Accounting Information Quality

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Abstract

Information Quality (IQ) is an emerging area of research that crosses many disciplines. This paper examines and reconciles the defining dimensions of information quality as studied in the fields of Management Information Systems and in Accounting. IQ frameworks from these fields are presented and contrasted. Three brief cases are discussed to illustrate the challenges of assuring high quality accounting information. The three case examples illustrate problems facing current practice, where over- or under-reliance on computer systems could prove to be an impediment to achieving good IQ.

Introduction

Information Quality (IQ) is an emerging area of research that crosses many disciplines. It is particularly critical within Management Information Systems (MIS) as it governs the design of systems as well as production and use of the information in the systems (Ballou, 1998; Wang et al., 1998; Lee, 1996; Wang & Strong, 1996). IQ, also referred to in research as Data Quality, permits the delivery of high quality information to information consumers. IQ encompasses the definition, measurement, analysis, and improvement to tools, methods and processes surrounding the collection, processing and delivery of information (Wang, 1998). As companies collect and integrate more and more data in comprehensive, enterprise-wide systems, the availability of high-quality information becomes a paramount concern in all organizations.

Providing and assuring quality information has been the primary objective of accounting since the inception of the field. With the advent of Accounting Information Systems (AIS), the traditional focus on the input and recording of data needs to be offset with a recognition that the systems themselves may affect the quality of information. Theoretical discussions of Accounting IQ need to be offset by pragmatic approaches to designing and auditing AIS (Kaplan et al, 1998).

This paper examines and reconciles the defining dimensions of information quality in these two areas. The IQ literature can inform accountants of systems issues that may be missing from the hierarchy of information qualities published by the Financial Accounting Standards Board (FASB), which is the basis of much accounting practice. In addition, IQ researchers and practitioners can learn from the tools and approaches developed by accountants. Many frameworks, rules and laws exist that govern IQ issues as they apply to the accountant's role in providing, controlling, auditing and interpreting accounting data. Despite the existing frameworks, rules and laws, field cases illustrate that accounting information quality needs to be further improved. We offer specific lessons for improvement by reconciling these two major frameworks used in the MIS and Accounting ar-

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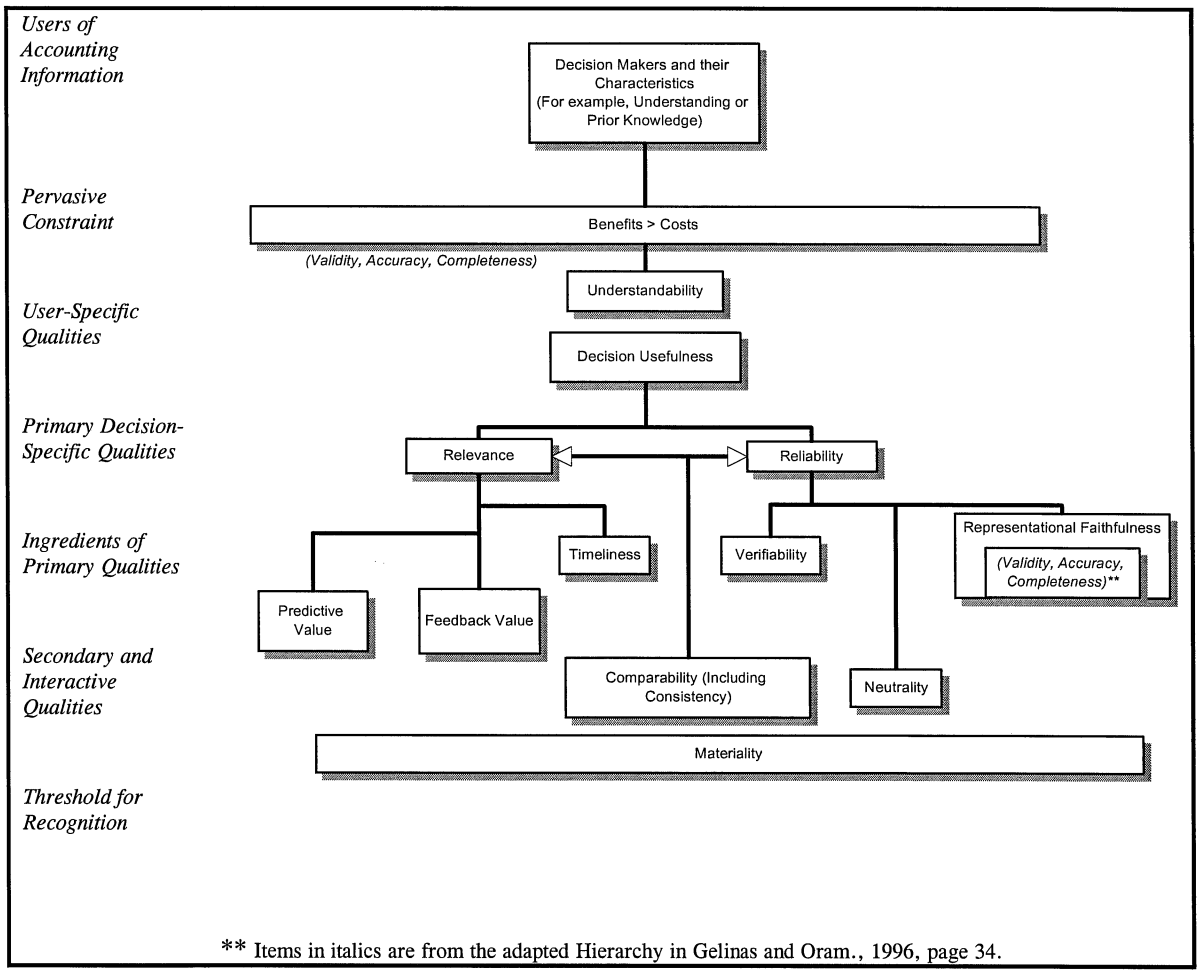
eas.

Reconciling the IQ Hierarchy with the IQ Dimensions

Accountants frequently reference a hierarchy of information qualities originally published by FASB (FASB, 1980). Dimensions of the hierarchy, reproduced in Figure 1, are described in Table 1. The definitions are derived from Gelinas and Oram (1996) and Pincus (1997). IQ researchers have independently developed and tested a set of dimensions that parallel this hierarchy (Wang and Strong, 1996). The Wang-Strong dimensions are included as Table 2.

It is obvious that there is considerable overlap in these two approaches. Both approaches identify Accuracy, Understandability, Relevance, and Timeliness as important aspects of IQ, and both consider Objectivity and Value Added to be benefits of information that characterize high quality data. The overlap confirms

Figure 1
FASB Hierarchy of Accounting Information Qualities (FASB, 1980)



** Items in italics are from the adapted Hierarchy in Gelinas and Oram., 1996, page 34.

Table 1
Definitions of FASB Hierarchy Elements

Elements	*Definitions*
Costs vs. Benefits	Overall constraint on the amount of information a decision maker will get.
Understandability	Familiar form and/or presentation; makes sense to user
Reliability	Comprised of Representational Faithfulness, Neutrality, and Verifiability
Representational Faithfulness	Ability to count on information being what its purported to be
Accuracy	Correspondence between the information and the events or objects that the information represents
Completeness	Degree to which information includes data about every relevant object or event
Validity	Information describes actual events or actual objects
Neutrality	Reasonably free from bias
Verifiability	Can be independently derived from the same underlying data
Relevance	Comprised of Timeliness, Predictive Value and Feedback Value
Timeliness	Availability prior to point of need
Predictive Value	Information that can help to predict the future
Feedback Value	Confirms (or disconfirms) user's expectations
Comparability	Can be compared to a benchmark
Materiality	Threshold below which even relevant, reliable information isn't likely to make a difference in a user's decision

(Source: Adapted from FASB, 1980, and Gelinas and Oram, 1996)

the robustness of the underlying concepts, especially as they were developed from different perspectives and for different purposes. The accounting hierarchy is intended to guide professionals in assessing the overall quality of the information collection, reporting and control processes for business financial and non-financial data. The Wang-Strong dimensions guide IS professionals in the delivery of quality information to information consumers, incorporating information technology in the production, storage and use of information.

More interesting are the differences between the two approaches. First, there are several aspects of the FASB hierarchy that are missing from the Wang-Strong presentation. Materiality, an underlying principal of accounting record keeping, provides a minimum threshold over which data is considered to be important enough for inclusion in collected or reported data. Cost-benefit identifies the upper threshold, wherein the information, while material, is not considered to be worth the effort of obtaining it. The Wang-Strong dimensions seem to presume that cost is not a relevant characteristic of information.

Validity and verifiability are also important to accountants, as they are charged with assuring that reported information fairly represent the economic, operational activity of an examined company. The Wang-Strong view assumes that underlying data is genuine and can be authenticated outside of the IQ assessment process.

The Wang-Strong dimensions include a contextual perspective that FASB does not, except as a characteristic of the decision maker, the user of the information. The dimensions of believability and reputation apply to how the user

Table 2
Dimensions of Information Quality

Dimensions	*Definitions*
Accessibility	the extent to which information is available, or easily and quickly retrievable
Appropriate Amount of Information	the extent to which the volume of information is appropriate for the task at hand
Believability	the extent to which information is regarded as true and credible
Completeness	the extent to which information is not missing and is of sufficient breadth and depth for the task at hand
Concise Representation	the extent to which information is compactly represented
Consistent Representation	the extent to which information is presented in the same format
Ease of Manipulation	the extent to which information is easy to manipulate and apply to different tasks
Free-of-Error	the extent to which information is correct and reliable
Interpretability	the extent to which information is in appropriate languages, symbols, and units, and the definitions are clear
Objectivity	the extent to which information is unbiased, unprejudiced, and impartial
Relevancy	the extent to which information is applicable and helpful for the task at hand
Reputation	the extent to which information is highly regarded in terms of its source or content
Security	the extent to which access to information is restricted appropriately to maintain its security
Timeliness	the extent to which the information is sufficiently up-to-date for the task at hand
Understandability	the extent to which information is easily comprehended
Value-added	the extent to which information is beneficial and provides advantages from its use

(Source: Adapted from Wang et al., 1996)

perceives the information. Up until now, accountants have been primarily concerned with providing quality information, and less about how it would be interpreted. With easy access to shared, public data, accountants should also begin to examine the range of contexts in which the information will be used.

Information technology complicates the study of IQ by increasing the amount of data that can be reasonably stored, increasing the number of access points to information and eliminating physical records of or easily readable formats for inputting and updating data. The Wang-Strong dimensions incorporate characteristics of systems that can have a direct impact on IQ, including Amount of Data, and Access to the information. A third dimension, Access Security, while not an explicit element of the FASB hierarchy, is a major component of tools and frameworks used to control information quality, such as COBIT, the Control Objectives for Information and Related Technology (ISACA, 1998). As the accounting profession expands its offerings into various areas of assurance services, it is important to focus on the qualitative implications of

Table 3
Case Examples of Accounting Information Quality Problems

Cases	Case Description	Key Dimensions
Case 1: The "Same Amount" Check	Most accounting software applications include routine edits to prevent duplication of input/payments, etc. The edit is designed to alert the user to the possibility that there are certain matching fields, i.e. vendor, payment amount, invoice date, etc. This is to prevent items from being erroneously processed. The user usually does a manual override to these edits quite easily.	Consistency
Case 2: The Fraud Situation	Often software will be deemed to be responsible for errors. A major loan servicer had two computer systems for processing their loans. On one of the systems, an agent was altering various critical loan data by using bottled "white-out." The US Office of Education determined that the computer system with the altered data was not acceptable. However, the true culprit of the fraud was an innocuous bottle of "white-out."	Validity
Case 3: The Tax Software Program	A major vendor of high-end tax software was unaware of a major software bug. The last line of the first page of a US 1040 is supposed to equal the first line of the following page. Unfortunately, in some cases, the amount on page two, which is critical to the actual tax calculation, was lower than page one. This resulted in taxpayers underpaying their taxes and receiving notices from the IRS that they had underpaid (which resulted in further penalties, interest, etc.). While clearly the software company was responsible for this major error, auditors in the CPA firm using the program should have caught this error before the IRS did.	Accuracy, Verifiability

the systems in which the information resides.

Two other dimensions common to the two approaches are worth mentioning as their use may differ in each perspective. The first of these is Comparability/Consistency. Accountants view information consistency as a concern both "across" time as well as "within" a particular time period (or set of data). Information must be comparable across records in a database, as well as with historical records. This dual view of consistency enables trend analysis and forecasts to be made, both of which are key activities of users of accounting information. The Wang-Strong view of Consistency is broader, and encompasses both of these.

The other interesting common dimension is Completeness. The FASB hierarchy is careful to distinguish between occasions when fields are missing from a record (considered to be an error in the record and therefore an instance of lack of Accuracy), and instances where a record is itself missing from a set, here illustrating a lack of Completeness. The Wang-Strong model includes three types of Completeness, including these two, missing values and missing records, as well as a third, schema completeness, which is a system design issue, and an

important area of concern of today's accountant.

Examples of Poor Information Quality

Although IQ is a major objective of audit and accounting practice, field experience repeatedly demonstrates that it is a difficult goal to achieve. Three examples from real companies are presented in Table 3 to show how an IQ framework could highlight or prevent typical IQ problems. Company names are omitted to ensure confidentiality.

Case 1 exemplifies the power of manual overrides exercised by accountants who know about and can interpret the context of "same amount" checks. When information quality control is left to unsophisticated and routine edit checks in databases, some otherwise innocuous looking errors may be overlooked and processed without correction by more knowledgeable accountants. The definition of *consistency* as performed by an overly simplistic edit check can be erroneous. This case reveals the relevance of accountants' knowledge base, which may not be embedded into automatic IQ edit checks designed to eradicate duplicate information.

Case 2 illustrates the implications of illicit actions when an information quality control process is not in place for reviewing and checking *all* aspects of information production. Automated information quality processes need to be coupled with manual, after-the-fact validity checks to comprise a comprehensive IQ framework. *Validity,* in the FASB Hierarchy, subscribes to the principle that "(all) information should describe actual events or actual objects." This dimension, missing from the Wang-Strong approach, may not have been included in this system's audit. In this case, the US Office of Education took too narrow a view of the information production process, and misidentified the actual culprit.

Case 3 shows the ramification of using an erroneously designed tax software tool, which created legal and accounting problems for CPAs and individual taxpayers. Software can shield a process from users simply because users assume that it embodies a correct process and will consistently render quality results. Therefore, the quality of the software tool itself must be reviewed as part of an accounting information quality assessment. Information, whether or not it is produced with a computer, must be accurate and verifiable by users. *Accuracy* and *Verifiability* are both important dimensions of FASB, while *Accuracy* is a Wang-Strong dimension. Neither the FASB hierarchy nor the Wang-Strong dimensions, however, explicitly articulate software quality as a key IQ dimension.

These cases illustrate that IQ assessment must encompass both computerized processes and the manual processes surrounding the preparation and use of computer-generated information. Users must neither ignore nor overly rely on computer controls in assuring that their information possesses all of the relevant information qualities.

Conclusion

The IQ hierarchy established in accounting reflects traditional accounting and auditing practice. Naturally, the hierarchy explicitly frames accounting context-specific IQ characteristics, such as Materiality and Cost-benefit, as these are explicit professional goals within an auditing perspective. The Wang-Strong dimensions are developed from a general information consumers' task context. As such, they encompass a broader definition that incorporates an information systems and technology context.

This discussion has examined (1) the overlapping dimensions, (2) exclusive dimensions, and (3) common dimensions of these two frameworks. It suggests that reconciling the two approaches to defining IQ offers lessons to be learned for both the accounting and IQ areas. IQ assurance will be an increasingly important con-

cern of the accounting profession as organizations adopt enterprise systems to augment existing business processes. The three case examples illustrate problems facing current practice, where over- or under-reliance on computer systems could prove to be an impediment to achieving good IQ.

Suggestions for Future Research

A comprehensive framework for measuring and testing IQ must incorporate the challenges and opportunities posed by IT today and in the future. Further study is being undertaken to establish formal guidelines about accounting IQ from data and cases collected from the field, to update the FASB hierarchy for tomorrow's concerns.

Interviews with users of the COBIT framework are being conducted to assess the current audit environment with respect to information quality, and to diagnose common IQ problems in organizations. Recommendations for applying IQ dimensions to generally accepted audit frameworks like COBIT and COSO will result from this analysis.

Research is also needed to ascertain the breadth of IQ awareness and application throughout the systems development, implementation, and use processes. Field studies of IQ assessment and testing are called for, to close the circle on this important information analysis component. 🕮

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