

# **Antecedents and consequences of cost system design choices**

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## **Summary in English**

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The central topic of this dissertation is the antecedents and consequences of cost system design choices. This topic already has a long history in the field of management accounting. In the second half of the 1980s, the design of cost systems regained much interest from both academics and practitioners. The internal and external environment in which many firms operated, and thus the environment in which costing was undertaken, had undergone substantial change. Traditional cost systems were heavily criticized for not being sufficient anymore in this new environment, and an alternative cost system, activity-based costing (ABC), emerged. The fundamental characteristic of this alternative cost system is its focus on activities performed by supporting units as the basis for assigning these units' costs to cost objects. ABC systems try to identify the causal relations between cost objects and the indirect costs they generate by measuring cost objects' demand for supporting activities. Since its introduction in the literature, an overwhelming stream of publications on ABC has developed, in which its benefits are strongly emphasized. Furthermore, ABC has become a central topic in the management accounting textbooks, and consultants have heavily promoted its use. One would therefore be inclined to believe that many firms by now would be using ABC. International surveys, however, repeatedly show that the percentage of firms that actually uses ABC is usually less than 20 percent. This has given rise to the so-called ABC paradox: the phenomenon that ABC, despite its clear theoretical benefits, is actually used by only a relatively small number of firms.

For researchers, ABC and its (relatively infrequent) use in practice offer a fruitful research subject. Since its introduction in the management accounting literature, several streams of research on ABC have developed, of which research on the determinants of the adoption and use of ABC is a major one. The results of this stream of research, in which the influence of many potential determinants has been studied, are generally inconclusive. On the one hand, this has led researchers into arguing that more research in this area is necessary, as the source of the inconclusive results may, according to these researchers, not only be substantial, but may also be methodological. On the other hand, it also has led researchers into broadening the scope of their research by, instead of focusing on adoption (or use) versus non-adoption (or non-use) of ABC, focusing their studies on either the stages towards ABC implementation, or on the determinants of the level of sophistication or complexity of cost systems. Building on these two developments within this stream of research, the overall objective of this dissertation is to provide empirical evidence on the antecedents and consequences of cost system design choices. This objective translates into the following two research questions, which are each dealt with in a separate chapter in the empirical part of the dissertation:

- 1. What is the relationship between environmental, organizational and technological factors, and ABC adoption and use?**
- 2. What is the relationship between cost system sophistication, purposes of use, and cost system effectiveness?**

Chapter 2 presents an overview of the research conducted to date on the antecedents and consequences of cost system design choices. For the most part, it focuses on studies of the factors that determine the adoption of and/or success with ABC. These studies provide a number of major conclusions. First, these studies show that there are many factors that influence the stages that organizations have to go through before being a successful user of ABC. Moreover, the influence of many of these factors appears to vary by stage of the implementation process. A major distinction in this respect is between contextual and process attributes (or factors). Contextual attributes influence both pre- and post-adoption stages, whereas process attributes may, together with the contextual attributes, affect post-adoption stages only. Another conclusion that may be drawn is that the studies on the influence of contextual factors on the adoption of ABC to date have shown unstable results, both among and within studies. This applies to both studies on contextual factors that are logically associated with the ABC theory (such as cost structure, competition and product diversity), and studies on contextual factors that influence organizational innovativeness (such as size, strategy and structure).

The studies on the influence of process factors on the extent to which firms have success with ABC, on the other hand, have consistently found a number of factors to be determinants of whether or not ABC implementations are successful, especially factors such as: top management support, linkage of ABC to quality initiatives, training in implementing ABC, linkage of ABC to performance evaluation and compensation, and adequate resources. These factors have in common that they are all non-technical, which implies that the extent to which an ABC implementation is successful is mainly determined by behavioral and organizational factors. Overall, the discussed studies on the level of success with ABC in practice show fairly consistent results: when ABC is implemented effectively and in an appropriate environment, its use is found to have clearly demonstrable positive effects on firms' financial performance, both in terms of stock return and operational return. From a methodological point of view, however, comments can be made on each of the discussed studies. For studies on ABC adoption and adoption determining factors especially statistical power and the time variance of these factors are major methodological issues. For studies on ABC success and success determining factors the possible distortion of the found effects of the use of ABC on the performance of firms as a result of selection bias is the main issue. Another possible cause of the rather unstable results of studies on adoption determining factors may be the rather limited operationalization of cost system design choices as use versus non-use of ABC. Therefore, several recent studies have operationalized the design of cost systems more broadly. However, especially if we look at the results of the two survey studies conducted to date, these results do not appear to be much more consistent than those of the earlier research. Both among and within the two studies the results strongly differ.

Chapter 3 briefly discusses contingency theory and forms of fit, and also develops the hypotheses that are tested in the empirical part of the dissertation. Contingency theory, which is the theoretical foundation of this dissertation, contends that there is no universally applicable system of management accounting and control. Instead the most appropriate system depends on the specific circumstances confronting an organization. The alignment (or 'fit') between the design of management accounting and control systems and contextual (or 'contingency') factors is therefore what contingency theory focuses attention on. This dissertation distinguishes between three types of contextual factors: environmental factors, which are related to the external environment of an organization; organizational factors, which are related to the strategy and structure of an organization; and technological factors, which are related to the fundamental work processes in an organization. Eleven hypotheses on the relationship between environmental, organizational and technological factors, and ABC adoption and use are developed. In addition, four hypotheses on the relationship between cost system sophistication, purposes of use, and cost system effectiveness are developed.

Chapter 4 introduces the data that are used to empirically examine the two research questions in this dissertation. These data are (almost exclusively) taken from a large-scale survey-study that I conducted in 2002, on the use of cost systems in medium-sized, Dutch manufacturing firms. Medium-sized firms were targeted for this study because larger firms commonly consist of a number of organizational units, which may not all use the same (or even a similar) cost system, whereas smaller firms may not use sophisticated cost allocation systems at all. Manufacturing firms were targeted because these are assumed to be a relatively homogeneous group, distinct from non-manufacturing firms. As part of a quite extensive procedure, a questionnaire was sent to either the general manager or the financial manager of 2108 firms. This questionnaire was used to gather firm-level data on their cost systems and on a number of contextual characteristics of the firms. Eventually, 225 usable and representative questionnaires (10.7%) were returned. I experienced some item non-response, however, as a result of which the effective sample size used in the analyses is lower. Most measurement instruments used are multi-item, and taken or adapted from earlier studies. In accordance with the distinction between usage for strategic and operational purposes made in the literature, factor analysis identifies two dimensions of cost system purposes of use among nine widely used purposes: cost system usage (and importance) for strategic purposes and cost system usage (and importance) for operational purposes. Finally, the data show many significant interrelationships among the contextual characteristics of the firms.

Based on the eleven hypotheses on the relationship between environmental, organizational and technological factors, and ABC adoption and use, developed in Chapter 3, the first research question is empirically examined in Chapter 5. Comprehensive models, simultaneously examining the influence of major environmental, organizational and technological factors, of ABC adoption and use are tested. These models build on and extend relations examined earlier by, among others, Bjørnenak (1997), Gosselin (1997) and Malmi (1999). The results show that firms with a higher level of competition, vertical differentiation and product diversity, and a lower level of centralization are more likely to adopt ABC, whereas firms with either a heterogeneous mass production process or a serial unit production process are less likely to adopt ABC than firms with a homogeneous mass production process. Similarly, firms with a higher level of competition, vertical differentiation and product

diversity, more production lines, and a lower level of centralization are more likely to use ABC, whereas firms with a serial unit production process are less likely to use ABC than firms with a homogeneous mass production process. Also, the influence of product diversity on a firm's likelihood of using ABC is found to be negatively moderated by the extent to which the firm uses advanced manufacturing technologies, supporting qualitative findings of Abernethy et al. (2001).

In addition, in Chapter 5 also the association between six aspects concerning the level of implementation and way(s) of using ABC among its adopters and three organizational structure factors is examined. The six aspects concern the level and (perceived) quality of the implementation of ABC, the width and integration of the ABC systems, and the update frequency of the structure and contents of these systems. Overall, these exploratory analyses show that the three organizational structure factors (vertical differentiation, formalization and centralization) not only influence ABC adoption decisions, but also the way(s) firms deal with ABC, given that they have adopted it. Among others, more formalized firms achieve a higher level of implementation quality and their ABC implementations are company wide more often than in less formalized firms. Also, more centralized firms update both the structure and the contents of their ABC system more frequently than less centralized firms.

Based on the four hypotheses on the relationship between cost system sophistication, purposes of use, and cost system effectiveness, developed in Chapter 3, the second research question is empirically examined in Chapter 6. Building on the two dimensions of cost system purposes of use identified in Chapter 4, cost system usage (and importance) for strategic purposes and cost system usage (and importance) for operational purposes, the joint (or interactive) effect of cost system sophistication and cost system usage (and importance) for strategic and operational purposes on cost system effectiveness is examined, controlling for the influence of environmental, organizational and technological factors. The results show that when cost system usage (and importance) for strategic and operational purposes is higher, cost system effectiveness is higher. More specifically, at the average level of cost system sophistication, the more strategic and/or operational purposes a firm's cost system is used for, the more intensively the system is used for decision making and the more satisfied are its users. Also, and more important, the results show that cost system sophistication and cost system usage (and importance) for strategic purposes interact negatively to affect the intensity of use of the system, while cost system sophistication and cost system usage (and importance) for operational purposes interact positively. Similarly, cost system sophistication and cost system usage (and importance) for operational purposes also interact positively to affect the level of satisfaction with the system. Additional analysis show that these interaction effects are non-monotonic. Accordingly, overall the results imply that at higher (lower) levels of cost system usage and importance for strategic purposes, cost system sophistication negatively (positively) affects cost system intensity of use, while at higher (lower) levels of cost system usage and importance for operational purposes, cost system sophistication positively (negatively) affects cost system intensity of use and satisfaction.

In addition, in Chapter 6 also the association between both the usage and importance of cost systems for each of nine purposes and ten environmental, organizational and technological factors is examined. These exploratory analyses show that, on average, the studied firms use

their cost system for a little more than six (of the nine) purposes. The most widely used and most important purposes are those for product pricing, budgeting and stock valuation. However, there is a large variation in both the number and types of purposes. In general, the results show that the different purposes for which cost systems are used, as well as (when they are being used) their importance, are clearly associated with the specific circumstances the firm is confronted with.

Chapter 7 summarizes the main conclusions of the study, discusses its main limitations, and presents some suggestions for future research.