

## Information Technology and Accounting Information Systems' Quality in Croatian Middle and Large Companies

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### Abstract

An accounting information system is of a great importance for preparing quality accounting information for a wide range of users. The study elaborates the impact of information technology on accounting process and as a consequence on accounting information systems quality. This paper analyzes the basic characteristics of accounting information systems quality, discussing the model of AIS's quality measurement. The perception of the quality of accounting information systems by accountants in medium and large companies in Croatia is also presented. The paper presents the historical overview of AIS's quality based on three empirical studies conducted in 2001, 2008 and 2012.

**Keywords:** accounting information system, information technology, quality

### 1. Introduction

The role of accounting information system (AIS) is of great importance for business decision making process and management. For the first time in 1966, the American Institute of Certified Public Accountants (AICPA) stated that: "Accounting actually is information system and if we be more precise, accounting is the practice of general theories of information in the field of effective economic activities and consists of a major part of the information which is presented in the quantitative form" [20]. Consequently, an accounting information system is a part of overall information system which main goal is to generate information for business decisions. The way of gathering, analyzing, processing, distribution and archiving accounting information has been changed during the years; however, accounting information has always been an important part of business operation.

In past few decades an accounting information system has been determined by different models and approaches. Accordingly, the most significant influence belongs to information technology.

### 2. Impact of information technology on accounting process

The application of information technology significantly affects the operations of the organization. Consequently, organization needs to understand the role of technology inside the organization and its influences on the organizational processes [9]. An accounting information system supported by a proper information technology is a requirement for management in modern business conditions. The quality of accounting information depends on the integrity of accounting information system as well as its relation with other business areas. Integrated business application (IBA) helps accounting to add value to business. As a result, an entity uses reliable, timely and accurate information. Accounting data processing

supported by appropriate IT causes a decrease in cost of accounting information production, the increase of confidence in accounting information and becomes time and energy saving.

Accounting information system is, historically viewed, determined by information technology development. In that sense, some survey results show that companies change their accounting information systems, especially in the field of cost accounting, as a response to the changes in environment and as a response to the new technologies. [2] Similar changes have happened in the field of managerial accounting. Empirical survey results in Slovenia show that certified accountants connect information technology with the changes in the role and tasks of managerial accountants. Among many features, information technology has been showed as the most significant feature of the changes in managerial accountants' role and tasks (73% in case of British managerial accountants and 72% of Slovenian managerial accountants). According to 41% British and 39% Slovenian certified accountants the second important feature of changes in managerial accountants' role and activities is recognized in new accounting software. On the third place is e-business (32%; 22%). [12]

It is obvious that traditional accounting system, its input, data processing and output have been changed because of information technology. „Fast progress in online technology and World Wide Web (www) application in past decade was the reason of e-commerce and e-business“[22]. Electronic accounting arises from the electronic and internet business concepts. In that sense, accounting can be recognized as accounting through virtual office and as paperless accounting. Accounting through virtual office can speed up the business – conducting process and does not depend on the geographic location of business partners and company. Paperless accounting implies electronic input and output and there is no need for documents' and reports' printouts. Although, today many business transactions are documented, processed and reported paperlessly, still paperless accounting has not been put in live on a global level. Integrated business applications contribute this new modern approach of accounting. The traditional sources of documents e.g. purchase orders, invoices, cheques have been changed with the wide spread of using e-mails and accounting evidence (journal, general ledger, subsidiary ledgers) has become electronic [11]. Basic requisites for paperless accounting are:

- a) data entering should generally have the form of electronic inputs,
- b) accounting records should be conducted as electronic records, (today, many parts of accounting records are still conducted manually and they are printed at the end of the period) and should be in accordance with accounting standards, principles, prerequisites, etc.; some parts of accounting records are integrated and allow fast data transfer (data records should arise at a place and at a time when a business event occurs and have to be automatically forwarded in all corresponding records and reports),
- c) conducting and distributing output (accounting information) in most cases have to be in electronic form in order to duly deliver up-to-date and reliable information to users, saved and continuously updated in an appropriate data base; while printing of accounting information would be performed when needed. [13]

Due to cloud computing in an accounting field, company pays only used computer resources delivered over a network. This trend also influences accounting information system development. The advantage of cloud computing is recognized in the process of hardware and software procurement. As a result, costs of development and maintenance of accounting information system decrease. Furthermore, information availability is improved due to Internet access in any time and from any place. The influence of information technology on accounting is not only represented by technological innovation but also there is an influence on a wide range of users [25]. In that context it is important to stress that companies all over the world have been using Internet for disclosure of financial and other business information [3]. Internet and XBRL language have significantly changing financial reporting. From the accountants point of view XBRL contributes gathering and analysis of information and helps to accomplish their legal obligations [1]. Regardless the advantages of information technology in accounting fields, certain information technology risks should not be diminished or

ignored. Although IT contributes all parts of accounting process, company should take care on internal control system, especially in IT environment.

### **3. Characteristics of accounting information system's quality**

In order to successfully perform numerous business tasks and make rational business decisions, quality information is necessary. Information is increasingly being recognized as a key economic resource and as one of the firm's most important assets [17]. According to Glazer, firms that successfully integrate an information technology strategy with their business strategies do so by focusing on the information itself, rather than on technology, as the real carrier of value and source of competitive advantage [7]. Information provides the capability to deliver services, make better decisions, improve performance, achieve competitive advantage and can also be sold directly as a product in its own right [17].

Numerous research efforts have been made in evaluation of information quality and information systems quality, and as a result many models on information and information systems quality have been developed. One of the first models was Shannon's model of communication from 1948, in which he extended the general theory of communication to include a number of factors, in particular the effect of noise in channel, and savings possible due to the statistical structure of the original message and due to the nature of the final destination of information [21]. Mason developed a conceptual framework for measuring the output of an information system, and based on communication theory he developed four approaches to output measurement: technical level output, semantic level output, functional output and influence or pragmatic level output [16]. Based upon theories of semantic information, including Dretske's semantic theory of information, Devlin's 'infor' theory, Stamper's Organizational Semiotics, and Floridi's revised standard definition of information, Hu and Feng have created a data-information quality model under an Information Source (S) – Information Bearer (B) – Information Receiver (R) framework [10]. After extensive review of conceptual and empirical studies on information systems, DeLone and McLean concluded that there are many measures of information systems success, which all fall in one of the six interrelated and interdependent categories forming information systems success model. These categories are system quality, information quality, use, user satisfaction, individual impact and organizational impact. [4] Wang and Strong developed a framework, based on the aspects of data quality important to data consumers. They mention accuracy, objectivity, believability, reputation, value-added, relevancy, timeliness, completeness, appropriate amount of data, interpretability, ease of understanding, representational consistency, concise representation, accessibility and access security as the most important data attributes [24].

Many information quality and information systems quality models have been presented in other relevant studies. Researchers indicate that information quality and information systems quality cannot be uniquely defined since they are multidimensional concepts. Accordingly, information quality frameworks contain some quality dimensions or categories derived normally based upon some research method in a specific domain with a set of quality metrics, criteria, components, items, or attributes [10].

The effectiveness of an organization is dependent on the quality of its information, which is provided within the enterprise information system. Generally, the information system is the set of formal procedures by which data are collected, processed into information, and distributed to users. The quality of information system can be managed and maintained only if the quality of all of its components (people, data, information, technology and work practices) is preserved [9]. Two broad classes of systems emerge from the decomposition: the accounting information system (AIS) and the management information system (MIS), which are integrated to achieve operational efficiency [8]. The distinction between AIS and MIS centers on the concept of a transaction. AIS subsystems process financial transactions and nonfinancial transactions that directly affect the processing of financial transactions. The management information system (MIS) processes nonfinancial transactions that are not normally processed by traditional AIS. [8] The principle AIS's goal is to generate information on company's financial position and business performance. In order to accounting

information become useful in decision making process, information that satisfies certain quality characteristics is expected. The factors impacting on data quality for accounting information systems are similar to those of the factors for information systems in general [27]. The quality of information is usually recognized through its accuracy [26]. However, there are many other measurements of information quality, as previously indicated. There is no unique attitude about the determinants of accounting information quality. There are some features that are recognized, by legislator or experts, as features of accounting information quality. According to International Financial Reporting Standards Framework financial information is useful when it is relevant and represents faithfully what it purports to represent. In that context, International Accounting Standards Board (IASB) stress that the usefulness of financial information is enhanced if it is comparable, verifiable, timely and understandable. Relevance and faithful representation are the fundamental qualitative characteristics of useful financial information. On the other hand, the second most important regulatory body in accounting field Financial Accounting Standards Board (FASB) indicates primary and secondary qualitative characteristics. As figure 1 shows FASB defines primary qualities as relevance and reliability.

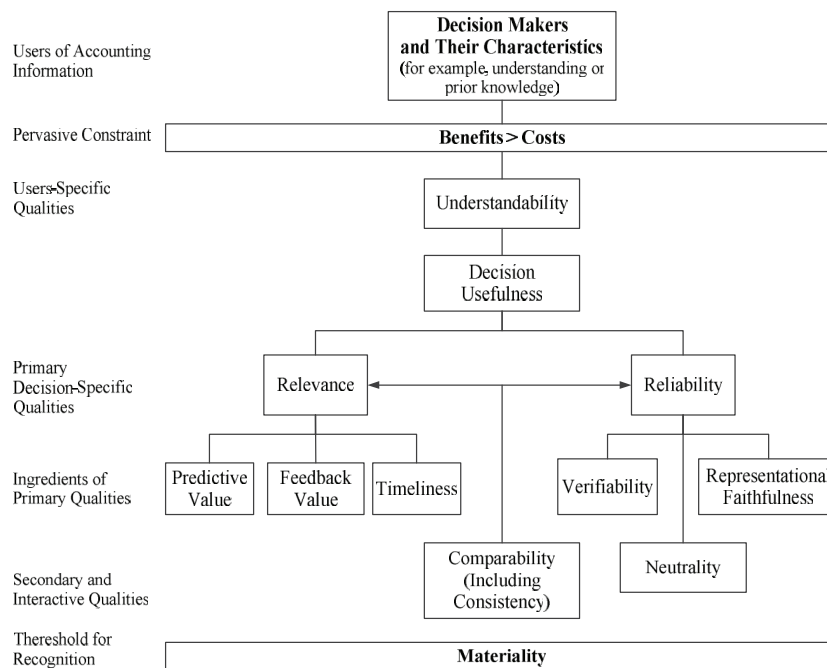


Figure 1. A Hierarchy of Accounting Qualities [6], [5]

Towards FASB hierarchy of accounting qualities quality AIS should generate reliable and relevant information. Today, AIS which is properly supported by IT is able to generate a wide range of information in a short term. However, information reliability is often omitted despite the fact that reliable information keeps confidence in AIS, needless to say how reliable information important for business management and making decisions is. Secondary accounting qualities are comparability and neutrality. Only neutral information without favoritism can contribute business decisions. Comparable accounting information helps users to detect similarities and differences in the financial position and business performance among companies.

The measurement of accounting information quality depends on the measurement of AIS's quality due to the fact that accounting information is an output of accounting

information system. Consequently the quality of accounting information depends on the quality of AIS and other non-accounting information systems (operative and statistic information subsystems). The literature doesn't provide an exact approach how to measure information systems' quality. Information systems' quality measurement is considered to be multidimensional. The basic mathematical model for accounting information quality measurement takes into consideration the benefits of accounting information and the costs of its production:

$$\text{accounting information quality} = \frac{\text{benefits of accounting information}}{\text{costs of accounting information production}},$$

where; benefits > costs.

This model, where quality accounting information is information which benefits are greater than its costs of production, is a basic model of accounting information quality measurement. Further, this model can be supplemented with different indicators of benefits and costs. The benefits of accounting information are hard to quantify but can be measured by the utility of information for the users, investors, creditors, tax authority etc. Costs represent the spent time and the resources needed for gathering documents, data processing, archiving and delivering reports to the users for making decisions. Practically it is very hard to identify and quantify all costs related to a production of accounting information. For instance, such costs are costs of hardware, accounting software, the salary of accountants, some other overheads (education costs, accounting data and information security, Internet access etc.). Overheads cannot be immediately associated with the production of accounting information.

Internal and external features of AIS' quality are of a great importance for the measurement of the accounting information benefits. Some of criteria are shown in table 1.

CRITERIA FOR ANALYSIS OF AIS' QUALITY					
	Principles of AIS' operation [23]	Accounting process' quality	AIS coverage	AIS development	Opinion of Croatian accountants <sup>1</sup>
<b>THE FEATURES OF QUALITY</b>	<ol style="list-style-type: none"> <li>1. connection AIS and a business decision system</li> <li>2. unique information system for the whole business system</li> <li>3. consideration of benefit and cost of information</li> <li>4. uniqueness of an access and classification of information</li> <li>5. information feedback</li> <li>6. information documentary evidence</li> <li>7. information quality</li> <li>8. AIS's rationality</li> </ol>	<ol style="list-style-type: none"> <li>1. input quality</li> <li>2. data processing quality</li> <li>3. output quality</li> </ol>	<ol style="list-style-type: none"> <li>1. accounting software quality</li> <li>2. hardware quality</li> <li>3. communication support quality</li> <li>4. quality of work and satisfaction of users</li> <li>5. organisation solutions quality</li> <li>6. data base quality</li> </ol>	<ol style="list-style-type: none"> <li>1. accounting systems planning quality</li> <li>2. accounting systems analysis quality</li> <li>3. accounting systems design quality</li> <li>4. accounting systems testing and implementation quality</li> <li>5. quality of postimplementation phase</li> </ol>	<ol style="list-style-type: none"> <li>1. multifunctionality</li> <li>2. universality</li> <li>3. control mechanism</li> <li>4. being up-to-date,</li> <li>5. compatibility to other software</li> <li>6. ability to upgrade</li> <li>7. simplicity</li> <li>8. universality</li> <li>9. grade of adaptation to business process</li> <li>10. employees' skill</li> <li>11. security and reliability</li> </ol>

Table 1. The features of AIS' quality

<sup>1</sup> These are the results of empirical survey conducted during 2005. The questionnaire was sent to accountants in 400 large and medium-sized companies. Response rate was 25%. [14]



So, quality accounting information system is the accounting system which meets internal and external users' needs. In order to accomplish this goal, accounting information system has to operate in the way that is able to be attuned to other systems. The level of AISs integration with other information systems determines its quality. AIS consists of hardware, software, people, communication and network, organisation solutions and data. The quality of AIS can be achieved provided each segment of the system operates properly. Moreover, the quality of AIS is contingent on the existence and the quality of implemented internal control procedures. Internal control system is a prerequisite for producing reliable accounting information. Xu finds top three critical factors for ensuring data quality in AIS: top management commitment, education and training, and the nature of the accounting information systems [26]. Among previous mentioned features many other features influence the quality of AIS. These are normative features (laws and standards), accounting methods and principles, information system audit, users' needs, organizational structure and many others and they have to be taken into consideration when company takes care on the quality of accounting information systems.

#### 4. The results of empirical research – case of Croatia

##### 4.1. Information technology in Croatian middle and large companies

The quality of AIS certainly depends on the level of application of modern IT within the company as well as on the requirement of company's environment related to such technologies. According to the empirical results the majority of analyzed medium and large companies in the Republic of Croatia are equipped with a relatively new hardware and software that support company's information system. It is important that Croatian companies realize the significance of investments in new IT equipment because it allows them to be more competitive. Table 2 shows respondents' answers on the age of computer equipment in their companies from the studies carried out in 2008<sup>2</sup> and 2012<sup>3</sup>.

The average age of the computer equipment and software that support the information system of your company is:	2008		2012	
	N	%	N	%
less than 1 year	2	2,0	3	2,1
1 – 3 years	45	46,0	63	44,7
3 – 5 years	34	34,7	53	37,6
more than 5 years	17	17,3	22	15,6
Total	98	100,0	141	100,0

Table 2. Average age of the computer equipment and software in middle and large companies in Croatia

The quality of accounting information systems depends on IT support. Table 3 shows IT support in Croatian middle and large companies. Empirical survey results indicate that IT users support in 2008 was usually organized as a separate department of the company. Similar survey results are found in 2001.<sup>4</sup> But, in 2012 more than half of the respondents outsource IT support. Results are shown in Table 3.

Historically viewed, IT impact on AIS is undoubted. According to a research conducted in 2008, 84% of accountants (from medium and large companies) believe that the IT impact on accounting tasks is significant.

<sup>2</sup>Empirical survey was conducted during the period from April till May 2008.; N=320 middle and large companies, response rate: 43,75%, respondents: accountants. [18]

<sup>3</sup>Empirical survey was conducted during the period from May till July 2012.; N=1.120 middle and large companies, response rate 12,68%, respondents: accountants. [19]

<sup>4</sup> Empirical survey was conducted during the period from March till May 2001.; N= 350, response rate 43,43%. [15]

IT users support in your company:	2001		2008		2012	
	N	%	N	%	N	%
is organized as a separate IT department	98	66	69	71,9	56	39,7
is outsourced by external specialized IT company	45	30	25	26,0	78	55,3
is organized within some other department in the company	6	4	2	2,1	7	5,0
Total	149	100,0	96	100,0	141	100,0

Table 3. Organization of IT users support

One of the criteria for measuring AIS’s quality is users’ satisfaction with AIS. According to the survey from 2001, most of accountants were satisfied with the quality of AIS (c. 87%). In 2008, 65% of the respondents stated that they are satisfied with the quality of AIS in their companies, while in 2012 the percentage amounted 75%. The most common reasons for relatively low assessment of the quality of company’s AIS in the study from 2008, were insufficient employee education and the need for introduction of newer IT as the current one could not improve business operation.

#### 4.2. The empirical study results on the factors of accounting information systems’ quality in Croatian companies

The empirical research was conducted from May to July 2012. Target population included medium and large enterprises in the field of manufacturing, construction and trade. The respondents were accountants. Two hundred eighty-seven responses were collected. After eliminating incomplete questionnaires or those which did not meet the set criteria, final number of processed questionnaires was 142. Questionnaire return rate was 12,68%.

The study was conducted to examine the perception of respondents about the quality of AIS in analyzed companies. The overall estimation of the AIS quality was formed as unweighted average of the factors that affect the quality of AIS. According to Xu [26] the three most important factors of AIS quality are: top management commitment, education and training, and the nature of the accounting information systems. Besides those three factors teamwork between accounting and IT professionals as well as auditing of information system and accounting information were also observed. Accounting information characteristics were adjusted to basic characteristics that those information should have in accordance to IFRS.

Statements	Middle companies		Large companies		Total	
	N	Avg.	N	Avg.	N	Avg.
Management recognizes the importance of AIS data quality and supports the activities for ensuring data quality.	101	4,109	41	4,244	142	4,148
Employees have appropriate education to understand and effectively use AIS (e.g. continuous education, education of new employees).	101	3,663	41	3,951	142	3,747
There is teamwork between accounting and IT professionals in your company.	101	4,029	41	4,171	142	4,070
There is continuous auditing of information system and data quality.	101	3,852	41	4,122	142	3,929
Quality of accounting information.	100	4,452	40	4,371	140	4,429
Nature of the accounting information systems. <sup>5</sup>	99	4,298	40	4,288	139	4,295
<b>AIS quality - total</b>		<b>4,062</b>		<b>4,197</b>		<b>4,100</b>

Table 4. AIS quality in analyzed companies in Croatia

<sup>5</sup> Related to average assessment of AIS characteristics.

Respondents assessed the extent to which they agree with certain statements related to AIS on the five-point Likert scale (with a choice of strongly disagree to strongly agree). The results are given in Table 4.

Eighty-five percent of respondents stated that management mostly or absolutely recognizes the importance of AIS data quality and supports the activities for ensuring data quality. There were 69% of those who had adequate education to understand and effectively use AIS. 59% responded that AIS in their companies is integrated to other business activities. 78% of companies have had a good teamwork between accounting and IT professionals. In order to determine whether the asset of information system is secured and the data integrity is assured it is necessary to conduct information system audit. Two thirds of respondents agree or strongly agree that this audit is continuously performing in their companies.

The usage of AIS depends on the perception of the quality of information by the users [20]. The average grade of accounting information quality in analyzed companies is satisfactory (4.43) and most of respondents agree that accounting information generated in their AIS is high-quality information. The overview of quality of accounting information is provided in table 5.

	Middle companies		Large companies		Total	
	N	Avg.	N	Avg.	N	Avg.
Relevance	101	4,337	41	4,317	142	4,331
Reliability	101	4,446	40	4,350	141	4,418
Integrity	101	4,535	41	4,463	142	4,514
Understandability	100	4,520	41	4,439	141	4,497
Timelines	101	4,406	41	4,342	142	4,387
Confidentiality	101	4,495	41	4,390	142	4,465
<b>Average assessment</b>		<b>4,452</b>		<b>4,371</b>		<b>4,429</b>

Table 5. Accounting information quality in analyzed companies in Croatia (empirical survey from 2012)

Overview of the nature of AIS is provided in table 6. Respondents from large companies, in comparison with those from middle ones, rated the simplicity of AIS usage somewhat lower. Even though, 80% of them agree that accounting software in their company is easy to use. There are 86% of them who agree that the software is stable and 94% of those who agree that it is upgradeable.

Statements	Middle companies		Large companies		Total	
	N	Avg.	N	Avg.	N	Avg.
Your company's AIS is easy to use.	101	4,009	41	3,976	142	4,000
Your company's AIS is stable.	100	4,230	41	4,219	141	4,227
Your company's AIS is upgradeable.	101	4,644	40	4,500	141	4,603
Your company's AIS is integrated to other business activities.	100	4,340	41	4,439	141	4,369
<b>Nature of AIS - total</b>		<b>4,298</b>		<b>4,288</b>		<b>4,295</b>

Table 6. Nature of AIS in analyzed companies in Croatia (empirical survey from 2012)

## 5. Conclusion

The quality of accounting information system is influenced by many factors. Modern accounting information system is almost unimaginable without the use of appropriate information technology. IT influences the way how AIS operates, contributes a preparing, processing, presenting and delivering accounting information. It significantly contributes the



accuracy and timeliness of accounting information and the quality of accounting information systems.

Based on conducted empirical research, it is possible to conclude that the quality of AIS and quality of accounting information in analyzed companies is at a satisfactory level. But nevertheless there are areas in which improvements are needed, such as the implementation of appropriate education of employees and conducting continuous auditing of information system, to ensure the quality of accounting information.

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