distance and were excluded from the regression, leaving 194 cases. Multiple regression was then performed, using the data quality in AIS composite as the dependent variable and each of the composites for internal auditor roles and critical success factors as an independent variable.

Table 4 summarises the results of the ordinary least squares regression analysis. The entire model was statistically significant ($F = 33.468, p < 0.0005$) such that there does appear to be a relationship between the dependent and independent variables other than random variation. The independent variables as a group explained 64.6% of the variation in data quality in AIS. These results indicate support for the

hypothesis of this study: the roles of internal auditors and the implementation of critical success factors were significantly associated with data quality in AIS.

Statistics related to the coefficients for each independent variable are also shown in Table 4. Five variables had a significant regression coefficient (emboldened in Table 4). Two of these were roles of internal auditors (systems involvement and management reporting), while three were critical success factors (middle management commitment, teamwork and AIS suitability). The regression coefficients for the remaining variables – control oversight, communication, top management commitment, input controls and personnel competence – were not significant.

DISCUSSION AND CONCLUSIONS

In a time when information has gained extreme importance for the successful functioning of organisations and when organisational stakeholders such as investors and regulators are increasing their pressure on organisations to produce sound accounting information, data quality in the AIS is essential. This study has provided input for answering questions about how AIS data quality can be improved. The results support the hypothesis that roles of internal auditors and other critical success factors are associated with data quality in the AIS. In particular, systems involvement and management reporting roles of internal auditors were positively associated with AIS data quality in the cooperative enterprises studied. Thus, the higher were internal auditor's perceptions of the importance of their system involvement and management reporting roles, the higher were their perceptions of the data quality in their cooperative's AIS. Middle management commitment, AIS suitability and teamwork were also positively associated with AIS data quality in these organisations. Thus, the higher were internal auditors' perceptions of the commitment of middle management to data quality, the suitability of their cooperative's AIS and the level of teamwork in the cooperative, the higher were their perceptions of the data quality in their cooperative's AIS.

The study's findings clearly indicate that internal auditors have an important role in ensuring the quality of data in the AIS and, ultimately, the quality of an entity's corporate governance. This issue,

although accepted as fact in the literature, has until now not been directly supported by empirical evidence. While the literature cites many roles for the internal auditor, those that appear to be most important for AIS data quality are related to involvement in system development, modification and oversight (system involvement), and communication to higher authorities and the independent external auditors (management reporting). Indeed, the management reporting role is referred to as 'management intimidation' by Peursum (2004), who regards the role as the one most clearly associated with Burns, Greenspan and Hartwell's (1994) idea of 'cruciality', through which internal auditors enjoy authority to monitor and influence management. The findings of the present study indicate that this authority has a special function in ensuring data quality, allowing internal auditors to bring managers to account for problems that could reduce data quality and acting as an important foundation for good corporate governance.

Two roles of internal auditors, control oversight and communication, were not found to be associated with AIS data quality. Control oversight, which predominately involves low-level testing of controls, may not be important to ensuring data quality when systems have been adequately designed with internal auditor involvement. The communication role relates to lower-level support and reporting and so may not be as essential to data quality as the internal auditor's ability to freely report at higher levels. Further research is needed to confirm these issues.

The results of this study do not entirely support those of Xu (2003) and Nord, Nord and Xu (2005). Those researchers concluded that there are six critical success factors necessary for achieving AIS data quality. In the present study, however, it was found that only three of these factors could be regarded as "critical" (middle management commitment, AIS suitability and teamwork). The differences in findings could be related to several factors. Firstly, in this study the association between the factors and data quality in AIS was empirically examined, rather than relying on rankings of the factors' importance for data quality in AIS by stakeholders. Secondly, the country and cultural contexts of the studies differ. Thirdly, different organisational types were considered. Future research is needed to

determine the relevance of each of the critical success factors using measures of data quality as a reference (as in this study) in a variety of contexts.

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Table 1: Rotated Loadings of Items Measuring the Roles of Internal Auditors^a

Item ^b	Component			
	1	2	3	4
Converting files to the system	0.93			
Testing during implementation	0.93			
Documenting the system	0.92			
Developing operating procedures	0.91			
Setting criteria for information technical staff of the accounting information systems department	0.89			
Programming	0.88			
Implementing controls	0.88			
Resolving system problems	0.82			
Managing systems development or modification projects	0.81			
Developing system controls	0.72			
Testing how output data is handled.		0.91		
Testing communication networks/controls		0.90		
Testing data or controls for processing		0.90		
Testing data or controls for entry		0.84		
Testing to ensure compliance with law regulation contracts or policy.		0.73		
Co-ordinating audit activities with external auditors			0.83	
Conducting follow-up investigations to determine whether management or others have responded to your recommendation after some time has passed			0.76	
Reporting to a higher level in the organisation if management fail to respond			0.72	
Producing regular reports for the annual general meeting of active members of the cooperative			0.67	
Filing written reports on issues raised				0.78
Agreeing with managers the purpose of your investigation before commencing the audit				0.78
Communicating with information technical staff				0.78
<i>Cronbachs alpha coefficient</i>	0.97	0.93	0.77	0.74

^a Kaiser-Meyer-Olkin measure of sampling adequacy = 0.90.

^b Respondents were asked to what extent their role as internal auditor involved the activities represented in each item by circling a number from 1 to 7, where 1 = not at all and 7 = to a great extent.

Table 2: Rotated Loadings of Items Measuring Critical Success Factors^a

Item ^b	Component					
	1	2	3	4	5	6
The AIS package is easy to modify	0.88					
The AIS package is stable	0.83					
The AIS package has sufficient documentation for people to follow	0.82					
The AIS package is up-to-date	0.81					
The AIS package automatically performs as much validation of data as possible (based on business rules etc.)	0.81					
The subsystems of the AIS are integrated	0.80					
The AIS package is easy to use	0.79					
The AIS package is suitable for this cooperative	0.72					
An effective data management approach such as a centralized database is employed	0.64					
Top management assumes responsibility for data quality performance		0.87				
Top management supports long-term data quality improvement process		0.85				
Top management allocates adequate resources toward efforts to improve data quality		0.77				
Top management (such as chairman secretary treasurer of the cooperative) recognises the importance of data quality in the AIS		0.74				
We have clear data quality goals identified by top management		0.71				
There is effective communication between different members of the organisation such as director secretary treasurer internal auditor manager and staff			0.76			
There is effective communication between different departments			0.76			
There is effective communication within departments			0.71			
We work as a team in this organisation			0.67			
We try to get the information right during the input phase				0.85		
Our input data controls are very effective				0.79		
Our input data controls are very reliable				0.70		
Competency and innovation in doing a job are encouraged					0.79	
We employ well-trained experienced and qualified personnel at all levels of the organisation both technical and business areas					0.78	
Personnel are encouraged to try new and better ways of doing their jobs					0.69	
Middle managers accept responsibility for data quality performance						0.88
Middle management is effective in improving data quality						0.84
There are effective procedures for ensuring data quality at the middle management level						0.43
<i>Cronbachs alpha coefficient</i>	<i>0.95</i>	<i>0.90</i>	<i>0.83</i>	<i>0.80</i>	<i>0.73</i>	<i>0.72</i>

^a Kaiser-Meyer-Olkin measure of sampling adequacy = 0.91.

^b Items were measured on a 7-point scale, where 1 = strongly disagree and 7 = strongly agree.

Table 3: Rotated Loadings of Items Measuring Data Quality in AIS^a

Item ^b	Component
	1
How timely is the data in the AIS? (Timely here means the recorded value is not out of date)	0.85
How complete is the data in the AIS? (Complete here means all values for a certain variable are recorded)	0.84
How accurate is the data in the AIS? (Accurate here means the recorded value conforms with the actual value)	0.78
How consistent is the data in the AIS? Consistent here means that the representation of the data value is the same in all cases)	0.73
<i>Cronbachs alpha coefficient</i>	<i>0.81</i>

^a Kaiser-Meyer-Olkin measure of sampling adequacy = 0.74.

^b Respondents were asked to rate data quality in the accounting information system in their cooperative on each of the items using a 7-point scale, where 1 = very low and 7 = very high.

Table 4: Regression of Data Quality in AIS on the Internal Auditor Role and Critical Success Factor Variables

Independent Variable	Unstandardised Coefficient	Standardised Coefficient	t-Statistic	Prob. Value
System Involvement	0.24	0.30	5.80	<0.01
Control oversight	0.01	0.01	0.27	0.79
Management Reporting	0.08	0.12	2.13	0.03
Communication	0.07	0.09	1.34	0.18
Top Management. Commitment	-0.05	-0.07	-1.05	0.30
Middle Management Commitment	0.15	0.15	2.48	0.01
Input Controls	-0.01	-0.02	-0.38	0.71
AIS Suitability	0.22	0.26	3.90	<0.01
Teamwork	0.24	0.28	3.78	<0.01
Personnel Competence	-0.03	-0.05	-0.71	0.48

Constant = 0.995

$R^2 = 0.646$ Adjusted $R^2 = 0.627$

$F(10\ 183) = 33.468$