

Information Fatigue: The Case of Activity-based Information (ABI) in Decision-making

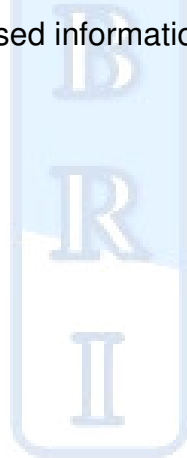
Aretha Hill
North Carolina A&T State University

Shawnta Friday-Stroud
Florida A&M University

Abstract

Many organizations implement technological innovations to provide employees with information to cope with the increasing complexities in the organization's environment. As employees are being inundated with increasing information produced by these new technologies, studies suggest that many are not able to effectively use the new information for business decisions. This paper discusses how the incompatibility of task, cognitive functioning, training, and information attributes may hinder employees from effectively using certain information in making decisions in the context of activity-based costing systems. Such insights may assist system designers, trainers and managers with addressing many of the challenges from implementing new technologies.

Keywords: task, training, activity-based information, systems, cognitive functioning



Introduction

As complex business imperatives and challenges appear, organizations consistently react to the need to remain at the forefront of their industries by implementing new high-capability information technologies. Such mechanisms are beneficial in providing relevant information to manage the increasing complexities in an organization's operating environments (e.g., product/service proliferation, increased competition, complex product designs, complex and integrated production processes, increased overhead costs and cost reduction efforts) as well as to enhance decision-making. However, many organizations are implementing leading technologies and creating an abundance of information without considering the attributes of the information (e.g., its complexity, level of aggregation, reliability, ambiguity, timeliness) and obstacles that may impede effective use of the information. Corporate executives often naively expect that knowledge will be created and immediate behavior changes will occur after more information is provided to decision-makers. They fail to realize that how the information is processed, interpreted and used will vary from situation to situation. The employees' decision-making styles, information needs, and information processing capabilities will impact the extent to which employees use or rely on the new information (Hill and Bates, 2007; Davis, 1993; Wofford, 1994).

The paper discusses how environmental factors have significant effects on the effective use of new information. Considerable attention has been directed towards improving decision-making by provider users with more sophisticated information to deal with their work environments. We explore how the incompatibility of task, cognitive functioning, training, and information attributes may hinder employees from effectively using new and presumably better information in making decisions in the context of activity-based costing (ABC) system. Many companies have implemented an ABC system in an effort to satisfy the information requirements necessary for product costing, to support their continuous improvement programs, and, ultimately, for providing a competitive edge (Anderson and Young, 1999; Waeytens and Bruggeman, 1994). However, implementing an ABC system alone, does not guarantee enhanced decision-making. The literature presents evidence that many organizations are experiencing problems getting their employees to make decisions and take actions based on activity-based information (ABI) (Hill and Bates, 2007; Anderson and Young, 1999; Malmi 1997).

It is postulated that the obstacles that organizations face in reaping the desired results from their ABC investment are related to attributes of ABI. Specifically, lack of perceived benefits from using ABI, reliability of ABI, incompatibility of ABI with task and decision-making activities, limited information-processing abilities (e.g., information overload) and inappropriate training in selecting and using task-relevant ABI. Accordingly, a key question is not whether implementing an ABC system improves performance, but, under what conditions, and for which types of task environments and information processing styles does ABI improve or hinder decision-making performance. Such information may assist system designers, trainers and managers with addressing challenges stemming from ABC system implementation.

The following section provides an overview of ABI. The next section discusses the behavioral and cognitive-related factors that may impede ABI use, including

potentially inappropriate applications of ABI. The summary and implications are presented in the concluding section.

Activity-based Information

An ABC system is by nature a multi-functional, yet complex management innovation used for determining the costs and performance of activities and products. The goal of ABC is to provide improved cost data by using a causal relationship of cost driver to activities to allocate costs (Roberts and Silvester, 1996). Correspondingly, implementation success may be referred to as the ability of employees to actually use ABI to improve task performance. Consistent with Davis (1993), we postulate that use of ABI will depend on users' perceptions of the information and the specific circumstances in which it is used.

The uniqueness of the ABI will have an impact on the extent to which users will use the information. ABI is often seen as highly detailed, ambiguous and inflexible for regular operations (Waeytens and Bruggeman, 1994; Player and Keys, 1995). Employees often feel that ABI is irrelevant and provides no specific or "new" insights to address management functions (Waeytens and Bruggeman, 1994). The factors posited to influence the successful use of ABI are cognitive functioning, task complexity and training. These factors are discussed in the following sections.

Relevance of ABI Task and Decision-making Performance

The challenge for information system designers is to develop a system that produces information that is both useful and reasonably effortless to extract. Employees are more likely to use new information to the extent that the information is well organized, fairly easy to use, and provide them with task-relevant knowledge for coping with environmental uncertainties (Davis, 1993). This assertion, based on expectancy theory, asserts that a system that does not provide relevant information to help people perform their jobs is not likely to be received favorably even when the implementation has been handled carefully. (Igbaria et al., 1997).

Turney (1991) argues that ABI is flexible enough to meet employees' information needs. An ABC system can be used to provide "what if" analyses. However, the availability and "novelty" of ABI does not guarantee that it will be used. Several studies cite instances where users felt that the ABC system and its information are too inflexible and did not believe that ABI would be beneficial to them in addressing their immediate concerns (Anderson, 1995; Krumwiede, 1998; Waeytens & Bruggerman, 1994). Managers also want to exercise control over the type and timeliness of relevant reports and be able to choose the specific level of information aggregation that is necessary to perform their respective tasks (Bruns and McKinnon, 1993). Although these capabilities exist in most ABC systems, many organizations do not fully utilize these features and generate very detailed "standard" ABM reports. The information provided in these reports may not be task-relevant or timely and is often viewed as difficult to comprehend and use (Player and Keys, 1995). As such, any benefits that could be obtained from using task-relevant ABI are not realized.

Waeytens and Bruggeman (1994) found that some employees felt that the ABI was too complex for product costing and too ambiguous for managerial functions. Managers wanted more relevant cost information without having to operate a “complex” information system. They felt that the costs of maintaining an ABC system outweighed its benefits and that such a system did not provide them with any “new” information. Although the managers believed in the capabilities of the ABC system, the environment was not conducive to such a system. It is possible that the level of effort required to use ABI plays a critical role in employee’s perceptions of the usefulness of the information (Davis, 1993). Accordingly, negative perceptions and experiences regarding the effort expended to use ABI may reduce the perceived performance benefits of its usage. In turn, employees will refuse to use ABI for task performance.

Task Complexity

The reluctance to use ABI may also be attributed to a lack of fit between employees’ tasks and ABI characteristics (e.g., complexity and levels of aggregation) (Hill and Bates, 2007). Complexity theory suggests that the level of task complexity will affect an individual’s information needs, perceptions of information sources, intentions, and behaviors (Blili et al., 1998). As decision makers are faced with more complex and uncertain tasks, they prefer information that is most beneficial in decision-making and easiest to use. To cope with the uncertainty and complexity, the decision makers will have to vary their information search, processing, and use procedures. These changes in behaviors will most likely influence the usefulness, and ultimately, the use of certain types of information.

It appears that individuals faced with highly complex situations are the ‘least satisfied’ and the ‘most demanding’ with respect to the information (Bruns and McKinnon, 1993). Individuals that have to make decisions in a highly uncertain environment may consider the diversity and amount of information provided in ABC reports useful in increasing information processing capacity (i.e., reducing uncertainty) and enhancing decision quality. Consequently, these individuals may be more inclined to use the ABI. Interdependent tasks may also necessitate diversity in the information set provided. ABC reports that are cross-functional (i.e., provide relevant information to users throughout the organization with varying task and decision-making characteristics), yet task-specific, are more likely than traditional cost management reports to be perceived as useful in meeting these increased information needs (Hill and Bates, 2007).

At some level, unfortunately, ABI may become detrimental and no longer beneficial. When tasks are complex and decision-makers are already overwhelmed due to other environmental issues, the use of ABC reports that are detailed and ambiguous may create overload and promote negative perceptions regarding the level of difficulty of understanding and using the information. Managers have to think about many diverse issues with varying degrees of complexity (Hill and Bates 200). They spend a considerable amount of time making decisions and solving problems. As such, it would not be a stretch to assert that the managers do not want to become even more overwhelmed by having to use information that is irrelevant, ambiguous, unreliable

and/or difficult to understand. Although potentially useful, ABI may be perceived as a hindrance, rather than an aid.

Employees may also have unfavorable perceptions of ABI and reject the information in situations where tasks and events are fairly routine and analyzable (i.e., low task complexity). Employees may believe that there are no performance benefits from using broad scope and detailed ABI, especially where traditional cost management information is available. When individuals are faced with more analyzable and routine task activities, the use of detailed “standardized” ABC reports may be viewed as irrelevant or redundant and interfere with their simple information needs. In this case, detail information processing and the use of ABC reports may contribute to individuals wasting time and resources on relatively effortless tasks and decisions. As a result, employees may have unfavorable attitudes regarding the usefulness of ABI. Keeping the above in mind, any future or extended reliance on ABI for process improvement, planning or other advanced applications, where the use of ABI is most advantageous, is less likely to occur.

Cognitive Functioning

Human information processing theories suggest that individuals with higher information process capabilities generally engage in more activities that would facilitate effective decision-making even when using complex and ambiguous information (Robinson and Wick 1992; Wofford, 1994). Such individuals often search for relevant information, prefer more novel information, and are able to process large amounts of diverse information in more dimensions than do individuals who have low cognitive functioning capabilities (Streufert and Swezey, 1986). Higher cognitive functioning employees, as compared to less cognitive functioning employees, will evaluate more information, be less susceptible to information and task overload, consider more decision alternatives, and make better strategic decisions (Ginsberg, 1989; Wofford, 1994). As compared to less cognitively functioning individuals, they tend to be more open-minded to new ideas, have a higher tolerance for diverse, yet detailed and ambiguous information, and are not bounded by environmental conditions. As such, higher cognitively functioning individuals will also be more likely to effectively use ABI.

Given the detailed and complex nature of ABC, it appears that higher information processing capabilities is critical for effective decision-making in complex task environments where ABI is the primary source of information. As compared to employees with less cognitive functioning capabilities, higher cognitively functioning employees may prefer to manage their task activities by acquiring timely, detailed, and task-specific ABI. The higher information processing capabilities will enable decision-makers to process and structure large amounts of diverse ABI, establish a causal relationship between task relevant and situational factors, suggest process improvements as well as manage uncertainty.

Training

In many organizations, ABC systems are putting more information into decision-makers' hands; however, the training programs are ineffective in promoting the effective

use of ABI for task and decision-making performance. Many training programs tend to focus on technical issues and often fail to meet the users' information needs (Hill and Bates, 2007). Consistent with the training literature, it is posited that ABC training plays an important role in developing and sustaining the competencies of the employees (Igbaria et al., 1997; Guimaraes et al., 1992). If designed properly, ABC training programs and workshops can be mechanisms that may promote understanding use of ABI for improving managerial decisions, such as, product costing and process improvements.

In addition to demonstrating the logic underlying ABC, training workshops should be designed to help all potential users gain the knowledge necessary to effectively use ABI. This goes beyond a mere overview of the technical aspects of ABC concepts and procedures. Employees must understand the shortcomings of the information provided by the traditional costing system and how ABI will enhance not only the company's performance, but their individual performance as well. For that reason, trainers must be knowledgeable enough to "actively" demonstrate how ABI and the unique features of the ABC system can be used in addressing specific task situations or new business challenges. When potential users receive guidance on the selection and use of task-relevant ABI to fit their unique needs or expectations, they are more likely to use the information to a greater extent. In order to accomplish this objective, ABC education and training programs should be strategically designed to provide employees with task or user-specific training. The training should also be carefully planned with the awareness of the disparity that exist in employees' information needs, information processing abilities and learning preferences.

To facilitate the effective use of information provided by the ABC system, we suggest a three-prong "task-abilities-preference-training" fit approach that can be used to design ABC training programs. First, consistent with Weller (1999), managers can assess the information needs, information processing abilities and learning style preferences of its employees. Trainers can use this information to design multi-faceted training workshops geared toward the "observed" information processing abilities and learning style preferences of the users. The initial training workshops should be designed based on the dominant information processing abilities and learning styles, so that employees receive exposure to the new system and its informational output in a manner that is congruent with his or her capabilities, tasks, and preferences. Because the training is consistent with the employees' prior experiences, learning will be facilitated in a manner that will reduce information or task overload. The specialized training will also help promote favorable perceptions, acceptance of the system model and use of the new, yet often complex information, such as ABI. Subsequent training workshops can then be designed towards other information processing and learning capabilities, which will move the employees toward adapting the necessary styles for effective processing and use of ABI for product costing and advanced uses of ABI, such as, continuous improvement and performance measurement.

The second aspect of the suggested approach focuses on promoting ABC learning in a user group context, consistent with Argyris and Kaplan (1994). Organizational leaders should identify key individuals in the intended user areas (e.g., operation supervisor/managers) to serve as enablers within their respective areas. These individuals should possess both the analytical skills to analyze the company's

cost information and the ABC model, and process knowledge to help users select and use ABI for their respective tasks and decisions. The operating trainer or enabler may be used to demonstrate the usefulness and use of ABI, prove the ABM concept, and communicate the nature of the actions expected using ABI. Since these enablers or operating trainers are knowledgeable of both ABC and the targeted functions and areas, they may also be utilized to assist in the development of more accurate ABI or agreed-up cost-drivers, provide on-going assistance to individuals in their respective areas, provide information about updates to the ABC cost models and system, and provide users with information on new ABC developments and ABI applications. The enabler or operating trainer will basically serve as a liaison between the ABC system developers and the users.

Third, training programs should have a long-term, strategic focus (Argyris and Kaplan, 1994). The workshops should be orientated toward developing skills that facilitate the use of ABI to address specialized tasks, such as product costing (short-term focus). At the same time, ABC workshops should also be designed in a manner that will promote the use of ABI for continuous process improvements and other competitive challenges (long-term focus). In other words, ABC workshops should be highly specialized, yet able to develop multiple competencies that will be used to address current issues, but also develop expertise that will be needed in the future. This strategy will help move the employees and the organization to a point where ABI is considered the preferred information for supporting process improvements and performance measurement efforts (Igbaria et al., 1997; Shields, 1995).

Conclusion

It is misguided to implement information technologies and expect managers to instantaneously and effectively use the new information for optimal decision-making. We offer insights into how certain “human-related” factors may hinder employees from effectively using new information, such as ABI, in performing their job-related and decision-making activities. The extent to which individuals rely on ABI in making cost reduction and process improvement decisions is largely influenced by their perceptions, tasks and training received. We suggest that individuals are more likely to use ABI if they believe that the information is both easy to use and beneficial in performing their job-related activities.

Managers that face highly complex tasks and decisions are more likely to be frustrated if they have to expend a lot of effort to comprehend complex information provided by a new technological innovation. We expect that without proper interventions, these individuals will be less likely to use the information in the early phases of the implementation of the technology. There are several plausible explanations for this phenomenon. First, when users’ task activities are complex and/or highly ambiguous, the comprehension and use of new, complex information may create (or increase) task or information overload and negative perceptions of using the information. Second, ABI may be seen as too detailed, complex and ambiguous. Third, individuals may doubt the accuracy of the information and spend a considerable amount of time verifying and reconciling ABI with data from traditional systems. Finally, users

may not have received adequate training and guidance in the selection and effective use of task-relevant ABI.

Practitioners may find this practical discussion of human factors that cannot be ignored when new technologies are introduced beneficial in their decision-making. It is proposed that: (1) complex information, such as, ABI may be better suited for certain individuals and tasks than for others; (2) it is important to design reports and training programs that accommodate different information needs, processing abilities, and preferences; and (3) new technologies, such as ABC systems, are more likely to facilitate better decision-making when there is compatibility between task, cognitive functioning, training and information attributes.

With respect to users' task and decision-making activities, practitioners should focus simultaneously on making the benefits and practical applications of the new information provided by the innovation transparent to users along with developing easy-to-use interfaces. Consultants and managers should be better able to identify specific situations most conducive to the application of ABI and the extent to which certain types of ABI will be used most optimally. Another key to effective use of the new information is providing adequate (task-specific) training and education to users about the ABM system and the functionality of ABI. When tasks and information is complex and decision-making requires increased knowledge and flexibility, appropriate ABI training may also facilitate user preparedness for the ensuing organizational change and the use of ABI.

System designers and trainers should continuously be aware of the differences that exist in users' task constraints, information processing needs and capabilities when designing technological systems and user-friendly interfaces, selecting output formats, and designing training programs. Employees should also receive appropriate training and guidance on what information is most useful for and how it can be effectively used in performing task-related and decision-making activities. Users should be continually educated about updates, benefits and potential applications of the information provided by the technological innovation.

Practitioners face many challenges in getting employees to use and rely on the information provided by new technological innovations. It appears that circumventing contextual barriers to the use of the new information will be one of the first steps to realizing the benefits of the technological innovation and changing the negative perceptions of some of its users. To this end, managers will be able to optimize decision-making and minimize information overload.

References

- Argyris, C. and R. Kaplan (1994). "Implementing New Knowledge: The Case of Activity-based Costing", *Accounting Horizons*, Volume. 8, 83-105.
- Anderson, S. and M. Young (1999). "The Impact of Contextual and Process Factors on the Evaluation of Activity-based Costing Systems", *Accounting, Organizations and Society* Volume 24, 525-559.

- Blili, S., R. Raymond, and S. Rivard (1998), "Impact of Task Uncertainty, End-user Involvement and Competence on the Success of End-user Computing", *Information and Management* Volume 33, 137-153.
- Bruns, Jr., W.J. and S.M. McKinnon (1993), "Information and Managers: A Field Study", *Journal of Management Accounting Research*, Volume 5, 84-108.
- Chau, P.Y. (1996). "An Empirical Assessment of a Modified Technology Acceptance Model", *Journal of Management Information System*, Volume 13, 185-204.
- Davis, F.D. (1993). "User Acceptance of Information Technology: System Characteristics, User Perceptions and Behavioral Impacts", *International Journal of Man-Machine Studies*, Volume 38, 475-487.
- Ginsberg, A. (1989). "Construing the Business Portfolio: A Cognitive Model of Diversification", *Journal of Management Studies*, Volume 14, 417-438.
- Guimaraes, T., M. Igarria and M. Lu (1992). "The Determinants of DSS Success: An Integrated Model", *Decision Sciences*, Volume, 409-430.
- Hill, A.Y. and I. Bates (2007). "An Empirical Analysis of ABI Acceptance Measures and Determinants", *Journal of International Business Disciplines*, Volume 1, 46-61.
- Igarria, M., N. Zinatelli, P. Cragg, and A.L. Cavaye (1997). "Personal Computing Acceptance Factors in Small Firms: A Structural Equation Model", *MIS Quarterly*, Volume 21, 279-305.
- Malmi, T. (1997). "Towards Explaining Activity-based Costing Failure: Accounting and Control in a Decentralized Organization", *Management Accounting Research*, Volume 8, 459-480.
- Player, S. and D.E. Keys (1995). *Activity-Based Management: Arthur Anderson's Lessons from the ABM Battlefield*, Mastermedia Limited, New York, NY.
- Roberts, M. W. and K.J. Silvester (1996). "Why ABC Failed and How it May Yet Succeed", *Journal of Cost Management* Volume 1, 23-35.
- Robinson, G.S. and C.W. Wick (1992). "Executive Development that Makes a Business Difference", *Human Resource Planning*, Volume 15, 63-76.
- Shields, M. D. (1995). "An empirical analysis of firms' implementation experiences with activity-based costing", *Journal of Management Accounting Research* Volume 7, 148-166.
- Streufert, S. and R. W. Swezey (1986). *Complexity, Managers, and Organization*, Academic Press, Orlando, FL.
- Turney, P. (1991). *Common Cents - The ABC Performance Breakthrough*, Cost Technology, Hillsboro, OR.
- Waeytens, D., and Bruggeman, W. (1994), "Barriers to Successful Implementation of ABC for Continuous Improvement: A Case Study", *International Journal of Production Economics*, Volume 36, 39-52.
- Weller, L.D. (1999), "Application of Multiple Intelligences Theory in Quality Organizations", *Team Performance Management*, Volume 5, 136-143.
- Wofford, J.C. (1994), "An Examination of the Cognitive Processes Used to Handle Employee Job Problems", *Academy of Management Journal*, Volume 37, 180-192.