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## THE EFFECT OF STRATEGY AND ORGANIZATIONAL STRUCTURE ON THE ADOPTION AND IMPLEMENTATION OF ACTIVITY-BASED COSTING\*

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This study examines the effect of strategic posture and organizational structure on the adoption and implementation of general forms of activity management (AM) approaches. To explain the decision to adopt and implement AM, theories of strategy and of innovation in organizations are drawn upon. Employing a survey methodology, a questionnaire was used to collect data on the organizational determinants and business strategies of a sample of strategic business units in Canadian manufacturing firms. The questionnaire also collected data on the AM approaches these SBUs had adopted and implemented in the last two years. The results show that strategy influences the extent to which SBUs adopt an AM approach. As expected, organizations with high vertical differentiation are positively associated with the adoption of activity-based costing (ABC) over other forms of AM. Furthermore, centralization and formalization are associated with organizations that actually implement ABC after adopting it. This study provides some insight into the apparent paradox, in the part that despite the theoretical benefits of ABC, relatively few companies employ it and that a material number of those that adopt ABC do not actually implement it. It demonstrates that activity-based costing consists of a series of decisions and that managers have several opportunities to revise their initial choice during the innovation process. It also shows that organizations that adopt and implement ABC are bureaucracies. © 1997 Elsevier Science Ltd. All rights reserved

In recent years, academics and management accountants have demonstrated a great deal of interest in activity-based costing (ABC). However, surveys have shown that the diffusion process for ABC has not been intense (National Association of Accountants, 1991; Institute of Management Accountants, 1993; Armitage & Nicholson, 1993; Innes & Mitchell, 1991, 1995; Cobb *et al.*, 1992; Lukka, 1994). Moreover, there is evidence that some firms that had started to implement ABC have decided to stop the implementation process (Horngren, 1990; Innes & Mitchell, 1991; Nanni *et al.*, 1992; Madison & Power, 1993). This is the essence of the ABC paradox: if ABC has demonstrated benefits, why are more firms not actually

employing it? Ten years ago, Kaplan (1986) suggested four explanations for the management accounting lag: the lack of adequate role models, the prevalence of computer-based accounting systems, the emphasis on financial accounting and the fact that top management does not emphasize the improvement of the relevance of their management accounting systems. This article provides additional explanations by examining to what extent contextual factors like strategy and organizational structure influence the adoption and implementation of ABC and, thus, by providing some insight into the ABC paradox. This article is one of the few empirical studies on ABC (Swenson, 1995; Shields, 1995).

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In this article, ABC is considered a level of activity management (AM). AM is classified into three basic categories: activity analysis, activity cost analysis and ABC. These three levels that represent the range from simple activity analysis without cost tracing to full activity-based cost reporting, are described in the second section of this paper. Innovativeness in managerial accounting systems is influenced by the propensity of organizations to innovate and their capability to implement innovations. Strategy affects organizations' needs for management accounting innovations. Simons (1987), (1988), (1990) demonstrated that strategic business units (SBUs) that follow a prospector strategy (Miles & Snow, 1978) adapt their cost management systems to user needs to a greater extent than SBUs with a defender strategy. Organizational structure encourages or discourages the implementation of innovations. Since the beginning of the 1960s, organizational innovation theories have been developed and tested empirically in many different organizations, mainly from the not-for-profit and public sectors (Hage & Aiken, 1967; Aiken & Hage, 1971; Baldrige & Burnham, 1975; Daft, 1978; Aiken *et al.*, 1980; Kimberly & Evanisko, 1981; Damanpour, 1987). Very few of these theories were tested in the manufacturing environment (Burns & Stalker, 1961; Hull & Hage, 1982; Ettl *et al.*, 1984; Dewar & Dutton, 1986). None of these innovation theories have been studied in an accounting setting. This research has also mainly focused on technical innovations rather than on administrative innovations (Damanpour, 1991). As it will be demonstrated further in this article, ABC has characteristics of both technical and administrative innovations. Thus, this article is predicated on the notion that it would be a contribution to both ABC and innovation literature to examine the "ABC paradox" from a diffusion of innovation perspective.

The remainder of this article is organized as follows. The next section consists of a description of the different approaches to AM. The following two sections include a discussion about strategy, organizational structure and their

impact on innovations in cost management systems. Thereafter there is a description of the survey methodology used in this research and an analysis of the data collected. The final section includes a discussion of the contributions and the limitations of this article.

#### ACTIVITY MANAGEMENT: AN INNOVATION WITH MULTIPLE LEVELS

Activity management (AM) is the effective and consistent organization of a SBU's activities in order to use its resources in the best possible way to achieve its objectives (Brimson, 1991). It requires information on activities and their contribution to organizational goals. AM represents a new way to organize production and may also include an alternative method, ABC, to record manufacturing costs. AM may also supply accounting information for value chain analysis (Hegbert & Morris, 1989) and strategic cost management (Shank, 1989). Activity management (AM) can be divided into three levels: activity analysis (AA), activity cost analysis (ACA) and ABC. Figure 1 depicts these levels. AA is the initial level while ABC is the final and most refined one. ABC subsumes ACA and AA. AA is a prerequisite to performing an ACA.

Activity analysis (AA), the first and most simple level, consists of identifying the activities and procedures carried out to convert material, labor and other resources into outputs (Brimson, 1991). Activities that do not contribute to

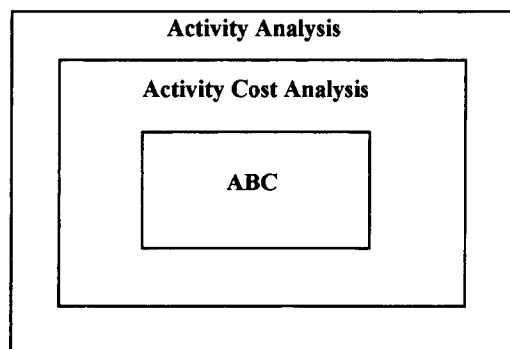


Fig. 1. The three levels of activity management.

the value of those outputs may be removed, replaced or diminished. AA does not require cost analysis and does not necessarily lead to a new overhead allocation method. It is typically a prerequisite to the process of installing an ABC system. Activity cost analysis (ACA) is the next level in the AM process. Activity cost analysis (ACA) subsumes AA, but adds the process of explaining the structural determinants of the costs of the activities. Many authors refer to this level as cost driver analysis (Shank, 1989; Nanni *et al.*, 1992). ACA enables management to identify the costs of each activity and the factors that cause them to vary. ACA may be accomplished without implementing a product costing system that allocates overhead costs on the basis of these drivers. Nanni *et al.* (1992) suggested that many firms have not implemented an ABC system because most of the benefits are found in the cost driver analysis. Organizations would prefer to take actions to reduce the effects of the drivers instead of using them to allocate indirect costs. Cost driver analysis allows firms to prioritize the changes they want to make. Activity-based costing (ABC) enables management to measure product and service costs with more accuracy (Cooper, 1988). ABC traces costs to products and services in two distinct levels. First, overhead costs are identified with homogeneous activity-based cost pools. Second, pooled costs are applied to products using measures of the activities consumed. ABC requires the completion of the ACA and AA levels.

In this study, AM is considered as a multi-level innovation. Zaltman, Duncan, and Holbek (1973) defined innovation as the adoption of an idea or a behavior that is new to the organization adopting it. The innovation process is usually described as comprising four distinctive stages (Hage, 1980; Gerwin, 1988): adoption, preparation, implementation and routinization. Adoption is the first stage in the innovation process. During this stage, the need for change is recognized and the organization makes the decision to adopt or reject the innovation. This stage is characterized by a high level of uncertainty about the innovation's returns. Several

contextual factors may affect the organization's decision to adopt an innovation. Once the decision to adopt the innovation has been made, the organization has to develop the infrastructure needed to support the innovation. This represents the preparation stage. If the organization has adopted an AM approach, several key actions will have to be completed. First, managers and accountants will be trained, a consulting firm, if necessary, will be selected and computer software will be purchased or developed in house. Second, accountants and managers will have to identify activities, determine the pools in which activity costs will have to be collected and select the cost drivers that will be used to allocate activity costs to specific cost objects. The preparation phase of ABC comprises AA and ACA, which are the first two levels of AM. During the preparation process, the organization has the opportunity to re-examine the decision made during the adoption stage (Rogers, 1983; Leonard-Barton, 1988). Some organizations that have adopted ABC have stopped the installation during the implementation process (Horngren, 1990; Innes & Mitchell, 1991; Nanni *et al.*, 1992; Madison & Power, 1993). From an innovation perspective, these organizations may have decided to re-invent ABC and limit themselves to the AA and ACA levels. The implementation stage consists of introducing the innovation and evaluating its impact. During the last stage, routinization, the innovation becomes a part of daily practices.

Organizations that adopt and implement ABC, or other levels of AM, have specific characteristics in terms of their business strategy and organizational structure. In the next two sections, the literature on the influence of these two contextual factors on the innovation process is briefly examined and three hypotheses about their effects are developed.

#### BUSINESS STRATEGY AND THE DIFFUSION PROCESS FOR INNOVATION

Strategy plays a key role in the diffusion of innovation process. The necessity to innovate is

driven by the type of strategy employed by a SBU. Miles and Snow (1978), (1994) identified four strategic types of organizations according to the rate at which they change their products and markets: prospectors, defenders, analyzers and reactors. The fundamental difference among these types is the rate of change in the organizational domain. Prospectors are characterized by their dynamism in seeking market opportunities, their capability to develop and produce new products to meet customers' needs, their investment in large amounts of financial resources related to research and development, and their enhancement of teamwork. Defenders have a strategy which is the polar opposite from prospectors. Defenders operate within a narrow product-market domain characterized by high production volume and low product diversity. Defenders compete aggressively on price, quality and customer service. They engage in little or no product/market development and stress efficiency of operations. Analyzers stand between these two categories, sharing characteristics of both prospectors and defenders. Reactors do not follow a conscious strategy. They are viewed as a dysfunctional organizational type. The premise of the Miles and Snow typology is that prospector, defender and analyzer strategies, if properly implemented, can lead to effective performance<sup>1</sup>.

The decision to adopt an AM approach relies on the perception that SBUs need to have better information on activities and their related costs and on their impact on product cost and product profitability. Prospectors are organizations that continually experiment with innovation. Prospectors are organizations that face a more unpredictable and uncertain environment

than organizations following a defender strategy (Slocum *et al.*, 1985; Govindarajan, 1986). Prospectors have structures that enable them to facilitate and coordinate numerous and diverse operations. Thus, the adoption of innovation would be easier for prospectors than for defenders.

Prospectors' needs for information cover a much broader range than defenders due to their quest for product-market opportunities. Simons demonstrated that prospectors tend to adapt their cost management systems to user needs to a greater extent than defenders (Simons, 1987, 1988). Thus, the following hypothesis is tested:

**Hypothesis 1 (H1):** A prospector strategy is positively associated with the adoption of an AM level.

#### ORGANIZATIONAL STRUCTURE AND THE DIFFUSION PROCESS FOR INNOVATION

Organizational structure influences the capability of an organization to successfully adopt and implement an innovation (Damanpour, 1991). Considerable efforts have been directed, in the business literature, at gaining a better understanding of the diffusion process for innovation in organizations during the last twenty years. Theories of organizational innovation have emerged based on the mechanistic/organic continuum developed by Burns and Stalker (1961). In this section, the dual-core model and the ambidextrous model are linked to the adoption and implementation processes for AM approaches. These two theories rely mainly on distinctions in the nature of the innovation and in the stages of the diffusion process. Damanpour (1991) found support for those models.

<sup>1</sup> The Miles and Snow typology was chosen for this study for the three following reasons. First, the capacity of an organization to innovate is the key dimension of this typology. Therefore, this typology is appropriate for examining the issue of innovation in management accounting systems. Second, this typology is consistent with Porter's low-cost and differentiation generic types (Porter, 1980, 1985), as it is considered in several studies. Hambrick (1983) suggested that prospectors are a particular type of a differentiation strategy and defenders another type of a differentiation or a cost leadership strategy. Miller (1987) associated prospectors with a differentiation strategy; this strategy was labeled complex product innovation. Govindarajan (1986) compared a differentiation strategy to prospectors and a low-cost strategy to defenders. Third, the Miles and Snow typology is academically well accepted and internally consistent. Additionally, it has been empirically tested in several studies (Hambrick, 1981; Snow & Hrebiniak, 1980; Hambrick, 1983; Slocum *et al.*, 1985; Simons, 1987, 1988, 1990).

### *The dual-core model*

The dual-core model rests on the distinction between administrative and technical innovations (Evan, 1966; Daft, 1978). Accounting innovations are usually classified as administrative innovations (Dunk, 1989). Evan (1966) argued that administrative innovations tend to lag behind technical innovations because they are perceived by management as being less closely associated with the profit objectives of manufacturing organizations. According to the dual-core model, mechanistic characteristics facilitate the adoption and the implementation of administrative innovations. Technical innovations are easier to adopt and implement in organic organizations. Daft (1978), Kimberly and Evanisko (1981) and Damanpour (1987), (1991) found results that are consistent with this model's propositions.

AM has characteristics of both technical and administrative innovations. AA and ACA are classified as technical innovations because their focus is mainly on processes and activities. AA and ACA have an impact on how products are manufactured and services are rendered. If organizations decide to go beyond the AA and ACA levels and install ABC, then the innovation becomes more administrative than technical. ABC is an administrative innovation because its implementation may lead to new administrative procedures, policies and organizational structures. If we consider AA and ACA as technical innovations and ABC as administrative, the dual-core model suggests that organizations with organic characteristics will more easily adopt AA and ACA while mechanistic organizations will decide to pursue ABC. Thus, the following hypothesis is tested.

**Hypothesis 2 (H2):** Among organizations that adopt an AM approach, a mechanistic structure is positively associated with organizations that adopt ABC.

### *The ambidextrous model*

The ambidextrous model is based on the distinctions between the initiation and implementation stages of innovations (Duncan, 1976). The initiation stage is quite similar to the

adoption stage described earlier. It consists of all the actions leading to the decision to adopt the innovation such as problem perception, information gathering, attitude formation and evaluation and resource attainment (Damanpour, 1991). The implementation stage comprises all activities between the adoption and the routinization of the innovation (Rogers, 1983). According to this theory, the initiation of innovations is easier in organic organizations while implementation is facilitated in mechanistic organizations. Damanpour (1991) showed that the research in this area has not produced findings in the direction of the theory's propositions. However, Zmud (1982), in a study of the influence of centralization and formalization on the diffusion of modern software practices, found that the propositions of the ambidextrous model were accurate for technical innovations but not for administrative innovations.

AA and ACA are the initiation stages of ABC. Organizations that adopt ABC have to go through these two levels to collect the information necessary for the implementation. Horngren (1990), Nanni *et al.* (1992), Innes and Mitchell (1991) and Madison and Power (1993) have pointed out that many organizations that adopt ABC terminate the process before the implementation. Organic organizations that adopt ABC may be more tempted to limit the innovation process to the AA or ACA level. Mechanistic organizations that adopt ABC would prefer to pursue ABC all the way. Therefore, the following hypothesis is tested.

**Hypothesis 3 (H3):** Among organizations that adopt ABC, a mechanistic structure is positively associated with organizations that implement ABC.

## RESEARCH DESIGN

In this study, a mail survey was employed to collect information about the adoption and implementation of innovations in cost management systems, strategy posture and organizational structure. Mail survey was chosen because it enables researchers to survey a large

random sample of a population at a relatively low cost. Unlike interviews, mail survey focuses on facts rather than on personal opinions. It also places less pressure on an immediate response and provides the respondents with a feeling of anonymity. Two potential problems must be anticipated when using mail surveys to collect data: low response rate and non-response bias. To insure that the response rate would be high enough, the Total Design Method was used (Dillman, 1978). This approach has proven to be very effective in providing higher response rates and collecting quality data. Specific analyses were conducted to assess nonresponse bias.

#### *Questionnaire and population surveyed*

The questionnaire employed in this study consisted of eight pages including the front and back cover. The questionnaire was pre-tested to insure the appropriateness of the questions and eliminate ambiguities. All organizations located in the province of Québec received a French and an English version of the questionnaire. The questionnaire was sent with a cover letter and a pre-addressed, postage-paid envelope. The cover letter was addressed to the controller or the vice-president of the organization. A postcard reminder was forwarded to each respondent three weeks after the first mailout. A third follow-up was mailed five weeks after the first mailout. A replacement questionnaire and a return envelope were included in the third mailout.

The population surveyed consisted of Canadian manufacturing firms listed in the Financial Post CanCorp's CD-ROM. The population was limited to the 1555 firms with SIC codes 30, 34, 35, 36, 37, 38 listed in CanCorp<sup>2</sup>. These codes represent manufacturing industries in which product diversity and production process

complexity are important. According to the ABC literature, product diversity and production process complexity have shown to be important determinants of the need for reexamining cost allocation procedures. The list of firms was screened to ensure that it would be adequate. Firms listed in more than one of the previously mentioned industry categories were, of course, only considered once. All firms with sales below 20 million Canadian dollars were also discarded. This was done to avoid small organizations for which structural and business strategy variables would not apply (Miller, 1987). Highly diversified firms were also excluded because the focus in this study is on SBUs rather than on corporations. Several firms classified as manufacturers were discarded because they were actually only distributing subsidiaries for foreign firms. Obviously, firms that were defunct were also rejected. The remaining firms were individually analyzed to identify their SBUs and the name of their controllers. The mailing sample included 415 SBUs. In some cases, it was not possible to identify the SBU's controller. In such cases, the questionnaire was sent to the firm's controller or the vice-president of finance. The names and addresses of the controllers and vice-presidents were extracted from the CanCorp data base. This information was cross-checked with other available lists and data bases<sup>3</sup>.

#### *Measures*

Three categorical variables were employed to classify SBUs to test the three hypotheses. First, organizations were classified into two groups according to whether they had adopted an AM approach. This first variable was named AM adopters, coded AMADO. A value of 1 was attached to organizations that adopted any AM level and a value of 0 to organizations that had

<sup>2</sup> 30: Rubber and miscellaneous plastics products, 34: Fabricated metal products, 35: Industrial machinery and equipment, 36: Electronic and other electric equipment, 37: Transportation equipment, 38: Instruments and related products.

<sup>3</sup> The Scott's Directories 1993-1994 for Ontario, Québec, Western Canada and Atlantic Canada; The Roster of Members of the Society of Management Accountants of Canada; The Blue Book of Canadian Business; The Directory of Directors, published by Financial Post; The Who's Who in Canadian Business; The Guide to Canadian Manufacturers, published by Dunn and Bradstreet; Compustat CD-ROM for Canadian firms, published by Standard and Poor.

not adopted an AM approach. The second variable was called ABCADO, for ABC adopters. Organizations that adopted an AM approach were divided into two groups. The first group included those that adopted ABC and the second group those that adopted AA or ACA. A value of 1 was assigned for membership in the first group and a value of 0 for the second. The third variable was labeled ABCIM, ABC implementers. Organizations that had adopted ABC were again divided into two groups. The first group comprised all organizations that implemented ABC and the second group those that implemented AA or ACA or did not implement ABC. ABCIM was set equal to 1 for SBUs that implemented ABC, and to 0 otherwise.

Multiple methods were used to classify organizations according to their strategy types. First, respondents classified their own organizations as prospectors, defenders and analyzers. The instrument developed by Snow and Hrebiniak (1980) was used to make this classification. Respondents were asked to select the description that most closely fit their organizations in comparison to other firms in their industry. This method yielded a nominal scale. Second, the validity of the classification was cross-checked. The latest annual report available on the CanCorp data base of each respondent was examined and SBUs were classified according to that information. The correlation coefficient between the classification by the respondents and by the investigator was 0.83.<sup>4</sup> Two dummy variables were used for strategy. The first variable, called PRO, was set equal to 1 if the SBU was a prospector, and to 0 if the SBU was an analyzer or a defender. The second variable, ANA, was assigned a value of 1 when the SBU was an analyzer and a value of 0 when the SBU was a prospector or a defender.

Centralization, vertical differentiation and formalization were used to operationalize organic and mechanistic structures. These three organizational determinants were selected because they represent three major dimensions

of organizational structure and because they have been widely used in the innovation literature (Hage & Aiken, 1967; Aiken & Hage, 1971; Aiken *et al.*, 1980; Kimberly & Evanisko, 1981; Hull & Hage, 1982; Ettlie *et al.*, 1984; Damanpour, 1987, 1991). Furthermore, since we may expect that SBUs may be more organic or more mechanistic on some dimension, the use of the three determinants listed above enabled the researcher to capture with more precision the organic-mechanistic continuum.

Centralization (CENT) represents the concentration of decision-making authority at a specific level in the hierarchy. Mechanistic organizations are more centralized while organic organizations are less centralized (Burns & Stalker, 1961). Damanpour (1991) found a negative relationship between centralization and innovation. The instrument employed in this study to measure centralization was taken from Pugh *et al.* (1968), Kandwhalla (1972), Gordon and Narayanan (1984) and Hull and Hage (1982) and adapted to the specifics of the study. It measured centralization using a series of twelve standard decisions and identifying on a five-point scale, ranging from line supervisor to head office manager, the level at which decisions are made. As a check on the internal consistency, Cronbach alpha was computed for the centralization scores. The alpha value was well above the generally accepted minimum criterion level of 0.5 and 0.6 (Nunnally, 1978). A factor analysis was conducted to accurately scale the variable. It produced one factor with an eigen value greater than one which explained 78% of the total variance (Cureton & D'Agostino, 1983). Therefore, the mean for the twelve decision items was used to measure centralization.

Vertical differentiation (VERT) refers to the depth of the structure. It reflects the number of hierarchical levels below the chief executive officer. Vertical differentiation is lower in organic organizations than in mechanistic organizations. Hull and Hage (1982) have shown that vertical differentiation inhibits the diffusion

<sup>4</sup> The analyses described further in this study were conducted with both sets of classification. There were no significant differences in their results.

of innovation in manufacturing organizations. On the other hand, Aiken *et al.* (1980) found a positive relationship between vertical differentiation and innovation in not-for-profit and service organizations. Vertical differentiation was measured as the total number of hierarchical levels between the strategic business unit's CEO or equivalent and the front line supervisors. This type of measurement has been used in various studies in the organizational literature (Hull & Hage, 1982; Robbins, 1983; Damanpour, 1991).

Formalization represents the degree to which jobs within an organization are standardized. The literature on innovation suggests that there is a negative relationship between formalization and innovation (Burns & Stalker, 1961; Aiken & Hage, 1971). Damanpour (1991), in his meta-analysis of organizational determinants of innovation, did not find a significant association between innovation and formalization. However, the results were significant for innovations in manufacturing organizations. Four statements about the extent to which rules, procedures and policies are standardized provided a measurement of the level of formalization. This instrument was adapted from Robbins (1983). A factor analysis of the four factors was conducted. It produced one factor which accounted for 98.4% of the variation. Therefore a single scale was constructed by averaging the scores of the four statements pertaining to formalization.

## RESULTS

### *General information and descriptive statistics*

The initial mailing was made to 415 SBUs located in Canada. 162 SBUs returned questionnaires of which 161 were complete and usable. This yielded a response rate of 39.0%.

This rate is considered to be satisfactory for a mail survey (Emory, 1985; Wallace & Mellor, 1988). To ensure that the inferences from responses to this survey were not biased by nonrespondents, the two following procedures were conducted. First, a comparison of the profile of respondents against known characteristics (language, industry, and size) of SBUs in the mailing sample was made. This comparison shows that respondents are similar to SBUs included in the mailing sample for at least these three dimensions. Second, a comparative analysis of responses by date of receipt was also performed. Such a comparison is based on the presumption that late respondents may be surrogates of nonrespondents (Wallace & Mellor, 1988; Wallace & Cooke, 1990; Oppenheim, 1992). The responses of the first twenty respondents and the last twenty respondents for the adopted AM approach, the implemented AM approach, organizational structure variables and strategy types were compared. The results from this analysis show that there are no significant differences between the two groups of respondents. Given the high response rate and the results from the procedures used for testing for nonresponse bias, it appears unlikely that there is a nonresponse bias in this study.

*Adopted and implemented AM approaches.* Figure 2 summarizes the categorization of SBUs that responded to the survey according to the type of AM approach they adopted and the type of AM approach they finally implemented.

The majority of respondents adopted an AM approach. These 122 SBUs represent 75.8% of the respondents. Eighteen SBUs (6 had adopted ABC and 12 had decided to pursue AA or ACA) that decided to pursue an AM approach did not implement it. As indicated in Fig. 2, of the 122 SBUs that adopted an AM approach, 45 adopted AA or ACA and 77 adopted ABC. Thus, the ABC adoption rate is 47.8%.<sup>5</sup> In the second section

<sup>5</sup> This percentage is fairly high in comparison to other surveys (NAA, 1991; IMA, 1993; Armitage & Nicholson, 1993; Innes & Mitchell, 1991). One feature of this study is the distinction between the adoption and implementation stages in the diffusion of a management accounting innovation. Figure 2 shows that only 49 SBUs, out of the 77 that adopted ABC, implemented ABC. Therefore, the rate of implementation is only 30.4% which is much closer to the results from the latest survey conducted in the United States by the Institute of Management Accountants (IMA, 1993). In that study, 36% of the respondents mentioned that they had implemented ABC.



of the questionnaire, respondents were asked to indicate the type of AM approach they finally implemented. The 45 SBUs that adopted AA and ACA did not necessarily implement the selected level. The majority of SBUs, 24, implemented AA or ACA. Surprisingly, 9 SBUs implemented ABC even though they had decided to adopt an earlier level in the AM approach. There were also 12 SBUs that did not implement any AM approach. Figure 2 shows that of the 77 SBUs that adopted ABC, only 49 implemented ABC. 22 SBUs decided not to implement ABC and stop at the AA or ACA level. This behavior is consistent with observations made by Horngren (1990), Innes and Mitchell (1991), Nanni *et al.* (1992) and Madison and Power (1993). There were also 6 SBUs that adopted ABC, but decided not to implement any AM approach. This confirms the need to make a distinction in ABC surveys between the adoption and the implementation stages.

*Strategy and organizational determinants.* In the third section of the questionnaire, respondents were asked to select the strategic profile, from the three created by Snow and Hrebiniak (1980), that best described their SBU. The 60 SBUs classified as prospectors represent 37% of the respondents, the 54 analyzers 34%

and the 47 defenders 29%. This is consistent with Miles and Snow (1978) who predicted that prospectors, defenders and analyzers would be equally distributed in each industry. For each strategy type, organizations were classified according to the type of AM approach, if any, they adopted. A Chi-Square analysis confirmed that prospectors adopt AM approaches more frequently than analyzers and defenders (Chi-Square = 4.43 with a *p*-value = 0.03). The 122 prospectors, analyzers and defenders that adopted AA, ACA or ABC were classified according to the type of AM approach they finally adopted. Thirty-five prospectors adopted ABC while only 27 analyzers and 15 defenders did. A Chi-Square analysis confirms that prospectors adopted ABC more frequently than analyzers and defenders (Chi-Square = 4.23 with a *p*-value = 0.04).

The fourth section of the questionnaire included the instruments employed to measure centralization, vertical differentiation and formalization.

*Hypotheses testing*

In this article, logistic regressions are employed to test the hypotheses. Logistic regression was chosen because it is a much stronger test than

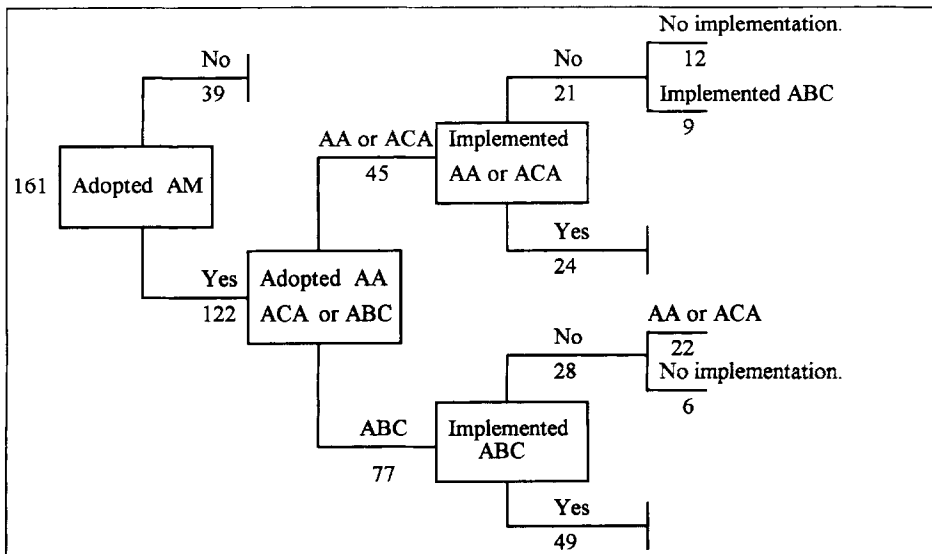


Fig. 2. Classification tree.

correlation analysis and Chi-Square. In the innovation literature, correlation analysis has been the most frequently used approach to test hypotheses (Damanpour, 1991). In this section, Spearman correlation coefficients between the AM adoption and implementation variables (AMADO, ABCADO and ABCIM), strategy dummy variables (PRO and ANA) and structural variables (CENT, VERT and FORM) are examined to better understand the relationship between the variables.

*Adoption of activity management approaches (AM).* Hypothesis 1 stated that a prospector strategy is positively associated with the decision to adopt an AM approach. The Spearman correlation coefficients between AMADO (the categorical variable for AM adopters) and strategy were examined and included in Table 1. The correlation coefficient between AMADO and PRO is positive and significant. Prospectors tend to adopt AA, ACA or ABC more frequently than analyzers and defenders. SIZE<sup>6</sup> and PRO are also significantly associated.

TABLE 1. Correlation matrix: Adoption of AM, strategy and size<sup>a</sup>

	PRO	ANA	SIZE
AMADO	0.17 (0.04)	0.06 (0.42)	0.10 (0.21)

<sup>a</sup>This table shows Spearman correlation coefficients for the 161 SBUs that responded to the survey. Probabilities are given in parentheses. Variables: AMADO = AM approach adopters (=1) or non AM approach adopters (=0); PRO = Prospectors (=1) or Defenders and Analyzers (=0); ANA = Analyzers (=1) or Prospectors and Defenders (=0); SIZE = The log of the number of employees. Significance levels are determined using two-tailed tests.

Since the sign of the coefficient is positive, prospectors tend to be larger organizations.

The following model was employed to test hypothesis 1:

$$\text{AMADO} = a + b_1 \text{PRO} + b_2 \text{ANA} + b_3 \text{SIZE} + e \quad (1)$$

Table 2 reports the results of the logistic regression. Partial Chi-Square coefficients for strategy dummy variables and size were examined<sup>7</sup>. They show that a prospector strategy is significantly associated with a manager's

TABLE 2. Adoption of activity management approaches (AM) and strategy: Logistic regression results<sup>a</sup>

	Expected Sign	Coefficient (Std. Error)
Intercept		-0.4156 (0.9555)
PRO	+	1.2420*** (0.4805)
ANA	+	0.9954** (0.4520)
SIZE		0.1400 (0.1586)

Model  $X^2=10.33$ ,  $p=0.0160$

Somer's D=0.323

\*\*  $p<0.05$

\*\*\*  $p<0.01$

<sup>a</sup>The model is  $\text{AMADO} = a + b_1 \text{PRO} + b_2 \text{ANA} + b_3 \text{SIZE} + e$ . Variables: AMADO indicates whether the respondents adopted (=1) or did not adopt (=0) an AM approach; PRO = Prospectors (=1) or Defenders and Analyzers (=0); ANA = Analyzers (=1) or Prospectors and Defenders (=0); Size = the log of the number of employees. The results were similar when size was measured in terms of total sales. Significance levels are determined using two-tailed  $X^2$  tests.

<sup>6</sup> Even though hypotheses about the relationship between organizational size (SIZE) and the adoption and implementation of AM approaches are not developed in this article, this factor was measured in order to control for its potential effect. Studies that have considered the relationship between size and innovation have produced mixed results (Damanpour, 1992). Blau and McKinley (1979) and Dewar and Dutton (1986) found a positive relationship between size and innovation. Hage (1980) reported a negative relationship while Aiken *et al.* (1980) a non-significant relationship. The number of employees in the SBU was used to measure SIZE. This measure was transformed logarithmically to adjust for expected non-linearity. This type of measure has been employed in several studies of innovation (Aiken *et al.*, 1980; Etlie *et al.*, 1984; Zmud, 1982; Dewar & Dutton, 1986).

<sup>7</sup> A test for the joint significance of the two strategy dummy variables was also conducted by deleting the two variables from the full model. The results of the comparison show that the difference between the two logs is 8.342 (2 degrees of freedom) which is significant with a  $p$  value below the 0.05 level. This implies that both strategy variables, PRO and ANA, have a significant impact on whether SBUs adopt an AM approach.

decision to adopt an AM approach. Analyzers also tend to implement AM approaches more than defenders. Size does not influence the adoption of an AM approach. These results are consistent with H1. Competitive strategy influences managers' decisions to adopt an AM approach.

*Hypothesis about the type of adopted AM approach.* To test hypothesis 2, the 122 SBUs that adopted an AM approach were divided into two groups. The first group consisted of the 45 organizations that decided to pursue AA or ACA. The second group comprised the 77 SBUs that adopted ABC. The two following procedures were conducted. First, the significance of the Spearman correlation coefficients between ABCADO and centralization, vertical differentiation and formalization among SBUs that adopted an AM approach were examined. Table 3 includes these coefficients. The ABC adopter variable, ABCADO, is significantly correlated with vertical differentiation while it is not with centralization, formalization and size.

Second, the following logistic regression was also employed to test H2:

$$\text{ABCADO} = a + b_1 \text{CENT} + b_2 \text{VERT} + b_3 \text{FORM} + b_4 \text{SIZE} + e \quad (2)$$

The results of this logistic regression are shown in Table 4. Partial Chi-Square tests were used to test the significance of each variable.

Only the coefficient for vertical differentiation is significant with a  $p$ -value below 0.01. Thus, SBUs with a higher number of hierarchical levels are more likely to adopt ABC. All other variables do not have a significant impact on ABCADO. The results of these tests show that H2 is confirmed.<sup>8</sup>

Only one organizational determinant, vertical differentiation, proved to have a significant impact on the decision to adopt ABC. Vertical differentiation is a critical determinant in the mechanistic/organic model since it captures how bureaucratic the decision process is in the organization. The selection of an administrative innovation like ABC is facilitated in SBUs that have a higher level of vertical differentiation because this type of innovation is much more formal. These results are consistent with the dual-core model (Daft, 1978). When a mechanistic organization decides to innovate in the cost management area, it prefers to select an administrative innovation like ABC.

*Implementation of AA and ACA or ABC among SBUs that had adopted ABC.* H3 attempts to provide some insight into why firms that adopt ABC are not necessarily implementing it. To test H3, the 77 organizations that adopted ABC were divided into two groups. The first group included the 28 organizations that had decided to pursue ABC but that finally implemented only AA or ACA or did not

TABLE 3. Correlation matrix: Organizations that adopted an AM approach\*

	CENT	VERT	FORM	SIZE
ABCADO	0.08 (0.38)	0.33 (0.00)	0.09 (0.30)	0.15 (0.11)
CENT	1.00	0.12 (0.20)	0.24 (0.01)	-0.18 (0.05)
VERT		1.00	0.15 (0.11)	0.29 (0.00)
FORM			1.00	0.03 (0.72)

\*This table shows Spearman correlation coefficients for the 122 SBU respondents that adopted an AM approach. Probabilities are given in parentheses. Variables: ABCADO ABC adopters (=1) or non ABC adopters (=0); CENT = Centralization; VERT = Vertical differentiation; FORM = Formalization; SIZE = The log of the number of employees. Significance levels are determined using two-tailed tests.

<sup>8</sup> Vertical differentiation and size are significantly correlated with one another as it is shown in Table 3. To better understand the impact of this correlation on the decision to adopt ABC, the following reduced model was also employed. This model is similar to the full model except that size was omitted.

$$\text{ABCADO} = a + b_1 \text{CENT} + b_2 \text{VERT} + b_3 \text{FORM}$$

The results of this logistic regression are essentially similar to those of the full model.

implement any AM approach. The second group was made up of the 49 SBUs that had both adopted and implemented ABC. This third variable pertaining to AM approaches was called ABCIM.

TABLE 4. Type of adopted activity management approach (AM), strategy and organizational structure: Logistic regression results<sup>a</sup>

	Expected Sign	Coefficient (Std. Error)
Intercept		-2.9377 (1.6713)
Centralization	+	0.0115 (0.0248)
Vertical differentiation	+	0.4470*** (0.1672)
Formalization	+	0.0717 (0.0817)
Size		0.1534 (0.1600)

Model  $X^2=13.99$   $p=0.0073$

Somer's D=0.419

\*\*\* $p<0.01$

<sup>a</sup>The model is  $ABCADO = a + b_1CENT + b_2VERT + b_3FORM + b_4SIZE + e$ . Variables: ABCADO indicates whether the respondents adopted (=1) or did not adopt (=0) ABC; CENT = Centralization; VERT = Vertical differentiation; FORM = Formalization; Size = The log of the number of employees. The results were similar when size was measured in terms of total sales. Significance levels are determined using two-tailed  $X^2$  tests.

TABLE 5. Correlation matrix: Organizations that adopted ABC<sup>a</sup>

	CENT	VERT	FORM	SIZE
ABCIM	0.31 (0.00)	-0.13 (0.26)	0.34 (0.00)	-0.14 (0.41)
CENT	1.00	0.20 (0.08)	0.30 (0.00)	-0.20 (0.08)
VERT		1.00	0.13 (0.26)	0.13 (0.25)
FORM			1.00	0.01 (0.99)

<sup>a</sup>This table shows Pearson correlation coefficients for the 77 respondents that adopted ABC. Probabilities are given in parentheses. Category and variables: ABCIM = Implementation of ABC; CENT = Centralization; VERT = Vertical differentiation; FORM = Formalization; SIZE = The log of the number of employees.

Table 5 comprises a correlation matrix for organizations that adopted ABC.

An examination of the correlation matrix shows that the correlation coefficients for centralization and formalization are significantly correlated with the implementation of ABC among organizations that adopted ABC. Centralized and formal SBUs that adopted ABC tended to implement ABC while decentralized and informal organizations tended to stop at the AA or ACA level or finally decided not to implement an AM approach. The following logistic regression was also employed to test H3:

$$ABCIM = a + b_1 CENT + b_2 VERT + b_3 FORM + b_4 SIZE + e \quad (3)$$

The results of this regression are shown in Table 6. The Chi-Square for the overall model was 15.98 with four degrees of freedom and a  $p$ -value of 0.003. The coefficients for formalization and centralization are positive and in the expected direction. The coefficient for vertical

TABLE 6. Implementation of ABC and organizational structure: Logistic regression results<sup>a</sup>

	Expected Sign	Coefficient (Std. Error)
Intercept		-4.5333 (2.0340)
Centralization	+	0.0713** (0.0331)
Vertical differentiation	+	-0.2596 (0.1909)
Formalization	+	0.2925** (0.1233)
Size		-0.0902 (0.1882)

Model  $X^2=15.98$ ,  $p=0.0030$

Somer's D=0.536

\*\*  $p<0.05$

<sup>a</sup>The model is  $ABCIM = a + b_1CENT + b_2VERT + b_3FORM + b_4SIZE + e$ . Variables: ABCIM indicates whether the respondents implemented (=1) or did not implement (=0) ABC; CENT = Centralization; VERT = Vertical differentiation; FORM = Formalization; Size = The log of the number of employees. The results were similar when size was measured in terms of total sales. Significance levels are determined using two-tailed  $X^2$  tests.

differentiation is of the opposite sign from that expected. Partial Chi-Square tests show that centralization and formalization are significantly associated with the implementation of ABC, supporting H3. Centralized and formal organizations that adopt ABC are more likely to implement ABC than decentralized and informal organizations. These results also suggest that decentralized and less formal organizations may have greater flexibility to stop the ABC implementation process at the AA or ACA level if they feel it would be relevant to do so. There is no significant evidence of an association between vertical differentiation and the probability of implementing AA or ACA instead of ABC. Vertical differentiation may have more impact on the adoption decision than on the implementation process.

These results provide some support for the application of the ambidextrous model in a managerial accounting context. Although vertical differentiation does not have an impact on SBUs' decision to implement ABC, the fact that centralization and formalization do is an important finding. Centralization has frequently been used in management accounting research as a surrogate for organizational structure and the mechanistic/organic continuum (Gordon & Narayanan, 1984; Chenhall & Morris, 1986; Gul & Chia, 1994). The results of the analysis conducted in this section show that when mechanistic SBUs make the decision to adopt an innovation such as ABC, they carry through with the overall process without stopping at an earlier level of AM like AA or ACA. Thus, we may suggest that ABC is adopted and implemented in bureaucracies.

### *Discussion*

The results from the analyses described in this section allow us to infer that strategy and organizational structure do influence, to a certain extent, decisions to adopt and implement AM approaches. Competitive strategy sets the need for cost management information. Organizations that compete through innovation and product and market development tend to be more open to new techniques that enable their

managers to improve processes and information. This would explain why, in this study, a prospector strategy is associated with the adoption of AM approaches. Prospectors are usually more flexible organizations. Thus, we may expect that they would prefer AA and ACA since these two levels require less time and effort and are less constraining than formal ABC. However, the results in this study show that, among SBUs that adopt an AM approach, the type of AM approach is not significantly different for prospectors, defenders and analyzers. This would suggest that competitive strategy influences the adoption of the innovation but not the nature of the adopted innovation.

Organizational structure is also an important determinant in the diffusion of innovation process. It influences the type of AM approach a SBU selects. Mechanistic organizations give greater importance to formal systems while organic organizations favor informal systems. AA and ACA consist essentially of analyses of activities and their related costs. They are not formal accounting systems. ABC is much more formal. Therefore, mechanistic organizations were expected to select ABC while organic organizations would tend to select AA or ACA. The results of this study provide some support for this reasoning. The degree of vertical differentiation is positively related to the adoption of ABC in the SBU sample used here. Higher levels of vertical differentiation are characteristically associated with a mechanistic organizational structure. Thus, mechanistic organizations tend to adopt ABC while organic organizations tend to adopt AA or ACA.

Organizational structure also appears to influence the implementation process. An administrative innovation like ABC would be easier to implement in mechanistic organizations. The implementation of technical innovations such as AA and ACA may be facilitated in organic organizations. These statements are consistent with the ambidextrous model (Duncan, 1976). According to the innovation theory, in mechanistic organizations, when top managers have decided to commit themselves to a new system, they put forth all the resources

available to ensure that the implementation will be a success and exert control on the implementation process. The results in this study confirm this interpretation. They show that, among SBUs that adopted ABC, more centralized and more formal SBUs tend to implement ABC while the others prefer the AA and ACA levels.

### CONCLUSION

This study attempted to provide some insight into the "ABC paradox". Despite the fact that academics and management accountants have demonstrated a great deal of interest for ABC during the last ten years, surveys have shown that the diffusion process for ABC has not been intense. It is the role of management accounting researchers to investigate the factors that might influence managers' decisions to adopt and implement activity management approaches like ABC.

The findings suggest that the adoption and implementation of an AM approach depends upon several contextual factors. The type of strategy an organization selects establishes the need for innovation in the activity management area. Organizational structure influences the capability of an organization to implement innovations. Organic organizations are more likely to implement AA and ACA while mechanistic organizations are likely to be more successful in the implementation of ABC. Organizational structure and the mechanistic and organic continuum have been operationalized in the management accounting literature mainly by the use of the level of centralization (Gordon & Narayanan, 1984; Chenhall & Morris, 1986; Gul & Chia, 1994). In this study, the three components of organizational structure, centralization, formalization and differentiation, were considered.

The results show that a prospector strategy is associated with managers' decision to adopt an AM approach. Since prospectors are innovative organizations, they tend to adopt innovations in accounting as well as in operation management.

The results of this study also show that organizational structure plays an important role in the selection of the type of AM approach. It was found that organizations with a higher level of vertical differentiation tend to adopt ABC more than organizations with a lower level of vertical differentiation. Thus, mechanistic organizations prefer to adopt ABC which is a more formal and more administrative innovation than AA and ACA. These results are consistent with the dual-core model.

Centralization and formalization were significantly associated with the implementation of ABC among organizations that adopt ABC. Horngren (1990), Nanni *et al.* (1992), Innes and Mitchell (1991) and Madison and Power (1993) have discussed the fact that some organizations that adopt ABC prefer to stop the implementation process at the AA or ACA level. However, there was no empirical evidence of this behavior. In this study, among organizations that adopt ABC, it was found that more centralized and more formal organizations are more associated with the implementation of ABC in comparison to decentralized and less formal organizations. This study is one of the first empirical study that provides some explanations for the behavior of organizations with respect to the implementation of ABC.

As with any research, this study has many limitations. The following limitations are the most pertinent. First, even though the response rate was fairly high at a level of 39%, there is a potential nonresponse bias. Several tests were performed to try to prevent this threat. However, we cannot conclude that respondents are adequate surrogates for the whole population of manufacturing SBUs. Second, the operationalization of competitive strategy and organizational structure may have caused some problems. Even though, the use of self-typing to identify strategic groups is an accepted practice in strategy research (Ginsberg, 1984, Hambrick, 1989, Snow & Hambrick, 1980), respondents may misunderstand the character of the strategy being studied. For instance, managers may classify their SBUs on the basis of the intended strategy, the realized strategy or the emergent

strategy (Mintzberg, 1978). To attempt to reduce the potential effect of this limitation, strategy types were also inferred by the investigator.

The operationalization of the organic and mechanistic continuum through centralization, vertical differentiation and formalization may also be, in some cases, inadequate. Since sometimes the three variables are not highly correlated, it may be argued that they do not proxy for organic and mechanistic organizations. For instance, some organizations had high scores for centralization but low scores for formalization. In such case, centralization and formalization scores do not enable the researcher to classify the organization as organic or mechanistic. Thus, the operationalization of the organic and mechanistic continuum may occasionally be deficient.

Third, the scores for centralization, vertical differentiation and formalization may be closely linked to each SBU's industry. For example, SBUs in manufacturer of transportation equipment (two-digit SIC code 37) may be more centralized than manufacturer of rubber products (two-digit SIC code 30). Thus, the scores for centralization, vertical differentiation and formalization may be affected by the SBU industry. Dummy variables were employed to capture the effect of the industry. All the models described in Section Six were run with the dummy variables. These tests showed that industry did not have a significant effect on the adoption of AM approaches, the adoption of ABC and the implementation of ABC. Four, even though all the models had significant Chi-Square, the highest Somer's D was 0.54 which is considered to be moderately low according to Agresti (1990). Five, even though the SBUs were carefully identified, in a few cases, the questionnaires were sent to the head office controller or vice-president. The responses from those managers may differ from those of SBU managers because their perception of the cost management system may be different. Despite these limitations, this study makes a significant contribution to the management accounting research.

This study contributes to our understanding of the diffusion process for management accounting innovations such as ABC. An important finding of this study is the association of competitive strategy with the propensity to innovate in the managerial accounting area. Innovators such as prospectors appear to be more inclined to adopt AM approaches than defenders. Another contribution of this study is the association between organizational determinants and the adoption and implementation of ABC. Vertical differentiation, centralization and formalization may be surrogates for organizational structure. Mechanistic organizations are more prone to adopt and implement ABC because they rely on formal systems.

This study also enriches the literature on ABC which has been limited to "success stories on ABC implementation". Much of the research on ABC has focused on explaining why and how organizations should adopt and implement ABC. This study provides some explanations on the contextual factors that influence the diffusion of a management accounting innovation like ABC. This study also contributes to the innovation literature. While the diffusion of innovation literature has mainly focused on technical innovations and not-for-profit settings, this study examines the diffusion process for an innovation, activity management, that combines characteristics from both technical and administrative innovations. Furthermore, the data was collected only in manufacturing organizations. Very few studies on the diffusion process for innovation have been conducted in the manufacturing environment.

As with any research, this study has raised more questions than it has answered. During the last decade, management accountants have shown a great deal of interest for innovations in managerial accounting. The diffusion process for such innovations is far more complex than most academicians and practitioners expected. This article was an exploratory study on the influence of contextual factors on the adoption and implementation of AM approaches. It is the first piece of a research program on the

diffusion of management accounting innovation may better understand how management in today's organizations. It may be possible to accounting innovations spread within organiza- conceive that during the next few years, we tions.

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