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# INTEGRATING IT AND MANAGEMENT ACCOUNTING INFORMATION: A CONCEPTUAL FRAMEWORK

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## Abstract

*Functional managers have long underutilized management accounting information because it is untimely, aggregated, and irrelevant for decision making. This paper reviews several IT related concepts that have the potential to overcome this management deficiency. These include knowledge management, intranet/community of knowledge, information value chain, data warehousing, and critical success factors. The paper concludes that the value of these newer concepts may depend on the dynamism of the organization's environment and the development of more advanced tools for their use, but that some organizations can benefit right away by beginning to use the ideas to initiate discussions between accounting and functional areas.*

**Keywords:** Management accounting, knowledge management, information value chain, data warehousing, critical success factors

## Introduction

Under the scope of accounting information systems, accounting departments serve as information providers who identify the most relevant information for management decisions. The functional managers, such as purchasing and manufacturing managers, receive management reports that have been rarely used because they do not contain information that the managers want (McKinnon and Bruns 1993). Many organizations, as a result, have been investing substantial valuable resources to generate reports that are underutilized.

The above management deficiency raises the issue of how to generate information that is more useful for functional managers. This paper suggests solutions through the use of advanced strategic information system (IS) and information technology (IT) concepts including data warehousing, applied critical success factors, the information value chain, knowledge management systems and the use of an intranet to encourage the emergence of a "community of knowing" (Boland 1995). The paper reviews the potential for these tools and concepts to enable accountants and functional managers to communicate their information needs and create the most useful management reports.

We focus our discussion on the impact of those IT notions to various information attributes including the quality of quantitative and qualitative accounting information and the ability of the system to manage organizational knowledge. The next section examines those characteristics in what we may term the conventional management accounting system. The subsequent sections review the other IT related concepts and their potential.

## Conventional Management Accounting System

The primary objective of an accounting system is to identify, measure, record, and communicate economic information about an organization or other entity in order to permit informed judgments by users of the information. There are two major categories of accounting information: financial and managerial accounting. Financial accounting provides information concerning financial position and profitability of an enterprise to such external entities as shareholders, creditors, customers, regulatory commissions, and financial analysts. Managerial accounting, on the other hand, produces management reports intended for use by managers throughout the firm to support their normal operations (Needles et al. 1999).

In the traditional accounting system, accountants have almost absolute control over accounting information. The management reports normally include the information that accountants believe to be useful for operations according to the established accounting standards and procedures. In addition, because management accounting information is derived from the historical-based financial accounting system, it has been criticized that the information is "too late, too aggregate, and irrelevant" to management decision making (Johnson and Kaplan, 1987). Routine management reports are the most common type of accounting products that can automatically be obtained from the accounting information system. This type of report is most appropriate when managers are dealing with systematic, well-structured problems. However, in an increasing dynamic business environment, executives have complained that these types of reports are insufficient to solve nonsystematic, ill-structured, and complex decision situations (Rockart and Treacy 1982). Even with progress in developing improved systems, researchers note that accounting information still present problems of timeliness, aggregation and irrelevancy, and these problems affect the quality of management decisions (McKinnon and Bruns 1993; Arya et al. 2000).

Among the attempts to increase usefulness of the accounting information is the recommended use of qualitative accounting information (Lovell 1986; LeSaint-Grant 1992; Smith 1993; Corrigan 1998). However, most accounting information is quantitative and the issue of what should be included in the report is still questionable.

In summary, despite the extensive use of accounting systems in an organization, the processes of managing and transforming accounting information into organizational knowledge has not yet been resolved. The following sections introduce several emerging IT management concepts that may help managers gain what they need from the managerial accounting system.

## Knowledge Management Approach

Knowledge management (KM), the creation, distribution, and integration of knowledge across the organization increasingly is viewed as a basis for sustainable competitive advantage (Grant 1996; Kogut and Zander 1992). One approach to bridging the gap between the utility of accounting information and the information needs of functional managers would be to frame the issue as one of providing to the functional manager the knowledge that is embedded in the accounting system—i.e., as a KM issue. Consulting organizations arguably lead in the development and implementation of databases to improve knowledge management, e.g., Andersen Consulting's *Knowledge Xchange*, Ernst & Young's *Center for Business Knowledge*, (Garvin 1997). These KM systems (KMSs) provide a way for individuals to contribute information and experiences to a shared pool of information from across the organization. The KMSs also enable individuals to retrieve answers to their questions from this pool. KMSs thus facilitate the capturing and sophisticated retrieval of knowledge and information (Huber 1991). The intent typically is to enable organizations to learn faster and stay ahead of competition (Garvin 1993).

KMSs can include any type of information, including both quantitative (financial and non-financial) and qualitative. Qualitative information may be in structured or semi-structured text format and often takes the form of reports from prior project leaders on what they have learned during a project.

The information may be turned into more structured knowledge by a series of vetting processes. For example, at Accenture (formerly Andersen Consultants), practice area managers review submissions from consultants and decide what constitutes "best practices" (Makela 1998). The review process addresses information quality and helps transform notes on case studies into knowledge about the best approaches to problems.

KMSs seek to turn tacit knowledge (Polanyi 1966) into explicit knowledge so that it is more accessible to users. Much as described by Nonaka and Takeuchi (1995), the use of a KMS is intended to enable the knowledge that otherwise might remain tacit to be shared more efficiently with others.

For a KMS to succeed, the organization must support a culture that encourages contributors to add their stories and knowledge to the database. One approach to this is to include in their annual reviews a summary of employees' contributions to the knowledge base. Ownership of the entry can be established so that only the original contributor can make updates or changes in the entry. The entry is available for everyone to read, and others who have something to add can make another entry.

The KMS approach is primarily a western and predominantly a North American US approach. Nonaka and Takeuchi (1995) argue that the use of computer databases is not well-suited for knowledge creation because such systems neglect the importance of interaction between individuals and knowledge creation as a social activity (Takeuchi 1998). From their viewpoints, tacit knowledge is best communicated and shared through personal interactions.

## Information Value Chain Approach

Rayport and Sviokla (1995) identify five steps, or separate activities, in a proposed model for the *information value chain*: generate, organize, select, synthesize, and distribute. Meyer and Zack (1996) propose a similar categorization of activities: acquisition, refinement, storage/retrieval, distribution, and presentation. The first model, with its steps of “generate” and “distribute,” provides more of an information provider perspective. The second model, with its step of “acquisition,” provides more of a user perspective. In both cases, the models parallel the adding of value to a physical product through separate, sequential steps in a production process.

Recently, some researchers note that many information systems are “black boxes” in the sense that the user can not see what is happening in the value chain—the processes that add value are hidden to the user. By controlling the *visibility* of the steps in the information value chain, an organization can increase or decrease a customer’s involvement in the process and provide distinctive value to customers (Yang and Vandenbosch 1998). An example an invisible process is the use of an automated teller machine (ATM) to withdraw funds. In this process, the bank does not burden the customer with all the transaction details that result from the withdrawal (the debiting and crediting of accounts and the creation of the audit trail for the series of electronic transactions involved in the customer’s request for cash). On the other hand, some information systems provide a customer interface that “opens up” the black box and provides more visibility. Dun & Bradstreet (D&B) provides customers with direct (read) access to the company’s database on organizations. By providing increased visibility, D&B permits customers to perform data analyses on their own to fulfill diverse information needs. Through the process of *making visible*, D&B provides customers with tools that enable them to take responsibility for fulfilling their own information needs.

The information value chain approach does not distinguish quantitative from qualitative information. Data quality can be “built in” just as in physical value chains through careful control of each process step.

Context, which enables the user to transform data to information and, in a larger sense, into knowledge, must be provided either by the system or by the user of the information. In the case of a value chain that is invisible, the rules and procedures initially built into the system during the design phase provide the context. In the case of a visible value chain, the customer can interact with the system. The latter enables increased flexibility as the customer’s information demands change.

Data *ownership* can be transferred as the information passes from one stage to the other and acquires additional value. However, the original (financial) data ownership would remain with the original providers (the accounting department), who are responsible for the source quality and certification for financial reporting.

A significant management option is the degree of visibility that will be built into the process, and, consequently, how much potential interaction the customer may have with the value chain. In the past, designers went through a formal systems development life cycle design process that included a thorough study of the information requirements of the system users, design and implement phases, and maintenance. Such an approach encapsulated the design parameters in the process and made them less visible after the system became operational. Yang et al. (2001) also argue that increased visibility (as provided by the Internet) enhances organizational and individual learning

The question of visibility of the systems by organizations make accounting information available to functional managers is an area for further research. With the rapid development of easier-to-use network and communications technologies, information providers and information users, formerly separated by other roles such as systems analysts and designers, can work more closely together. Providers and users can create information value chains quickly and change them easily to meet changing requirements.

## Intranet: Creating “Communities of Knowing”

The Internet has become more prevalent in business and commerce. The same technologies also make possible intranets (networks of computers and networks within an organization). Intranets can provide an alternative approach for functional managers to obtain the information they need for their work.

Intranets provide the technical framework for creating an information system that is more visible and flexible than systems that have followed a more conventional development path—e.g., a development path that includes stages of a) needs analysis, b) system design, c) system implementation, and d) user support (Yang et al. 2001, forthcoming). Such systems may have immediate benefits because of this flexibility and visibility, and they also may stimulate a different kind of relationship between the accounting area of an organization and the functional managers.

The immediate and direct value of an intranet is the lower cost of communicating data and information. Berners-Lee, the originator of the Internet, the global network of networks, views the Internet as a “common information space in which we communicate by sharing Information” (Berners-Lee 1998). An intranet may be viewed similarly but applied to an organization rather than globally. An intranet, as a system in which the user requests information (a “pull” system) rather than being provided pre-determined information (a “push” system), gives the information user more control.

Intranets can contain data, information, and knowledge by providing quantitative data, context, and even broader contexts and backgrounds through successive links to other sites. An intranet is an efficient way to make information available to a wide range of users.

Even more so than the global Internet, it may also be an efficient and effective way to acquire information. Each use of the intranet, as an instantiation of an information system, provides the user with the ability to quickly change search strategies, thus enabling multiple instantiations of a system for slightly different purposes. Some observers of the Internet argue that the increased speed and efficiency of communication are not the greatest benefits. Instead, the real value may be in the growth of online communities (Armstrong and Hagel, 1996; Hagel and Armstrong 1997).

Each use of an intranet may be viewed as an instantiation of an information system that increases the visibility of the system to the users (Yang et al. 2001, forthcoming). The increased visibility is one reason the Internet stimulates the formation of communities and enables these communities to become self-sustaining, supportive networks of individuals. The communities emerge as the participants’ roles are unrestricted; some information users become information providers and vice versa. There is more sharing of information among the participants in the network.

An intranet could support a group of individual accountants and functional managers in a community of mutual learning. In such a community, both the managers and the accounting staff learn from the other group. The accounting people learn more about the information needs and requirements of the functional manager; the functional managers learn more about the context and the significance of the available accounting data. Together, over time, the two groups develop shared knowledge and mutual understandings, common systems, and a set of shared expectations about what the other group can provide. In short, they would become a “community of knowing” (Boland 1995).

Intranet sites typically are open for any authorized reader, but ownership of the site is protected so that only the author of the site can edit and make changes. Quality of the data on the site is the responsibility of the author. As with any system that potentially can be linked to other systems, security—through the use of firewalls, passwords, and even encryption—may be advisable.

Locating relevant information is the responsibility of the user, in contrast with transaction-based systems in which the system designer and analyst attempted to anticipate the future information needs of the user. This suggests that individuals in the organization must be knowledgeable of the technology and its use. Keys to successful implementation of such a system include training and preparation of both the users (functional managers) and the providers of the accounting information.

The structure of an intranet is well-suited for situations in which the organization may be growing and changing rapidly. It can enable rapid deployment of information, fine-grained growth and expansion, and rapid responsiveness to changing information needs.

## **Data Warehousing Approach**

Data warehousing creates a central, organization-wide repository in which to organize relevant data spanning both functions and time periods. This use of historical information is unlike other information requesting approaches that use more current data. A user-friendly environment allows decision-makers to drill down for necessary information, with the possibility of performing strategic analyses, uncovering organizational opportunities and threats, and predicting future trends based on historical data.

Many data warehousing projects center primarily around the storage and quick accessibility of quantitative data. The integration and summary of numeric data provides users vantage points of facts and figures across a spectrum of views, ranging from broad, holistic organizational data to data at its most granular format (Inmon 1996). In situations of rapidly changing environmental conditions, the periodic archival of historical quantitative data becomes a consideration (Joshi and Curtis 1999).

Other data warehousing projects have given attention to the provision of qualitative data for decisions regarding external opportunities and responses. Much of this type of data originates from reports by industry researchers, trade publications, annual reports, and other published sources. An organizational data warehouse can serve as an accessible library for this qualitative

information (Joshi and Curtis 1999). Decision makers who would otherwise be oblivious to internal sources of qualitative data taken from departmental reports are given the opportunity to search this information. Qualitative data warehousing can allow valuable inferences to be made, although the ownership of this data may be an issue in some organizations (Van Alstyne et al. 1995).

Much like other types of information systems, data warehouses by themselves are not especially good at codifying and storing tacit knowledge. In addition to the problems of translating personal experience and knowledge to a structured data repository while keeping its original depth and richness, pattern detection becomes much more problematic without set standards. Text mining has been offered as a possible solution that extends data mining by its use of natural language processing (Liddy 2000). Intelligent agents may also construct predictive models for decision makers based on their reactions to past situations.

Organizations more apt to invest in data warehousing share the common characteristic of being highly data intensive (Chen et al. 2000). Firms striving for advantages through the early adoption of data warehousing quickly found that systems failing to provide data to management across the organization were destined to fail themselves (Teresko 1999). And similar to other systems, information provision often hinges on overcoming the issues surrounding ownership of data stored within the warehouse.

## **Critical Success Factor Approach**

The critical success factor (CSF) approach to requesting information requires an inventory of the absolutely necessary information for making sound decisions (Rockart 1979). Essential information is listed beforehand by either interviewing individual decision makers (Guynes and Vanecek 1996) or through a functional group listing process (Shank et al. 1985). This information is later presented either through periodic reporting or through the use of executive information systems. Advantages of using the critical success factor method include the explicit listing of areas in which managers should focus, the necessity for standard measures of this information, and the reduction of information overload (Rockart 1979).

Research indicates that traditional data provided by financial accounting is rarely used in the critical success factor method; rather, the quantitative data organized by the cost accounting function was observed as being considered more current (Rockart 1979). Although the critical success factor approach was once cited as the most prevalent method of determining information requirements, the inability to aggregate the latest desired information and change information requirements has been noted as factors for the approach's failure (Watson and Frolick 1993).

Not all of the information determined critical by decision makers is quantifiable. Managers and executives have often classified subjective data culled from sources both internal and external to the organization as being valuable (Rockart 1979). The codification and reporting of this information is not as easily done as quantitative reporting, due to the differences in standards desired by individual decision makers, and also necessitated by situation.

Top managers have mentioned the frequent dissatisfaction with reporting as a problem area (Rockart and Treacy 1982). When the method works well, the critical success factor approach not only provides managers with the proper access to important information, it can provide unique insights into the activities of executives (Watson and Frolick 1993). From analysis of the types of information considered critical to decision making, other functional areas may be able to make inroads into the priority of data collection and reporting.

Changing information requirements in mid-stream is another common problem. Not only do these requirements change quickly during environmental upheaval (affecting ongoing versions of systems), some users explained that needs changed as the critical success factor listing activities were taking place (Watson and Frolick 1993).

## **Empirical Evidence and Recent Applications**

One issue that must be addressed is the practicality of these approaches. In addition to the examples given above for the knowledge management in consulting practices, many organizations already are using some of the above concepts. For example, Microsoft Corporation utilizes data warehousing and intranet approaches to speed up its report distribution process (Boggs, 1999). Users are able not only to view the company's most recent financial information online, but they also can customize this information as needed through FinWeb, an intranet-based financial information system. Others have recognized the potential value of data warehousing and an intranet (Granof, 1999; O'Kelly, 2000; Tate, 2000). Also, Birkett (1995) presents a case study in which a company uses a knowledge management approach, built around activity-based costing, to support management decisions regarding quality improvement project. The critical success factors approach can play an important role in strategic

management accounting (SMA). The approach is used to help identify the critical factors in the internal environment and, in addition, the critical factors in the external environmental. Both sets of factors would highly relevant to decision making (Clarke, 1993).

We found no evidence that organizations are using the value chain approach to bridging the gap between accounting data and management information needs. However, we note that these approaches are not mutually exclusive. They can be combined in different ways and degrees to provide functional managers flexibility in acquiring accounting information and that encourages accounting system effectiveness and efficiency. Data warehousing and intranet approaches, for example, streamline processes of report generation and presentation. Knowledge management and information value chain approaches offer managers abilities to expand their comprehension of managerial issues through organizational knowledge base and information visibility. It is in this combination of approaches that organizations may find the greatest benefit.

## Conclusions and Implications for Research and Practice

Johnson and Kaplan (1987) stated that "The technology exists to implement systems radically different from those being used today. What is lacking is knowledge. But this knowledge can emerge from experimentation and communication." This article, exploring the potential for emerging IS and IT concepts to increase the use of accounting information for functional management, can be a starting point for academics and practitioners. The article identified how these emerging applications can benefit organizations, but some issues emerged from the review that deserve further research.

The value of the approaches may depend on the dynamism of the organization's environment (Miller 1987; Gupta and Chin 1993), and proposed approaches should consider the strategy-environmental fit (Miller 1987) and the subsequent trade-offs between the costs and benefits of the implementation.

We note that traditional accounting systems, the critical success factor approach, knowledge management systems, and data warehousing are all relatively formal systems that must go through a careful design process. We also note that a frequent complaint of users of these formally structured systems was that the information provided was dated and inflexible. In contrast, the implementation of an intranet to stimulate the formation of "communities of knowing" (learning communities) is, by its nature, an informal, emergent process. These observations suggest the following premises about systems that are intended to make accounting knowledge available to managers:

1. Managers who perceive their environment and organizations to be low in dynamism (i.e., stable relative to other industry environments) will find formal, structured support systems more useful than informal, emergent systems.
2. Managers who perceive their environment and organizations to be dynamic (compared with other industry environments) will find informal, emergent systems (such as intranets and communities in which knowledge is emerging) to be more useful than formally structured systems.

In addition to these premises, which can be investigated empirically, this review suggests a direction for practitioners who want to improve the communication and use of accounting knowledge. Taking the first steps in the CSF approach would initiate communication between accountants (and their knowledge of available data) and functional managers (and their information needs). Managers then would be able realize some benefits of improved communications and knowledge transfer prior to making a decision about the type of formal system and amount of resources to be invested.

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