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by

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ABSTRACT

An opportunity to study the technical and organizational impact of management accounting system changes has emerged with companies' adoption of activity based costing (ABC). This paper provides a structured account of experimentation with, and adoption and adaptation of ABC in General Motors Corporation, from 1986 to 1993. From this case, the paper develops a framework for evaluating ABC implementation and hypothesizes about factors that influence implementation. The search for factors that influence ABC implementation success is guided by the information technology and organizational change literatures, as well as anecdotal evidence of factors that influence ABC implementation success. Data is gathered from interviews, archival records, and direct observation and the primary method of analysis is with-in case comparison of data sources. The theory of ABC implementation that emerges is one of an evolutionary sequence of implementation stages that are influenced by socio-technical factors.

INTRODUCTION

The advent of lean manufacturing methods has created a need for new accounting methods to support decision-making in these environments (Kaplan 1983, 1984, 1985; Miller and Vollmann 1985; Johnson and Kaplan 1987; Drucker 1990, 1992; Nanni et. al. 1992). Activity based costing (ABC) emerged¹ in the 1980s to address incongruencies between product cost systems and advanced manufacturing methods. ABC addresses inadequacies of traditional labor-based cost systems by using a two-stage method that attributes costs first to production and business activities, and then to products on the basis of resource usage. The inclusion of product and activity costs, where activities are the fundamental building blocks of the value chain, creates a new, strategic role for accountants termed activity based management (Shank and Govindarajan 1989). By highlighting activities that cause costs, ABC systems promote decisions that are consistent with lean production, such as: reducing inventories; increasing common components; increasing quality by minimizing total quality costs; minimizing costs of ownership through supplier management; assessing customer profitability; and linking product design decisions to manufacturing cost (Cooper and Kaplan 1991a).

Firms' adoption of ABC provides researchers an opportunity to study the technical and organizational impact of management accounting innovations. In their review of management accounting research related to new manufacturing practices, Young and Selto (1991) note that, although anecdotal evidence suggests that behavioral factors are critical to successful implementation of new cost management systems, there has been little research on the implementation process. This study uses case study research to develop a framework for assessing ABC implementation and hypothesizes about factors that influence implementation success. The research design is a single case study of ABC implementation at General Motors Corporation (GM) that spans an extended time period (1986-1993) and includes multiple perspectives. The search for factors that influence ABC implementation success is guided by the information technology and organizational change literatures, as well as anecdotal evidence of factors that influence ABC implementation success. Data sources include: personal interviews; archival records; and, direct observation, and the primary method of analysis is with-in case comparison of data sources. The theory of ABC implementation that emerges is one of an evolutionary sequence of implementation stages that are influenced by socio-technical factors.

The paper makes three contributions to the management accounting literature. First, this study

provides the first clinical account of ABC implementation that spans many years and includes the perspectives of managers from many functional areas and hierarchical levels. Second, the research contributes a framework for assessing ABC implementation that is linked to mature, grounded theories of IT implementation and organizational change. Using the socio-technical perspective to present the technical challenges of ABC design against a backdrop of changing work routines and information structures, the paper provides a unifying framework for the anecdotal evidence and descriptive case studies prevalent in the literature. Finally, as part of theory development, the paper identifies behavioral and contextual factors that influence ABC implementation success. These factors provide a basis for hypothesis testing and suggest measurement strategies for empiricists who wish to establish the relative importance of different factors for implementation success (Anderson and Young 1995, Swenson 1994). In summary, the unit of analysis, the time period under consideration, the linkage to established theoretical frameworks, and the development of a theory of ABC implementation, distinguish this research from previous case studies that present stylized examples of technical issues for pedagogical purposes or that simply describe what is observed.

The paper is organized in five sections. The first section describes the research method, including site selection, data collection and data analysis. The second section presents a structured case description of ABC implementation in GM. The third section develops a model of ABC implementation using evidence from the case discussion. The fourth section describes unresolved issues and future challenges of ABC implementation at GM from the perspective of the managers interviewed for this study. Section five concludes with a summary of the paper and a brief discussion of directions for future research.

RESEARCH METHOD

This study employs exploratory case study research to develop a framework of cost management system change that is “grounded” by evidence from one firm’s experience implementing activity-based costing (Glaser and Strauss 1967, Yin 1989). Case study research complements traditional modes of deductive theory-building by providing perspective on complex interactions between variables that occur in social settings. The following sections use Eisenhardt’s (1989) framework for using case research in theory-building to describe the research methods of this study.

Research Site Selection

The selection of cases in case study research depends more upon the research question and resource limitations than upon statistical sampling properties (Eisenhardt 1989). The focus of this research --- factors that influence the success of ABC implementation in settings where ABC data are likely to differ from traditional cost data, where the organizational implications of changing cost systems is non-trivial, and where ABC data are likely to be used to support different management actions--- suggests four guidelines in selecting cases. First, to study factors that influence success, where success is defined as use of ABC data in the manner intended by the firm prior to implementation, firms with relatively mature ABC implementations are needed. Second, previous studies have shown that ABC data are most likely to differ from traditional cost data in settings with high coordination and control costs, such as those with diverse products, processes, customer demands, or vendors (Foster and Gupta 1990, Cooper and Kaplan 1991a, Anderson 1995, Banker, et.al. 1995). Third, implementation is most likely to be disruptive if it occurs over a protracted period and disrupts familiar routines. Large, vertically integrated firms are more likely to have lengthy implementation processes that cause significant organizational disruption. Limited resources typically cause large firms to implement ABC sequentially at different sites, creating a transition period in which organizational units that previously shared cost information do not “speak the same language.” Finally, a setting in which ABC data are likely to be used to support different decisions is needed. ABC was developed in response to perceived inconsistencies between lean manufacturing methods and accounting systems that reward labor efficiency. Thus, we expect firms that adopt both lean manufacturing methods and ABC to be more likely to use ABC data in the strategic manner of activity based management (ABM).

Taken together, these considerations point to the U.S. automobile industry. The term ‘lean manufacturing’ was coined in reference to the Japanese automobile industry; however U.S. manufacturers have adopted lean methods of manufacture in recent years. Diversity of products, processes, customer demands and vendors is high in the auto industry and influences product costs (Datar, et. al. 1993) and automobile producers are among the largest, most vertically integrated firms. Finally, managers of U.S. auto manufacturers have spoken publicly about the objective of replacing traditional costing practices with ABC (Pare 1993) and have permitted researchers to study their ABC projects in the past (Cooper 1990a, Beajon and Singhal 1990).

Top managers of the three major U.S. auto companies were contacted in Fall, 1992. GM and Chrysler agreed to participate; Ford declined, saying that while they were investigating ABC, an adoption decision had not been made. Extensive discussions with top managers at Chrysler revealed that, although their goal of company wide implementation of ABC was established in 1991, by the end of 1992 they were still far from that goal. In contrast, GM first implemented an ABC system in 1986 and began requiring use of ABC data in 1991. By the end of 1993 over 150 ABC models were complete and integration with other accounting and operating systems, including the budgeting system and the production scheduling and inventory control system, had begun. GM was selected as the site for studying factors that influence ABC implementation success because it had completed the ABC implementation and was using ABC data for decision-making, and because its industry setting is one in which ABC data differ from traditional cost data and new manufacturing methods demand new cost management methods.

The research proposal submitted to management divided the project into two stages. The first stage, which is the focus of this paper, documents the development of ABC as a corporate initiative. The second stage, a comparative study of GM and Chrysler, uses ABC implementation sites as the unit of analysis and examines patterns of success and failure in local ABC implementations in the context of an expanding corporate commitment to ABC (Anderson and Young 1995). Thus, the unit of analysis for this paper is the firm and discussion of plant-level implementations is limited to instances in which a plant significantly affects the trajectory of the corporate ABC initiative.

Data Definition and Scope

Case study research aimed at theory building "... is begun as close as possible to the ideal of no theory under consideration and no hypotheses to test (Eisenhart 1989, 536)." However, a clean slate is difficult to achieve and unguided data collection may overwhelm the researcher with data. Mintzberg (1979) and Eisenhart (1989, 536) advise approaching data collection with a well-defined research focus, and using the extant literature to identify potentially important variables (but not to specify relationships among variables). Following this advice, the literatures on information technology (IT) implementation, and cost management system change, and discussions of ABC implementation experiences are reviewed to identify variables that are likely to influence ABC implementation success.

Information Technology Implementation and Organizational Change

Early studies of IT implementation concluded that success was “technologically determined” or “organizationally determined” as a function of factors related to the technology and the culture of the organization.² These studies shared a rational view of IT implementation that ignored disruptions to familiar work practices, decision-making processes, and power relationships that commonly accompany IT implementation. Later studies found that IT failure was neither technologically nor organizationally determined, but rather, emerged from the complex interaction of socio-technical factors (Trist and Bamforth 1951) that were critical in enacting organizational change (Bostrom and Heinen 1977; Ginzberg 1981; Markus 1983, 1984; Mumford 1983; Ives and Olson 1984; Leonard-Barton and Kraus 1985; Kanter, Stein and Jick 1992). More recently, researchers have argued that these theories are inadequate because they exclude many stakeholders’ to the new IT system. Decision-making processes that use data from IT systems also require radical revision for benefits of the new system to be realized (Ginzberg 1981; Markus 1983, 1984; Leonard-Barton and Kraus 1985; Zuboff 1988; Armstrong 1990a, 1990b; Morton 1991; Kanter, Stein and Jick 1992). In this setting, successful implementation of new systems hinges on the organization’s ability to accept potentially disruptive changes; changes that often shift the locus of knowledge and decision-making from one political faction to another (Robey 1981; Franz and Robey 1984; Markus and Robey 1988; Fireworker and Zirkel 1990).

In their comprehensive review of empirical studies, Kwon and Zmud (1989) describe the IT implementation literature as evolving from a “factors” model, in which researchers focused on factors that influence IT implementation success, to a “process” model, in which researchers shifted from a linear to an interactive model of IT development that incorporated perspectives of multiple stakeholders. They synthesize evidence from the IT implementation, organizational change, and technology diffusion literatures into a model of IT implementation in which success negotiating the stages of implementation is influenced by five types of contextual factors (Figure 1).

[Insert Figure 1 here]

Kwon and Zmud link Lewin’s (1952) three-stage model of organizational change (unfreezing, change, and re-freezing) with traditional criteria of IT implementation success (acceptance and usage), to model the implementation process as six sequential (at times overlapping) stages:³

- initiation
- adoption

- adaptation
- acceptance
- routinization
- infusion

During initiation, pressure to change arises from internal needs or external competitive threats and a search for solutions begins. Adoption encompasses the selection of a proposed solution and the decision to invest resources to facilitate change. Adaptation follows as, in the process of changing, unforeseen needs or system shortcomings are identified. Acceptance reflects the minimal level of use and maintenance that the new technology requires to be sustained. Routinization is signaled by the complete replacement of old work practices by the new system; the IT application becomes a part of normal activities. Infusion arises when the IT application is used, often in unanticipated ways, to improve work effectiveness and is seamlessly integrated with other organizational systems (Cooper and Zmud 1990).

Kwon and Zmud's literature survey identifies five major contextual factors, each comprised of minor factors, that influence successful transitions between stages of implementation:

- characteristics of individuals associated with implementation
- organizational factors
- technological factors
- the task to which the technology is applied
- environmental factors

Important characteristics of individuals associate with implementation include: disposition toward change; education; job tenure; and, role involvement with the IT solution. Organizational factors shown to influence implementation are: the degree of centralized of decision-making; the degree of functional specialization; and, the existence of informal communication networks. Technological factors such as: complexity experienced by users; its compatibility with existing organizational structures and systems; and, the technical improvement relative to existing practices, are also determinants of implementation success. Important task characteristics include: task uncertainty; task variety; and, worker autonomy and responsibility. Important environmental factors are: heterogeneity of external demands on the organization; the uncertainty caused by external turbulence; and external communication networks.

Mapping the research domain of prior empirical studies onto the two dimensional, stage-factor matrix, Kwon and Zmud conclude that early studies in IT implementation typically concentrated on too few contextual factors and too narrow a time frame. They argue that the failure to comprehend fully the implementation process and the interactions of contextual factors promoted an incomplete, often

inconsistent theory of IT implementation. The IT implementation literature offers several variables for consideration in developing a theory of ABC implementation and suggests considering them relative to stages of implementation. An important lesson from the IT literature is that early research should be open to a wide range of influential factors and should go beyond early stages of system design to include use of ABC data and integration with other control systems.

Factors in Cost Management System Change

Soon after critics identified cost systems as a barrier to adopting lean manufacturing methods, researchers began to discuss organizational implications of changing cost management systems. Richards (1987) claimed that change requires: long and short-term objectives, an informal organization of champions, good communication, accurate timely cost information, employee involvement and a system for rewarding cost reductions. Shields and Young (1989) discussed the need to evaluate performance using the new cost system to promote its adoption. Stokes and Lawrimore (1989) identified the importance of persuading all parties involved in authorizing a new cost system investment of the inadequacy of existing systems. These studies, which include factors related to system design and factors that influence system usage, implicitly suggest two stages or levels of implementation analysis. Kaplan (1990) dealt explicitly with the issue of implementation stages, hypothesizing that new cost management systems pass through four evolutionary stages. He defined each stage relative to the degree of integration between cost management and financial accounting systems; thus implicitly identifying system integration as a critical factor in ABC implementation.

To summarize, the theoretical literature on cost management systems suggests that change occurs in stages. In early stages, success is influenced by adequately demonstrating existence of a problem and establishing goals for the new system. In later stages, using the system for decision-making and integrating the system with information and reward systems becomes critical for success. Influential factors in negotiating each stage are: providing intrinsic and extrinsic motivation to use the system and, having attained management support, assigning responsibility and communicating goals for the system.

Factors in ABC Implementation: Lessons from Practice

Soon after ABC began to be implemented, discussions of determinants of system acceptance and

use began to appear in practitioner journals. Technical and behavioral factors were implicated in implementation success (Beaujon and Singhal 1990, Cooper 1990a, Eiler and Campi 1990, Emore and Ness 1991; Haedicke and Feil 1991; Jones 1991; Kleinsorge and Tanner 1991; Brausch 1992; Koons 1992; MacArthur 1992; Drumheller 1993). Technical factors included: a model that reflected the economics of the business; early resolution of the degree to which ABC would be integrated with other accounting systems; and, a defined ABC model scope with clearly stated requirements for product cost precision. Behavioral factors included: a multi-disciplinary design team; adequate ABC training; an ABC system “owner” and project “champion”; top management support; and, performance measures and incentives consistent with using ABC data. Beaujon and Singhal (1990, 56) also cited managerial decision-relevance and design simplicity in promoting system use:

...it is difficult for those not directly involved in the ABC project to understand what the ABC system implies about the cost of activities... in many cases the difficulty could be reduced or eliminated through a better understanding of the natural focal points [uses] for activity-based information.

In sum, in the early 1990s the challenges of implementing ABC were believed to be primarily technical: defining the scope of the model; identifying activities; selecting cost drivers; and, analyzing ABC costs; and management support was to be obtained through training. Implementation was seen as a rational process of educating managers about ABC and developing an ABC model. Beaujon and Singhal’s words echo earlier writings in the IT literature (Gintzberg 1981, Markus 1984) and highlight how failure of the ABC system to be widely used was attributed to misunderstanding. Like the early IT literature, the ABC literature did not recognize that ABC systems exist in social settings in which technical rationality may diverge from individual rationality; discussions focused on what were believed to be the real challenges of implementation --- designing a model to produce ABC product costs.

Later, researchers began to respond to evidence that well-designed ABC systems that revealed dramatically different product costs were not generating management behavior consistent with profit maximization. A new stream of research emerged that linked ABC to organizational change. Cooper, et al. (1992) examined ABC implementation failures--- where failure was indicated by lack of use--- in eight companies. The root cause of system disuse was a failure by system designers to recognize the socio-technical setting in which ABC data are used:

A more fundamental cause of the delays in taking action may have been inadequate preparation of the organization for changes in thinking and decision making... The most

successful projects occurred when a specific target for change was identified early in the project... The target was the person or group whose decisions were expected to change as a consequence of the information. (p.8)

Early discussion of ABC implementation assumed that data from ABC was universally superior to traditional cost data and that rational agents would prefer ABC data if it were available at reasonable cost. Implementation failures were attributed to poor ABC designs, inadequate management awareness of ABC system costs and benefits, and communication failures between designers and users. Offering an alternative explanation, Argyris and Kaplan (1994) and Shields and Young (1989) argue that in spite of increased product cost accuracy, ABC data are not universally preferred because ABC data change the political landscape by creating embarrassing or threatening conditions for existing managers who respond defensively to block implementation. Implementation of ABC systems is unlikely to succeed until these stakeholders' concerns are addressed.

Summary

With hindsight, it appears that, like the IT literature before it, the cost management system literature and ABC implementation studies, evolved from a “factors” model to a “process” model of ABC implementation. Table 1 is a compilation, from the IT implementation, organizational change, and cost management system change literatures and from anecdotal evidence from ABC implementations, of variables that are likely candidates for inclusion in a theory of ABC implementation. The possibility that these variables' influence is stage-dependent is explored using Kwon and Zmud's six stages of implementation to compare the influence of each factor over time.

[Insert Table 1 here]

Data Sources

Three types of data are gathered: archival records, interview data, and direct observations. Archival records, including significant memoranda, minutes of meetings, policy handbooks and ABC training materials, were gathered in May 1993. Interviews with managers were conducted between March and August of 1993. In September 1993, the author was permitted to observe a corporate ABC User's Group meeting.

Ten corporate and division-level salaried employees were interviewed in over 40 hours of taped

interviews.⁴ Interview data from a separate study of Chrysler's ABC implementation are used to provide insight into external communications with other firms. A master set of interview questions was the informal basis for each interview and the company agreed to confidentiality between the interviewees and the researcher. Interviewees were identified based on their centrality (decision making authority or responsibility for implementation) to the corporate ABC adoption process. As a result, views of those who opposed the implementation of ABC are likely to be under-represented in the study. Because this research is retrospective, taking place after ABC was adopted as a corporate policy, it is unlikely that those who opposed ABC could be easily identified, and if identified, that they would be candid about their opposition. Opposing viewpoints were discussed with interviewees and documented in the minutes of meetings that preceded adoption of ABC.

Promotions and re-assignments preclude each employee from discussing the entire period from 1986-1993; however, at least three and as many as seven of the interviewees provided overlapping perspectives on the period. Table 2 is a profile of each employee's involvement with ABC from 1986 to 1993. Although this paper is focused on the development of ABC as a corporate initiative, six of the ten employees participated in implementing ABC in at least one plant location before moving to a corporate or divisional ABC position. All of the interviewees have extensive first-hand experience in diverse manufacturing settings; four worked in functional areas other than accounting and finance before becoming involved with ABC implementation. In sum, the interviewees' experience spans the eight year period and provides perspectives from different levels in the corporate hierarchy, from different functional areas, and from different production settings.⁵

[Insert Table 2 here]

Methods of Data Analysis

This research adapted three methods of data analysis recommended by Eisenhart (1989) to develop hypotheses concerning factors that influence ABC implementation. The first method of analysis involved rewriting the interview transcripts to create a chronological account of ABC implementation. The transcripts were superimposed on one another, and overlapping descriptions were compared to identify common and unique perceptions of events. Unusual interpretations, that were unlikely to reflect simple memory lapses, were identified for further investigation. In three cases follow-up interviews were

conducted to more fully explore conflicting viewpoints. Archival records were used to corroborate event chronology and to provide an albeit sanitized perspective of critical issues and their resolution during the ABC implementation process. The next section presents an abridged version of the composite case description from this stage of analysis.

The second method of analysis required dissecting and reorganizing the original transcripts around major factors suspected to influence ABC implementation success (Table 1). Thus, for example, references to influential leaders in the ABC implementation effort were categorized under "individuals" and references to software problems are classified under "technology". After removing quotes linked to the "likely suspects", the transcripts were reviewed again with the objective of identifying unanticipated factors that sped or slowed ABC implementation. Archival records were also reviewed at this stage of analysis, and although no new success factors emerge, the records corroborated several important factors and provided a perspective on the glacial pace of innovation.

The final method of analysis focused on examining whether ABC implementation at GM was well described by "stages" in which factors affect each stage differently or in which different factors emerge as influential at each stage. Kwon and Zmud's six stages of implementation were used to define transition points in ABC implementation. Then, using categorized interview and archival data from the second stage of analysis, each remark or archival reference was dated with respect to the approximate period to which it referred. Evidence on the relationship between major factors and implementation success was re-examined by implementation stage to determine whether this explained conflicting results.

CASE DESCRIPTION: ABC IMPLEMENTATION AT GENERAL MOTORS CORPORATION⁶

GM's management accounting practices date to 1925, when Donaldson Brown's concept of standard volume became the foundation of the financial control system (Sloan 1963, 16-4-9). Standard volume, defined as the "estimated rate of operations at the normal or average annual utilization of capacity," formed the basis for gauging operating efficiency, distinguishing costs which were controllable by divisional management and determining product costs. Indirect manufacturing expenses at standard volume were "translated into per unit terms" based on direct productive labor. Financial controls were meant to help managers measure performance of diverse, decentralized operating divisions in an environment characterized by large fixed costs and fluctuating demand. They were born of crisis and

“... were brought in to ensure that crises did not recur.” However, no approach anticipates every contingency. GM’s ABC project was a response to gradual changes in the environment that created a new crisis that was precipitated by increased product competition and disruption of traditional relationships between manufacturing cost and unit volumes caused by new, capital intensive technologies and industry-wide excess capacity (Keller 1989). The following sections describe the emergence of ABC as a GM policy using Kwon and Zmud’s (1987) six implementation stages as an organizing framework.

Initiation

During the 1970s, distortions in product costs caused by allocating manufacturing overhead over a dwindling direct labor base in diverse processing environments were addressed by increasing the number of “burden centers” in plants. The Director of Product Cost for North American Operations (NAO) recalled, “we went from one or two burden centers to ... as many as 1200 centers in one production complex.” By the 1980s, pressure to outsource component manufacture, coupled with tremendous investments in capital and indirect labor-intensive processes caused managers to question whether this was an adequate solution to the fundamental problem of determining component costs.

In 1984 a study of costing procedures called the Cooney Report, was launched by the Comptroller’s Office. The report recommended augmenting labor-based burden rates with “weights” to reflect process complexity. A member of the study team recalled that what started as a bold initiative to revolutionize product costing ended with a shallow recommendation to adjust the labor-based system because the team was overwhelmed by the diversity of costing practices they discovered and the impossible task of developing a universal cost system. There is no evidence that recommendations of the Cooney Report were implemented; perhaps because, as one manager described, it was viewed as an incremental solution and because it was “theory”, providing no guidance about how the “weights” were to be established.

In the early 1980s investments in transfer presses dramatically reshaped the economic landscape of GM metal stamping facilities.⁷ Plants that received these investments were assured a future but faced substantially different cost structures with high capital costs and increased consumption of indirect support resources. Plants that were not modernized were threatened with closure and faced aggressive outsourcing mandates. The radical shift of fortunes brought about by transfer press technology in

conjunction with the acknowledgment by corporate accounting of a “product costing problem,” stimulated plant comptrollers to launch experiments in product costing.⁸ Although costing experiments emerged in different production facilities, most of the experiments occurred in stamping plants.

In early 1987, five separate, uncoordinated costing experiments were underway; three originated in metal stamping plants and a fourth originated at GM Research (GMR) but was applied to metal stamping. One stamping plant developed a hybrid system called “factored-piece time” that used direct labor, machine hours and sales dollars to allocate indirect costs to products. A second, modernized plant treated each transfer press as a separate cost center and used machine hours to allocate costs to products. A third plant, in Pontiac, Michigan, that had not received transfer presses and was threatened with closure, experimented with an approach called “transactions costing” that was later renamed ABC.⁹

Researchers at GMR were developing an economic model for analyzing transfer press investments when they discovered that the required input data (e.g., machine-level data on setups costs and maintenance) did not exist. The research project was reorganized with one task force charged with assessing sources of cost data and developing better cost information systems. Two researchers assigned to this task force spent the first half of 1987 talking with managers throughout the corporation about the data they sought. In their presentations they formulated a model of a “cost matrix with different resource categories as the columns and *different operational steps* for metal stamping as the rows.” This differed from the stamping plants’ objective of tracing overhead costs to *products*. The GMR model was the first conceptualization of costing “activities” rather than products; and had profound effects later, when ABC was implemented at GM plants that were less concerned about product costs. Managers’ response was “very positive. There was a sense that the data wasn’t available and would be very useful.”

Although ABC started as a local initiative, the team at Pontiac was unique among those experimenting with new cost approaches in overtly promoting its activities in the corporation. In early 1987, the plant comptroller (and chief sponsor of the cost system experiment) convened a meeting of all Chevrolet-Pontiac-Canada (CPC, one of four Groups comprising GM NAO at that time) stamping plant comptrollers to share the results of an initial two-product pilot study and to teach them the ABC approach (ABC product costs were not yet available). One team member recalled the strategy of convincing these plants to develop ABC models:

After the meeting where we introduced the theory to the CPC managers, we sent them periodic progress reports... We even trained one person from [another plant] to develop their pilot ABC

model... [Pontiac's plant comptroller] told people about our work at every opportunity and a big part of the team leader's job was responding to requests for information.

Two stamping plants were persuaded to try the approach. At the same time, plants from different Groups, including two ACG (Automotive Components Group) plants and an engine plant in Pontiac, contacted the team and with their technical support began experimenting with ABC. Moving beyond financial circles, Pontiac's plant comptroller also publicized ABC in CPC's manufacturing and engineering areas.

As a result of widespread promotion of the Pontiac experiment, the GMR researchers stumbled across it in mid-1987:

...we'd seen the systems being developed in the other stamping plants. ... they were trying to take the concept of what we now know as ABC and shoehorn it into some sort of adjusted labor hour that reflects differences in parts. So it had a similar philosophy... but it hadn't quite let go of the old idea that everything has to pass through labor hours to be able to allocate dollars to it.

The Pontiac experiment broke out of the accounting "chart of accounts" framework and was most similar to the researchers' cost matrix. Recognizing that the data that they sought was not available and as part of GMR's policy of rotating researchers into production to increase their exposure to practical problems, the researchers joined the ABC design team at Pontiac in Fall 1987, to develop an ABC model for the plant's second major production area. This early linkage to an external (to the accounting function) constituency that was knowledgeable about ABC and needed ABC data was to prove invaluable when all of the cost experiments were evaluated at the corporate level.

The 1984 Cooney Report marked the end of formal Corporate and Group inquiry into new product costing methods; however, Group accounting departments kept close watch over the field experiments. On August 18, 1987 the team from Pontiac was invited to present their results to GM's Comptroller and to the Director of Finance of CPC in a presentation entitled: "CPC Group Transaction Based Costing: An Implementation Proposal."¹⁰ They reviewed the project's objectives--- a stand-alone decision-making tool that would not "disrupt existing financial systems" but would provide "realistic product costs, product design support, and an understanding of the cost of complexity while improving sourcing decisions"--- and proposed a three year schedule for implementing ABC at CPC's six remaining stamping plants and seven engine plants. The team also proposed formation of a CPC ABC Liaison Group that would be managed by Pontiac's Comptroller and would include a member from the Pontiac team and three new system designers. Each implementation site was to designate three employees with production experience for their ABC Design Team. CPC's ABC Liaison Group would train the team and

oversee implementation. A Pontiac team member remembered preparing for the meeting:

We knew it wouldn't be an easy sell. There were competing ideas, mainly machine hours ... we developed counter-arguments about why we didn't think machine-hour costing would solve the problem. We also anticipated resistance that stemmed from 'not-invented-here' feelings among the corporate people. CPC accounting people had been working with the modernized plants to develop machine-hour systems... they were predisposed to that approach.

She also remembered concerns that were raised in the meeting:

People hadn't heard of it [ABC] and didn't understand what the implications of changing the cost system might be... they thought it [the Pontiac ABC model] was too complex, and it was. We knew that 78 cost drivers were too many. In response we started studying how much cost was driven by each cost driver and what the effect would be if we started eliminating cost drivers.

The resources required to implement and maintain the system were another big sticking point: computers and manpower... management wanted to have a dollar benefit for implementing ABC.

The Director of Product Cost for CPC recalled the meeting:

...the results of the pilot at Pontiac showed disturbing differences between the ABC piece cost and the traditional piece cost... I would say that by the end of the meeting they were energized to move ahead with something that got us closer to the truth... I remember [GM's Comptroller] saying 'You're preaching to the choir, let's move ahead with it.' The team wanted to refine it [the ABC model]... but the momentum was there for corporate involvement to roll it out... That evening after the meeting [the Director of Finance] asked me if I would take this group under the CPC product cost group...

Team members from Pontiac remembered the outcome of the meeting differently:

We were pretty depressed... An important person in the meeting was visibly distracted during the presentation... we were hit with so many trivial objections. We were pretty certain that was the end of it, although we had permission to continue at Pontiac.

When questioned about the seemingly disparate beliefs about the future of ABC that emerged from the

August 1987 meeting, the Director was surprised and replied that the team,

... should have been elated not depressed... in their presentation they lacked an overall cost management vision and were unable to address how to make it 'fit' with existing systems--- they were really undisciplined. One of our objections was that many of the inaccuracies that their system 'corrected' were driven by flaws in their traditional system not by improvements offered by ABC. A poorly executed labor-based system isn't a basis for accepting ABC...

Despite their pessimism, the team returned to Pontiac where they were joined by the GMR researchers to complete ABC implementation in the plant's second major production area. Three of the four original ABC team members departed and project leadership devolved to the remaining original team member, with the plant Comptroller continuing as the project sponsor. As CPC's Director of Product Cost

predicted, seven months later these two people (hereafter referred to as the CPC ABC Sponsor and Designer) were relieved of their plant responsibilities and assigned to lead the ABC effort from CPC's Product Cost group. The March, 1988, transfer announcement stated:

[Pontiac's Comptroller] is going to head up the development and implementation of the ABC System for CPC, and the Pontiac Pressed Metal and Engine Operations will be lead plants for this more effective processing.

Although they were officially CPC employees, they remained in Pontiac to complete the ABC model and manage the transition from implementation to maintenance (provided by Pontiac's existing accounting group). They continued to provide technical support to plants experimenting with ABC, developed a Design Manual documenting ABC implementation steps, and defined their jobs to include providing ABC design support, ABC training, and "user"¹¹ support.

Although creation of a CPC Group-level ABC team suggests a juncture between initiation and adoption, the ABC team leader described the atmosphere as:

...wait and see... CPC management was still asking 'what benefits are we actually going to get from it?' ... there was no official mandate to implement ABC... plants called us if they were interested and we were there to support them if they were willing to commit resources to it.

The ABC Sponsor was not authorized to hire additional ABC Designers as had been proposed. This is not to say that there was not CPC Group-level support for the effort. On the contrary, every person interviewed cited the support of CPC's Director of Finance from 1987 until his retirement in late 1992 as the impetus for moving the discussion of cost system innovations from the plants and Groups to the Corporate level. As one person remembered:

His vision was an integrated system that would accurately define the cost of a vehicle...and future vehicles...he believed that it really helped you [if you could] predict the future ... 'If I can't afford the present, then I can't afford the future by continuing,' ... He had a vision of using better current information to project future product data...He was not trying to outsource a floorpan.

In sum, it would be premature to call formation of the two-person CPC ABC group a signal of ABC adoption. The team was physically isolated and had no authority to expand ABC's scope, although they had support at the top of the CPC organization. What can be concluded is that the influence of other cost experiments on the trajectory of the corporate cost system was sharply limited. As the Director of CPC Product Cost recalled,

...by then the [factored-piece time] approach was gathering dust on a shelf... I don't think it was considered practical. It was an interesting study and showed tremendous effort by a few people.

But it was clear that if you wanted to replicate that you would have to... spend the same amount of energy at every location. It just wasn't something you would want to foist on others... ABC was the first thing we saw that had the discipline, took existing information, had a practical amount of input from experts--- manufacturing and production people--- and gave you the sense that we're really starting to ask people for their thinking about where our costs are coming from.

As part of GM's commitment to technological innovation, an external panel of world-renown scientists, called the GM Science Advisory Committee (SAC), periodically reviews company practices and advises top management. In Spring, 1988, the SAC was charged with reviewing GMR, and concluded in their final report that:

A research group should be formed combining appropriate people from GMR and the central Finance and Accounting staffs and directed to study cost accounting problems.

In response, managers from GMR naturally recommended CPC's ABC approach as a model for corporate expansion. The two researchers who participated in the Pontiac implementation, their supervisor, and CPC's ABC Sponsor met with GM's Vice-President of Finance in early summer and the outcome of the meeting was the formation, in October 1988, of the Cost Systems and Measurements Council (CSMC).

The CSMC was charged with reviewing and recommending changes to existing cost practices as well as developing a comprehensive performance measurement system to support advanced manufacturing methods. The Council was jointly chaired by three individuals: the top managers of ACG and GMR, and GM's Assistant Comptroller. The Council was supported by a workgroup that was based in Pontiac and headed by the secretary of the CSMC, a member of the corporate finance staff. One of the GMR researchers, the CPC ABC Sponsor and the CPC ABC Designer were assigned to the cost team of the CSMC workgroup. The ABC Designer described the significance of the CSMC

The cost part of the CSMC [study] was translated as ABC... meaning that we were going to look at ABC and only ABC and we were not going to consider machine hour costing or anything else. Basically it was going to be ABC.¹² Though the decision continued to be an issue in the lower ranks, it was pretty much resolved in the minds of top management. Formation of the Council indicated a recognition that ABC had potential as a corporate-wide system. The CSMC workgroup's cost team was to evaluate this possibility.

Thus, if "initiation" is characterized as a broad search for solutions, then the formation of the CSMC with its objective of conducting a feasibility study of ABC suggests the close of the initiation stage and the beginning of the adoption process.

Adoption

The cost team of the CSMC workgroup was charged with assessing the feasibility of ABC as a corporate strategy. In the February, 1989, CSMC meeting, the team was given four guidelines for developing a corporate ABC proposal:

- 1) It must support engineers' assessment of alternative product designs;
 - 2) It must have the potential for providing information at different levels of aggregation (e.g., plant level, division level, vehicle level);
 - 3) It should be comprehensive, covering implementation plans for all North American manufacturing operations; and,
 - 4) The implementation strategy should address people issues, ensure that new information generated by the system is not threatening and suggest plans for facilitating the understanding of the data.¹³
- The workgroup identified two prerequisites to ABC becoming a corporate strategy. First, they had to demonstrate that ABC was applicable to a variety of process settings, including vehicle assembly, machining, stamping, molding, specialty processing and component assembly. Although eleven plants had installed ABC systems, they did not cover the spectrum of processes. Second, they needed to link ABC to corporate strategies for improved performance and show that ABC data precipitated better decisions. Although the Pontiac pilot study demonstrated that ABC product costs were different from traditional product costs it did not provide examples of uses of ABC data.¹⁴ To address these issues the team proposed in the April, 1989, CSMC meeting to implement ABC at eleven additional sites and to develop case studies from all 22 sites that would focus on uses for ABC data in management decision-making. The Council approved the plan asking for a complete evaluation of ABC by February, 1990.

In the following month, the cost team approached the eleven plants identified for the expanded ABC pilot study. Seven agreed to participate¹⁵ and one unsolicited volunteer emerged, bringing the pilot sample to 19 plants that represented most GM production processes. The next step was linking the sites to tests of system usefulness:

... initial studies focused on differences between traditional product costs and ABC product costs. That was the main measure of system validity ... the CSMC pilots expanded that to 'What kinds of decisions would you typically want to apply this better cost information to?' ... We figured out the claims that we wanted to make for ABC about decisions it supported ... we wanted to focus on sourcing, investment decisions, pricing, and continuous improvement.

We presented the list to the plants and said 'Which of these make sense... Are these hot issues in your plant... things that the ABC pilot could help support?' ... we tried to identify a natural match ... we asked them why they were doing ABC and how they wanted to use it... I think it was considerably less than universally true that they eagerly supported looking at decision support ...

Three new members joined the CSMC cost team to assist in training and advising the pilot sites. Training, previously conducted by Cooper and Kaplan using Harvard case studies, began to incorporate GM experiences and to focus on action plans and specific implementation steps:

We gave them specific instructions based on learning from earlier implementations. We explained their role in the CSMC study and our time frame. After implementation the teams were to present their results to their management and to attempt to use ABC for specific decisions of the type they were assigned to investigate. Then they were to develop a business case using their data that we would present to the Council and use for future training.

Evidence that ABC might become corporate policy came on June 21, 1989, as GM Chairman and CEO, Roger Smith, spoke to the National Association of Accountants (now the Institute of Management Accountants) in Cincinnati, OH. He reported that GM recognized problems in cost accounting practices, had been studying ABC since 1986, and was piloting it in 19 sites in hopes of "... find[ing] out if it can help us improve our costing techniques."

In their September 1989 progress report, the cost workgroup defined thirteen implementation benchmarks and reported each site's progress on a Gantt chart. The workgroup monitored the plants' progress against three criteria:

...we looked at where they were in the design process--- had they identified activity centers and cost drivers ... we assessed whether they were trying to understand and do analysis of their existing costs versus the ABC costs--- if they were trying to understand why some costs changed... those reviews got people thinking about cost flows, activities, process changes, and really drove the organization to understand the concepts... These first two indicators were clear-cut... The third factor that we looked at was the qualitative side of implementation... based on our impression of the team's involvement, divisional management's involvement, how the data was used after it was developed and whether there was support for it at the site... When we developed our report for the Executive Council we evaluated what had driven qualitative differences... training, application of the concepts, or other factors.

Even in the pilot study, the cost workgroup observed mixed success in implementation. Believing that factors related to management support and communication were critical success factors, the team requested that the CSMC provide greater visibility to the pilot teams through frequent communications with group-level managers and management support for full-time staffing of the local ABC teams and formation of plant-level steering committees. Subsequent monthly CSMC meetings included testimonials by team members from successful implementations about how the data was being used and indicated that 18 of the pilots would meet the January deadline.¹⁶

In February 1990, the cost workgroup presented results from the 18 pilot sites to the CSMC.

The minutes of the meeting indicate that the pilot study demonstrated that ABC data had the potential to support decision making in the five areas that were investigated and that there were significant changes in product costs at most of the production sites. One workgroup member noted that the Council assessed the pilot study's success using three criteria:

One question was 'Can we even do this... does it have broad applicability [beyond stamping]?'... I think the answer to that was a fairly clear, 'Yes'...

The second criteria [was]... does it make any difference? Is there any evidence that going through all this tells us anything different than the current accounting system? The answer again was a pretty clear, 'yes'...

The third aspect was 'How does this contribute to decision-making in the specific areas that we had chosen to look into?'... the results of that were less clear-cut, largely because we hadn't worked out (and I'm still not sure we have worked out) exactly how to design one of these ABC systems so that it really supports decision-making... There wasn't overwhelming evidence from these pilots---you couldn't add up how many dollars we saved as a result of implementing ABC---which [would have] made evaluation easy... I think the plants said 'OK, we'll crunch the numbers for you and when we're done you can do your analysis.' But I don't think they really warmed to the idea of reinventing the decision-making process for their plant.

Another workgroup member recalled the ensuing debate among Council members:

The main negative perception was that real-time decisions weren't made... [during the study] there wasn't a major outsourcing decision so the plants had to look at past decisions or had to extrapolate to some possible future decisions... There was a perception among Council members that this made the results weak. Another problem was that we couldn't present a dollar benefit to the Council for implementing ABC... Also, some of the plants' product costs didn't change very much... In most cases this was because they had used a lot of volume-based cost drivers in their models... some of it reflected intentional resistance and some was just misunderstanding the ABC theory... Of course we couldn't really say this since they were 'volunteers'... Politically it just wasn't the best way to handle it. Instead we assessed typical reasons for failure and included them in our training programs.

One concern that Council members raised in the meeting was the role of subjectivity--- identifying activities and selecting cost drivers--- in designing ABC systems. Before they would decide on the future of ABC, the Council directed the team to conduct a follow-up study comparing cost drivers used in two stamping plants to identify the degree to which subjective selection of cost drivers influenced product costs and to evaluate the potential for developing a common "cost driver list" to guide future ABC implementations. Other concerns that the group was instructed to address included: a corporate rollout schedule; whether ABC should be a corporate or local initiative; which costs should be included in ABC models; how to communicate ABC to the larger GM community; how to integrate and reconcile ABC models with existing financial systems; and finally, the source of resources for implementing ABC.

In March, the team presented a comparative analysis of ABC systems in stamping environments and concluded that “a list of core cost drivers would be a useful starting point for implementation;” however, further analysis was required to identify the cost drivers. In an early indication of migration of the project’s objectives from product to process costing, the team based its recommendation for adopting ABC on what they called “the primary benefit of supporting cost reduction” activities in a manner that considers “total organizational costs.” They recommended that ABC be developed as a stand-alone, PC-based system because integration across diverse systems would pose too great a problem in the short-run. (However, in the long run, all financial systems were to be harmonized with ABC data.) Of the 18 pilot sites, nine intended to continue using ABC, five liked ABC but did not have the resources to support two cost systems, and four did not like ABC and would not continue to support it.¹⁷ At the meeting’s conclusion the CSMC endorsed ABC as the recommended approach and directed the team to complete a rollout plan and present their findings to the Executive Committee and to the CFO’s Staff Meeting. In April the team proposed a five year rollout schedule for GM NAO. The Council amended this to three years, requesting completion by 1993.

In their last presentation to the CSMC in May 1990, the cost team proposed an organizational structure for supporting ABC that was accepted by the Council. An ABC Steering Committee, comprised of the four Groups’ Directors of Finance, the Assistant Comptroller, the ABC Sponsor and the GMR researcher, would guide the ABC implementation effort. Each Group (e.g., CPC, BOC) would have a team of ABC liaisons to support the plants. One liaison would represent the Group on the ABC Oversight Committee, a working arm of the ABC Steering Committee that was headed by the ABC Sponsor.

In June 1990, the CSMC cost team presented evidence from the pilot study to the Executive Committee. One participant remembered:

... We talked through the concepts briefly... then we reviewed the results... we had pretty much complete buy-in all the way through. In fact [the CFO] said that the existing costs systems were inadequate--- ‘not what we need to run the business.’ He wholeheartedly supported moving forward with corporate implementation.

With this endorsement the meeting turned to issues of implementation. The Committee agreed to the proposed organizational structure; thus the cost team of the CSMC workgroup was renamed the ABC Steering Committee, and became the backbone of the new ABC Oversight Committee. The perennial concern of how ABC would fit with the corporate strategy of common systems (e.g., the integrated

production scheduling and inventory control (PSIC) system) was raised and the Steering Committee was directed to pursue “common systems with different approaches” in the design of future ABC models. Corporate implementation was to be completed by 1993, with each Group determining a schedule of plant implementations to insure attainment of the goal. Thus, in June 1990, four years after the pilot study of “transactions-based costing,” management adopted ABC as GM corporate policy.

Adaptation

In the months preceding the first ABC Steering Committee meeting on November 16, 1990, the Groups devised plans for implementing ABC by 1993. As was the case in the CSMC pilot study, plants were selected “partly [through] volunteerism and partly based on the realities of knowing whether the plant was in turmoil ... not wanting to dump one more task on top of them.” At the meeting, the Director of ACG laid out an aggressive schedule of implementing 41 plants in 1991, 38 in 1992 and 31 in 1993. CPC’s Finance Director reported that their stamping plants were either completed or in progress. The modernized plants, where implementation had been postponed until completion of the CSMC pilot, were pioneering a new process aimed at “commonizing” key ABC design choices, such as major cost centers and cost drivers, for all CPC stamping plants. CPC was also building the first non-manufacturing ABC model to support cost analysis of die-building activities. The Truck and Bus Group reported that the pilot implementation at one of their two stamping plants had not been maintained; local ABC designers were reassigned to different jobs and there was no plan to update the model because plant management had “no use for the data.” No plans for implementing ABC in the BOC Group or the newly formed GM Power Train Group (GMPPT), were presented.

These presentations motivated discussion on three crucial issues that shaped the Steering Committee’s agenda for several months thereafter. First, the managers were concerned that ABC was not being communicated as a corporate policy to plant management. Part of the problem was that ABC publicity had been directed to the accounting community. The group decided that future ABC memos should be directed toward operational rather than financial uses of ABC data and should be circulated to plant managers and others in the manufacturing community. They also decided to name GM’s CFO as the official “Corporate ABC Champion” to heighten awareness of the ABC initiative. A second related issue, was that in the absence of a strong endorsement of ABC, managers relied on traditional systems that were

not easily reconciled to the ABC system. Thus, integrating ABC with existing financial and operating systems became an item for Steering Committee investigation. Finally, the apparent failure of the Truck and Bus implementation to inspire management support caused Steering Committee members to comment that ABC “needs to be restructured as a ‘pull-system’ ” with top management requiring cost information to be derived from ABC data. The ABC Sponsor was asked to identify all uses of plant-level cost data at the Group level and to distinguish uses that could be satisfied by ABC data.

The ABC Steering Committee met quarterly and the Oversight Committee met monthly. The Oversight Committee’s mission included training local designers, monitoring implementations, advising local teams on ABC design, providing software support, and serving as the hub of ABC communications. Training evolved from a focus on technical skills to a focus on strategic cost management skills:

[in the] training sessions... [we found] it was better to focus on the broad concepts... to make sure people understood what the need for change was and how the system could provide better cost information and how that information could be used in a more strategic way... When people saw it simply as a product costing system... you didn’t get the buy-in--- the non-financial people were not as interested and it made implementation harder.

Advising was limited to software support and application of the broad concepts of ABC:

We tried to stay away from a ‘cookbook approach’... we set guidelines and [said] ‘here’s how other teams have structured their process’... we tried to build entrepreneurial spirit and let the teams take ownership for their implementation. We didn’t claim to be experts about individual plants; we tried to be experts in addressing system problems and conceptual problems... consultants rather than on-line implementers.

To increase ABC’s visibility, the Oversight Committee employed three publicity vehicles. First, the minutes of all Committee meetings were circulated to the Groups’ operating areas. Second, they approached the General Technical Council (a GM Board-level committee) and the Manufacturing Technical Council (an executive-level council) for endorsement:

...by presenting [to them] and getting their endorsement we became part of their minutes... we started ... putting on other shows within other subcommittees. So we were building awareness and ... We were trying to develop the customer-supplier relationship [for information]...

Finally, the ABC Sponsor was a tireless advocate for ABC:

...[the ABC Sponsor] was the chief implementor, agitator, salesman, educator of ABC... he spent most of his time making awareness presentations... He’d start with... a management awareness presentation to the general manager and his staff--- if you don’t have support at that level, you’re not likely to succeed... he was ready to travel to any unit ... He had such a long list of contacts--- engineers, design types, GMR people--- he accomplished a lot through just a network of people who were interested in ABC. I don’t think he got a lot of official help.

In addition to publicizing ABC within GM, the ABC Sponsor developed a national reputation by speaking at conferences, representing GM at Computer Aided Manufacturing-- International (CAM-I), and teaching in an executive program at the University of Michigan's School of Business Administration. In mid-1990, his counterpart at Chrysler contacted him to discuss ABC in the first of what was to become an ongoing exchange about ABC implementation. The Chrysler manager recalled their first meeting:

...ABC at GM had gone much further than I had previously understood... not only had they done multiple plants, they had visions of doing the entire company... and they had a timetable and an action plan to get there... [he] had trained 600 people... [He] also shared with us how difficult it was to get people interested and to understand the implications of a direct-labor based system... I walked away... knowing that these guys really have a jump on Chrysler on this one.

[After the meeting] we were able to communicate to management here... that GM appeared to be ahead of us on this initiative; that they had, from a product cost and strategic planning side found out that their product costs were significantly different under ABC; and it was leading to different decisions. One of the early challenges that kept coming up at Chrysler was 'Are people really doing something different?' and without any specifics we were told that GM was making different sourcing and investment decisions... That was important for people to know.

Thus GM became known in the business community as a leader in ABC implementation; a role that solidified internal support for ABC at the corporate level.

The March 1991, Steering Committee meeting was again focused on insuring that plans were in place to meet the 1993 deadline. ACG's Finance Director reported that the Group was moving ahead, but remarked that he was concerned about whether completed implementations were being updated as a result of severe resource constraints in the plants. ABC was still viewed as a "special study" and typically local designers returned to their original jobs after building the ABC model. He questioned whether central coordination of the expanding set of implementations was adequate and suggested that this failure may explain poor utilization of ABC data in cost analyses. On the heels of this remark, and in response to previous concerns about system integration, the Committee decided to seek closer ties to the Financial Systems Steering Committee, a corporate group that was evaluating ways to harmonize diverse systems in a single corporate control system.

CPC's Finance Director reported completion of ABC implementation in one modernized stamping plant and indicated that the common design approach had been successful. The CPC Group Liaison who led the commonization effort described the process:

[CPC's Director of Finance] wanted a common stamping model to be determined before extending ABC to the modern stamping environment... Management agreed that the stamping plants should commonize, but the people at the plant weren't committed to it. I summarized

everyone's [non-modernized stamping plants] initial designs--- for example, everyone allocated utility dollars over machine hours--- and identified areas of disagreement. We called a meeting of all of the teams and [the ABC Sponsor] and I facilitated the discussion.

An Oversight Committee member described the commonization effort as an attempt to "put limits on" system differences that arise naturally from training programs that promoted entrepreneurial spirit and system ownership. During the CPC commonization meeting, disagreements arose concerning informational needs of individual plant managers and the level of detail required to support those demands. There were also disputes about the 'right' cost drivers for tracing specific costs to products.

We had a mix of generations of implementations--- they had a lot of knowledge and experience. Later implementations had already benefited from [one plant's] experience, so it wasn't as if they had designed their systems independently. Then we had some plants that had just been trained. They weren't sure about what they were going to do---they obviously didn't know whether they should fight for something or not. The Truck and Bus plant [an invited guest to the otherwise CPC meeting] had a really unique design.. there was a lot of ownership to that one and they did not want to give up much... we were trying to be conscious of not forcing the design on everyone ... The main criterion for settling disputes was balancing costs of getting information with benefits...If the information was available people were more willing to change.

Ultimately, the plants differed in the degree to which they used the common design. The CPC Liaison reviewed each model and negotiated with local teams members if their design choices were believed to distort product costs or to represent a misapplication of ABC design principles.

The Director of CPC Finance reported a second innovation at the March Steering Committee meeting. CPC was taking the first step to reconcile ABC data with traditional financial systems and move ABC from the status of "special study" to an integral part of the financial control system by developing its 1992 budget based on ABC data where it was available. The biggest challenges were: linking the traditional concepts of fixed and variable costs to the ABC model; reconciling actual production volumes with budgeted production volumes; and, distinguishing costs that were included in the budget and in traditional product costing but which were not traced to products in the ABC system (e.g., future-product costs). An Oversight Team member recalled:

Other issues that came up that we tried to resolve from a Corporate standpoint [was]... integration with other system developments... we were developing common systems... common accounts receivable and common payable systems... everybody was trying to understand how ABC would fit in that environment... we need commonality among the other systems before we can commonize the cost system.

The Finance Director of Truck and Bus announced that ABC would be revived at the existing ABC site but that plans for implementing at the second plant were delayed pending resolution of

workforce-related issues. The BOC Group Finance Director reported that BOC stamping plants would implement ABC in 1991. The GMPT Group Finance Director indicated that training was complete and implementation underway at nine sites; the remaining seven sites would be implemented after 1991.

The minutes of the first two meetings of the ABC Steering Committee hint at the early frustrations with ABC and the Groups' mixed resolve in the early stage of ABC adoption. They also highlight significant system and design process adaptations. When asked to comment on the relative enthusiasm of the Groups in embracing ABC and developing implementation plans, an Oversight Committee member said:

...CPC was the most aggressive, but they also had the most non-assembly plants. The ACG had about 75% of the job to get done and they ... were pretty aggressive in their timetable in moving out into at least one site per division. I'd say Truck & Bus and BOC probably were not as aggressive. I don't know that it was so much a factor that they didn't have the same problems as CPC did, but they clearly had more assembly plants and fewer component operations...they had bigger things on their agenda...Delco Electronics [reports through Hughes Aircraft and GM-Hughes Electronics and was represented on the Steering Committee though not officially part of the GM NAO ABC mandate] was probably up with the ACG as far as implementation.

While some Groups reluctantly accepted ABC adoption, others rapidly adapted it to fit their information needs. Those who led the adaptation process shaped the ABC system that gradually became institutionalized through "commonization" as the corporate standard. Adaptation continued as the population of ABC sites grew and local design teams introduced innovations in the design or use of the ABC system; however, Summer 1991 marked a clear transition to *corporate* acceptance of ABC.

Acceptance

The first indication of corporate acceptance and the intent to routinize ABC was publication on July 26, 1991, of Comptroller's Circular Letter (CCL) No. 2860, entitled "Implementation and Utilization of Activity-based Costing." CCLs are policy statements published by the comptroller's office and circulated throughout GM's financial community. CCL 2860, the outcome the ABC Sponsor's search for potential uses for ABC data, identified corporate requirements for the implementation, maintenance and use of ABC. It reflected the Steering Committee's effort to transform the corporate ABC approach to one of 'pulling' ABC data from the plants rather than 'pushing' the ABC system on the plants. Following are passages from CCL 2860 that indicate ABC acceptance:

As a result of the endorsement and recommendations of the General Technical Committee,

Manufacturing Technical Council, Competitive Cost Council, and Cost Systems and Measurements Council, the Corporation has recognized Activity Based Costing as the required system for assignment of overhead costs to activities or products... ABC implementation will be completed as soon as is practical, with December 1993 as the target for completion... phased timing requires that early adopters utilize the ABC product and activity costs as they become available in all decisions where product or activity cost information is required.

The initial focus of existing ABC implementations has been on manufacturing overhead costs... Initial ABC studies in non-manufacturing functions are now, or will be underway to define the applications of ABC to activities outside of manufacturing (e.g., engineering or commercial).

Key application areas to utilize the ABC information are represented by manufacturing and engineering special studies... ABC will not always be the primary decision support system for these decisions, but will facilitate improved decision making by providing a common information base of product and activity costs on which to model these issues in other decision support systems... ABC will also be utilized as a measuring device at the plant level to track the progress and continuous improvement resulting from operating decisions by the comparison of updated activity and product costs with those of previous ABC models. ABC information will also be linked to the Performance Measurement and Feedback System... one of the primary applications for... ABC product and activity cost information is the financial evaluation of product lines, manufacturing processes and production inputs... Other financial applications that are required to utilize ABC as the information base, when available, include Capital Appropriation Requests, Product Program and Pricing Proposals. Budget and Business Plan development must utilize the insights gained from ABC implementations in establishing the level of resources required to support production and processing of budgeted volume of products. General guidelines in the financial use of ABC information can be summarized by the requirement to use ABC activity or product costs wherever similar traditional costs are currently utilized. In this way, we will be basing our decision making on the best available cost information.

[Emphasis original]

An Oversight Committee member recalled that the letter was well-received by plants because it provided the first “tangible evidence of corporate support” and signaled plants to dedicate resources to ABC.

Although CCL 2860 recommended widespread use of ABC data, GM’s Comptroller recognized that system interfaces were necessary to make these recommendations operational. In January 1992 he formed the Common Costing Practices Committee, including members from accounting, the ABC group and systems support (GM-EDS), to study ways to standardize and harmonize existing cost management practices. The committee developed a modular system, called the “Simplified Component Costing System” (SCCS), that interfaced with the budgeting, inventory valuation, and production scheduling systems and used ABC cost data as an input.

In the year following CCL 2860, ABC training sessions were offered quarterly. Implementations proceeded at a pace dictated by the ability of the relatively small team of Corporate and Group ABC Liaisons to support new project teams. Previous implementation sites were encouraged to update their

ABC models to reflect 1992 budgeted costs and the minutes of the May 1992 Steering Committee meeting confirm that implementation and maintenance were occurring; however, the Finance Director of ACG expressed frustration at the slow pace. Of 114 sites, ACG had completed only 21 and was concerned that the 1993 deadline was unrealistic. He expressed hopes that a new, fast implementation process, called "blitz implementation"⁸, that was piloted at the end of 1991 in an Australian plant (GM Holdens) and replicated in a Delco plant in January 1992, could be used to meet the deadline. A Delco Electronics representative reported that they had used ABC data to identify costs of business processes and were attempting to motivate the elimination of non-value added activities. The perennial concern about communicating ABC to non-finance areas of the company was raised when the ABC Sponsor pointed out that Chrysler's ABC efforts were being driven by the enthusiasm of their President, Robert Lutz, whose background was in manufacturing and engineering. He also reported a disturbing trend that was emerging as ABC costs became available: plants were hesitant to provide information from ABC (product costs or ABC model design structure) to one another "for fear of losing competitive advantage."

These factors, in conjunction with growing awareness that improved product costs were not sufficient motivation for implementing ABC at some plants, caused the corporate ABC team to re-orient the ABC initiative during late 1992 and 1993. Moving away from the language of product costs, the group began to focus on activity or process costs as the key objective of the ABC system. Adopting the popular language of business process improvement, the team began to advertise ABC as a means for informing process re-engineering efforts, or "activity based management." The ABC software was modified to permit designers to classify costs (e.g., value and non-value added, and cost of quality categories such as prevention, appraisal and failure) in order to support detailed analysis of activity costs. While this increased the appeal of ABC at new ABC implementation sites, it was difficult to change the perception of managers from earlier implementations that ABC was a product costing system. The result was reluctance on the part of these managers to commit plant resources to updating and maintaining the ABC model from year to year. Multi-disciplinary design teams disbanded and the maintenance task devolved to cost accountants in the plant.

In February 1993, GM assembled the first conference of ABC "users" representing every Group and most of the plants that had implemented ABC. The objectives of the meeting included: sharing design techniques; discussing software issues; identifying "implementation roadblocks" and discussing solutions;

sharing success stories; and, establishing a network of ABC users in GM. The participants numbered over 100 and their responses to a survey conducted by the NAO ABC group indicated widespread enthusiasm for additional meetings. ABC implementers felt isolated at their plants and were encouraged to learn that others were facing similar challenges. The group met again in September 1993 with an even larger attendance. The substance of the meeting was similar¹⁹, with each Group Liaison reporting their progress in implementing ABC. The evidence suggested that all NAO plants would be completed by early 1994.

By November 1993, it appeared that the deadline for complete ABC implementation in NAO would be met, with over 150 different ABC models in existence.²⁰ Although the ABC models were not all adequately maintained and updated--- few plants had conducted a full activity analysis since the initial implementation, most simply revised the pool of costs to be allocated to correspond to the new year and added or deleted products as necessary--- every plant had an ABC model for some period between 1989 and 1993. One concern, raised by a Group Liaison, was that some recalcitrant plants had postponed implementation until the last possible moment and had scheduled 'blitz' implementations in the last quarter of 1993. Nonetheless, acceptance, as defined by the minimal level of use necessary to support survival of the technology, was attained by the close of 1993, where this study concludes

ANALYSIS OF ABC IMPLEMENTATION AT GENERAL MOTORS

Kwon and Zmud (1987) model successful negotiation of each stage of IT implementation as a function of five broad factors: the individuals involved, the organization's structure, the task, the technology employed and the external environment. The following subsections review evidence from GM's ABC implementation, from initiation to acceptance, to identify specific constructs within these broad categories that influence ABC implementation (Table 3). Reversal of the effects of particular factors from stage to stage, and the emergence of different factors at each stage support the claim that ABC implementation is well-described through a model of stages of evolutionary change

[Insert Table 3 here]

Individuals and ABC Implementation

Consistent with the organizational change and IT implementation literatures, the early days of experimenting with new cost systems were populated by entrepreneurial individuals who championed the

cause of ABC. These people embraced change; however, perhaps more important than embracing change was their ability and desire to drive change. The ability to drive change stems from role involvement--- the centrality of the proposed solution to the individual's job, their authority and their responsibility. The desire to drive change appears to be linked to the intrinsic value that these individuals placed on "making a difference."²¹ Pontiac's Comptroller was well-placed to drive change; however, dozens of other plant comptrollers were similarly well-positioned. The unique sponsorship by Pontiac's Comptroller and his concerted efforts to publicize ABC were critical in elevating the project from a local experiment to consideration as a corporate strategy. However, these efforts also produced negative side effects, discussed below, as he stepped outside of the traditional role of a plant comptroller and chose horizontal rather than the more typical vertical communications avenues to champion ABC.

The importance of entrepreneurial spirit and a bias toward change continued to be important during the process of adoption. However, sponsorship also had a dark side. The missionary zeal attributed to CPC's Director of Finance had the positive effect of elevating the issue to the corporate level but contributed to formation of a silent resistance movement within the financial accounting ranks that posed a constant challenge to ABC adoption. For example, although the CSMC was charged with evaluating ABC, many people believed that regardless of the study's outcome the CPC ABC effort would continue:

... [CPC Finance Director] was on the Council and he was pretty adamant that CPC was going to do ABC no matter what. I think he believed that it would one day replace existing systems.

Another manager had a similar perception:

There's no question in my mind that there were people who thought that [he] was such a strong advocate that he overwhelmed people who had legitimate objections... [he] wanted it so much that he didn't really let the negative aspects get voiced and resolved... People had trouble relating to [his] vision of [costing] a final product when they were producing a bracket or panel for that product... [and] they didn't get enough chance to say 'I don't know why I should devote so much time to this because I don't see anything in it for me.' ... In our zeal to move ahead, we did not have those conversations to the degree that I think everyone was comfortable.

The conclusion seems to be that a bias for change must be accompanied by a measure of patience and willingness to persuade others of the merit of the change.

Qualitative assessments of the CSMC pilot studies by the CSMC cost team found that individuals who were most likely to be enthusiastic ABC team members were those with significant process knowledge. Often, these were engineers or first-line supervisors; occasionally they were shop-floor workers who lacked formal education. These employees were instrumental in building ABC models that

represented the underlying production processes. Pontiac's Comptroller said that, given the opportunity to talk with a group of manufacturing people about the implication of process variety on product costs, he could always count on their support. He believed this so strongly that he made strong process knowledge a criterion for choosing people for ABC implementation teams. Models of organizational change typically propose that education relates to individuals' receptivity to change and job tenure relates to individual authority and ability to promote implementation. In GM's ABC implementation, while education may explain the entrepreneurial spirit of key individuals, it appears that job tenure is a proxy for process knowledge gained through job experience. Process knowledge appears to promote ABC implementation by positively influencing people's perception of technological "fit" and their "buy-in" to the ABC approach, rather than through channels of power and authority.

Individual's attitude toward change remains critical to the adaptation process. The clearest evidence of this effect in GM's ABC implementation is provided in the minutes to ABC Steering Committee meetings. Repeatedly, the individual associated with introducing innovations to the ABC process was CPC's Director of Finance, who was credited as early as 1988 as having a revolutionary vision for the ABC system. As was true of the ABC Sponsor during initiation, CPC's Director of Finance was well-positioned to enact change and exhibited an inordinate desire to drive change. One manager said that he believed that the Director viewed ABC as his final contribution to the company before retirement in 1992. Other Groups stand out as laggards in adaptation; however, it is impossible to determine whether this reflects inflexibility on the part of the individual leading the effort, disinterest in an approach that was invented elsewhere (perhaps not coincidentally, in the CPC Group), or simply being behind schedule in adoption owing to relatively meager implementation experience and, as a result, being less equipped to suggest process innovations.

Another individual factor in the adaptation stage is the resistance of early ABC designers to commonization. Designers of the first ABC models were trained to use local expertise in developing their models and expected to show "entrepreneurial spirit" in the process. Not surprisingly, these values collided with later needs to standardize the models for similar production environments. Problems subsided after commonization became the norm; however, initially individual factors that promoted initiation and adoption were at odds with factors that promoted the unique form that adaptation took---commonization.

In contrast to the first three stages of ABC implementation, the evidence suggests that acceptance was the first stage in which individual personalities receded and bureaucracy--- in the positive sense of routines that promote efficiency---- emerged as the dominant factor explaining acceptance of ABC. Informal support from leading personalities was replaced with an informal network of ABC users. Meetings of ABC implementers facilitate formation of informal communication networks between plants which the IT literature indicates will enhance the prospect of moving to the infusion stage of implementation. As the next section describes, organizational structures supplanted individual factors as the major influence at this stage of implementation.

Organizational Structure

Several managers cited GM's strong finance function and its historical independence from operations as the greatest source of resistance to ABC at both the plant and corporate levels. The 1984 Cooney Report is further evidence that centralized, specialized groups are more likely to develop a narrow range of solutions that are incremental in nature. Indeed, as discussed below, it was the fortuitous recommendation of an external body of experts, the Science Advisory Committee, that brought cost systems to the attention of top management, and the early involvement of GMR in ABC, that elevated the issue to one of management decision-making and caused managers outside of traditional financial circles to become involved.

In addition to limiting the range of alternatives, centralization also slowed the search for alternatives as plant managers awaited the Cooney Report before launching independent experiments. It was the uncharacteristic, experimentation with different costing approaches by plants that generated viable alternatives. By virtue of their independence, participants in each experiment developed loyalties to their approach. Competition for dominance took on a political tone--- as evidenced by memories of the Pontiac team member who spoke of strategies for combating advocates of other costing approaches. Positive and negative consequences of competition between parallel design teams are well-documented by Kidder (1981). GM's experience suggests both positive and negative effects of centralizing the search for new cost system approaches in the initiation stage.

Because the Cooney Report was conducted by specialists in the accounting and finance area it is difficult to separate the role of centralization from that of specialization in the failure of the study to

produce revolutionary alternatives. Two pieces of evidence suggest that specialization had a negative impact on the search for cost system alternatives. First, two managers noted that study participants were overwhelmed by the magnitude of the task in part because of their extensive knowledge of the existing cost system. Second, asked to explain why the Pontiac pilot study team included only one financial analyst and no accountants, Pontiac's Comptroller explained that he didn't think that accountants could approach the problem with a "clean slate" and that he believed that system changes would require close ties to engineering and manufacturing, a relationship that might threaten accountants' authority. Thus, to the extent that the technology being implemented is new, as ABC was at the time that GM began experimenting with it, a "leap of faith" may be required that a specialized group is unlikely to make. Furthermore, if specialists who would naturally develop the system are threatened by the change, they may be motivated to impede the search for system alternatives. Both factors limited GM's search for cost system alternatives. However, as ABC systems become more widespread, it is unclear whether these factors will impede implementation at other companies.

Centralization, in the form of the Cost Systems and Measurements Council (CSMC), continued to slow ABC adoption, as many prerequisites were established for corporate adoption. However, in the absence of centralized control, it is unlikely that the accumulation of decidedly mixed results from plant implementations would have led to widespread, voluntary ABC adoption. Indeed, the painstaking process of surmounting the hurdles posed by the CSMC caused ABC to gain central support that was not always mirrored by the plants. Thus centralization appears to have slowed adoption but increased management commitment to adoption. Specialization is typically thought to speed adoption as a result of ready access to specialized skills. However, the CSMC cost workgroup made relatively little use of accounting specialists who might have addressed concerns related to systems compatibility. Consequently, specialization did not favor ABC adoption, however, it can not be said to negatively influence adoption since its usefulness was never tested.

Centralization promoted a unique form of ABC system adaptation, named "commonization." This appears to have been motivated by the corporate need for standardization; a need that undercut the original corporate strategy to promote ABC model "ownership" at the plant by allowing plants to build unique ABC models. Further plant-level analysis is needed to establish the cost of standardization in terms of reduced local commitment to ABC. Functional specialization in ABC methods appears to have

promoted adaptation. A dedicated ABC Steering Committee and Oversight Committee focused corporate attention on implementation issues, the resolution of which often generated adaptations to the ABC implementation process. However, most ABC system adaptations were a response to uses of ABC data in plants, where multi-disciplinary design teams were the norm. Thus, it is less clear that functional specialization promotes innovation in system design and usage at the plant level---yet another indication that further analysis of ABC implementation at the plant level is necessary.

Centralization and functional specialization is often accompanied by vertical communication flows. However, informal horizontal communications networks--- those that linked plants with similar processes or plants in the production sequence--- were critical in introducing ABC as a viable corporate strategy. Several of those interviewed identified the power of grassroots involvement that Pontiac's Comptroller unleashed by pursuing a strategy of publicizing results of the Pontiac experiment to other plants as critical to overcoming resistance of the central financial group. The flip side of this enthusiasm was what one CPC manager referred to as the team's "lack of discipline." Failure of the team to seek Group-level approval and to use traditional communication channels placed divisional managers in the position of trying to "get them [the Pontiac team] back under control without squelching their enthusiasm." By circumventing traditionally hierarchical communication channels Pontiac's Comptroller may have contributed to polarization within the finance group that would later emerge as an impediment to implementation progress. Thus rather than being uniformly good for promoting the search for cost system alternatives, the GM experience suggests that the value of internal communication must be assessed relative to company norms--- norms that are likely to be correlated with organizational centralization.

Horizontal communications between plants also threatened corporate adoption of ABC during the CSMC pilot study designed to evaluate ABC. As one cost workgroup member recalled:

We tried to keep this as a control group and didn't really encourage people to talk with one another... we tried to coordinate the network ourselves... It's a little tricky because we were trying to build ... knowledge out in the operating units, and we wanted them to talk to each other so that they would be able to achieve success more readily... on the other hand we wanted this to be an experiment where we [could]... see what techniques worked better. We wanted them to experiment and not just find out what the other person was doing... we didn't want all the pilots to use identical cost drivers.

Had network communications been stronger, the results of the pilot study might have been weakened,

jeopardizing ABC adoption.

During the adaptation stage the organizational structure of the ABC Oversight and Steering Committees and the use of Group liaisons facilitated vertical internal communication. Because these networks focused on broad support of local ABC teams and spreading news of ABC innovations to all plants rather than stipulating how ABC models were to be built and maintained, it does not appear that they reduced adaptation of ABC at plants. In short, the combination of local design initiatives, that were centrally supported but not centrally governed, and centrally moderated communications, appears to have helped identify innovation and propagate adaptation.

As noted in the above section, during the acceptance stage organizational routines supplanted individual initiative as the major force influencing ABC implementation. CCL 2860 was a routine communication vehicle that was widely recognized and had strong internal legitimacy as a channel for transmitting corporate policy statements. The “blitz” implementation started as an adaptation of the typical implementation process to accommodate extraordinary circumstances and was quickly codified and adopted as an efficient means for implementing ABC. Training programs for implementors, maintenance support, and “awareness sessions” for top managers were standardized and offered with increased frequency to support rapid roll out of ABC. Finally, formation of the Common Cost Systems Committee and the resultant integrated cost approach reflects an attempt to standardize diverse cost management practices.

Technology and ABC implementation

Technological factors --- complexity of use, compatibility with existing accounting systems and the relative improvement over the existing cost system--- were from the beginning critical elements in the search for new cost system approaches. The statement by CPC's Director of Product Cost, that ABC was viewed as a pragmatic balance between using existing information and input from experts, indicates that complexity was an important screening mechanism for identifying viable cost system alternatives. Moreover, his comment that the pilot study identified “disturbing differences” in product costs suggests that solutions were being evaluated relative to the benchmark of the existing labor-based system. Similarly, the Pontiac team member's memories of “trivial objections” being raised, including concerns about system complexity, suggests that even during the early search for solutions the mental calculus of

balancing model complexity with ease of use was being performed by top management. The Director of CPC Product Costs' criticism that the team's presentation did not "address how to make it 'fit' with existing systems" indicates that compatibility with existing systems, a factor that the Pontiac team overlooked in their single-minded pursuit of improved product costs, was critical to upper management.

Complexity, compatibility, and relative merit compared to traditional cost systems were also key criteria at each of three system evaluations²² that preceded GM's adoption of ABC. Complexity was a determining factor in selecting ABC over other cost system proposals. Demonstrating compatibility with existing financial systems, with proposed operating performance measures, and with corporate strategies was a key objective of the pilot study conducted by the CSMC workgroup. Another aspect of compatibility that emerged was the ABC model's perceived representational accuracy for underlying business processes. Time after time managers cited the intuitive appeal of an ABC design process that solicited specific process knowledge from people in the plant as the strongest argument for the approach. Although the pilot studies did not prove that ABC costs were an improvement (in the sense of generating "correct" product costs) over traditional product costs, the CSMC studies identified significant differences between the two. The CSMC workgroup argued that the process of building an ABC model insured improved product cost accuracy. Thus, relative merit, as judged by representational fidelity of the ABC model for the underlying process, was a factor in the adoption of ABC. Relevance to decision-making emerged as a new criteria against which to assess ABC in the CSMC pilots. The pilot study was designed as an experiment to examine the usefulness of ABC data in several decision-making settings.

During the adaptation stage corporate demands for 'commonization' across plants and for integration with existing financial systems were critical technical factors in ensuring further development of ABC. Integrating the ABC system with existing financial systems and reconciling to the conventional cost system were important determinants of the direction that adaptations took. The drive to commonize ABC systems, in contrast to earlier efforts to instill ownership and promote creativity by ABC designers, was motivated by the need to move ABC from its status as a "special study" to becoming standard corporate policy. Not surprisingly commonization met resistance from some ABC designers who were convinced of the representational accuracy of their models.

The most significant technical aspect of ABC during the acceptance period was the need to shift the focus of ABC from product costing to process or activity costing. This need required modifications to

the ABC software to permit greater flexibility in determining the object of cost analysis. As the case discussion indicates, this evolution was not completely successful because so many managers had been trained to think of ABC as a product costing tool. Nonetheless, had the software modifications not occurred, it is unlikely that the corporate ABC group would have succeeded in altering the ABC strategy.

ABC Tasks and Implementation

Evidence of factors that influenced corporate ABC implementation provides limited opportunities for examining factors related to the plant-level ABC design task. Nonetheless, interviewees' experience as plant employees allowed some factors to surface that were influential and that bear investigation in future studies of local implementation efforts.

Researchers in the area of socio-technical work design have demonstrated that the interaction of work demands and individual work preferences influence implementation outcomes. Interviews with those who were involved at every stage of GM's ABC implementation reveal intrinsic aspects of the work that both motivate and discourage those charged with implementation. Participants in the earliest cost system experiments at GM spoke of enjoying the challenge and freedom of creating a cost model using their expertise and "detective work." This is in contrast to corporate staff members who participated in the Cooney study, who cited these factors as causes for the project getting "bogged down" and their feeling of being overwhelmed by the task. The difference in corporate and plant-level employees' response to a similar task seems to have been motivated by two factors.

First, the level of task uncertainty was significantly lower for plant-level designers asked to build a cost system for a specific, familiar production environment than for corporate staff members who were asked to design a generic cost system that would apply to diverse production settings. This suggests a range in which task uncertainty is associated with attainable but challenging tasks that has a positive influence in initiation. Beyond this range, the task is perceived to be unattainable and challenge gives way to anxiety and frustration. Second, the individuals assigned the task at the plant level were typically manufacturing employees on "special assignment" while corporate staff members were typically finance specialists. This difference may have created an element of personal risk that interacted with task uncertainty to create a situation in which task failure had different implications for members of the two groups. These observations suggest that task uncertainty has different effects on the initiation stage of

ABC implementation depending upon the mediating influence of individual circumstances of those performing the task. If task uncertainty and personal risk are kept within a reasonable range, autonomy in developing the ABC model motivates and challenges those involved.

Evidence from GM's ABC implementation suggests that task uncertainty and worker autonomy reduce the probability of adoption. While people who were responsible for developing the ABC models spoke of enjoying the challenge of creating a cost model using their expertise, GM's corporate management interpreted this freedom as "subjectivity" in ABC design choices. They responded by asking the CSMC work group to investigate whether system design variability could be reduced by creating standard ABC design templates for each production process. Thus, the very attributes of the ABC design task that make it a rewarding assignment for individuals, create anxiety among top managers and threaten corporate adoption.

Typically one equates adaptation to fluid experimentation, free from routines or standard approaches. However, since creating corporate routines appears to be one of the substantial forms that adaptation took, it is unclear how to interpret this at the corporate level. Anecdotal evidence about plant implementations supports the claim that allowing designers broad scope in using ABC data generated adaptations in system designs. Freedom to design ABC systems to satisfy local information demands suggests that task responsibility and autonomy (from the Group or corporate ABC departments) are important factors in promoting adaptation.

During the acceptance stage, the task of ABC implementors shifts from creative design to maintenance. In contrast to the challenge of designing new ABC models, maintaining and updating ABC models was described as 'drudgery' that left you "bleary-eyed, with migraine headaches" after staring at a computer screen for hours. Not surprisingly, headcount reductions and the lack of appeal for the task have caused many plants to abandon serious maintenance efforts.

The External Environment and ABC Implementation

It was no coincidence that cost system innovations were found primarily in GM's metal stamping plants, where acute pressure to outsource parts (non-modernized plants), radical changes in cost structure (modernized plants) and uncertainty about plant survival prevailed. Increased competition creates pressure to reduce product costs. Thus competition played a role in bringing cost systems under

management scrutiny and promoted the search for new cost management approaches.

Similarly it was no coincidence that plants from ACG and Delco Electronics, which sell in external markets and are frequently cited as a source of GM's competitive woes (Templin 1993), were among the earliest and most enthusiastic adopters of ABC after it was "discovered." Kwon and Zmud (1987, 240) argue that environmental uncertainty "stimulates innovation through an organization's effort to survive and grow" but may have a negative effect on IT implementation if uncertainty causes the organization to ration resources in a manner that constrains innovation. The identity of voluntary adopters of ABC is consistent with the claim that competition and environmental uncertainty promote ABC adoption. There is also limited evidence of the negative role of environmental uncertainty in the plant that withdrew from the CSMC pilot study. The plant was implementing several innovations related to advanced manufacturing methods and ABC was "crowded out" by these other innovations.

Competition was equally important in motivating adaptations of ABC. Innovative uses of ABC data were concentrated among three GM internal organizations: CPC, ACG, and Delco Electronics. While ABC innovations at CPC are probably the result of the individuals involved and being the original home of ABC in GM, the managers interviewed believe that ABC innovation at ACG and Delco plants was driven by the turbulent, cost competitive environment in which plants struggled to survive as a member of the GM parts family.

Another environmental factor that influenced ABC implementation was the role of external experts within the company. Having identified problems with the cost system, the choice of ABC was profoundly influenced by opinions of external experts. Groups such as the Scientific Advisory Council, reinforced the need for new cost accounting methods and validated GM's choice of ABC. External experts, such as Cooper and Kaplan, played an important advisory role during GM's adoption process. The firm's external auditors established the pace at which ABC could replace traditional costing practices during the acceptance stage.

External communications of two types influenced implementation. First, external communications played a reinforcing role within the company. An example of this is Roger Smith's speech to the NAA, a group of management accounting practitioners from a broad range of industries. Smith presented ABC as evidence of GM's innovative stance with regard to management accounting practices. His message bolstered the self-image of local ABC designers, who were often discouraged by

the resistance of local managers to ABC, and became the oft repeated example used to demonstrate the importance of ABC to the company. A second role of external communications was providing external validity for the ABC concept. Because GM was an early ABC adopter, communications with other firms were limited in the early days of implementation. As the interchange with Chrysler illustrates, during 1990 and 1991 GM was too far ahead in their ABC implementation to benefit from its peers. Nonetheless, these interchanges were valuable validity checks that reinforced management's commitment to ABC. By 1992 interactions with other firms began to provide external bench marks and ideas for adaptation. GM became a prominent member of ABC user groups and attended national conferences on ABC.

BEYOND 1993: PROGRESS AND CONCERNS

Although 1993 marked the end of ABC implementation from the standpoint of developing ABC models for GM part manufacturing plants, ABC is far from a routine. Some of the earliest implementation sites have routinized ABC system maintenance and some uses of ABC data; however, only two plants (one Delco Electronics and one ACG plant) were identified by corporate ABC managers as having reached "infusion" of the ABC approach, where infusion is indicated by using cost data in fundamentally different ways. These plants use ABC data to identify non-value added activities as candidates for business process reengineering and to create "activity based budgets"; thus, they show signs of moving from ABC to activity based cost management.

Johnson (1992) claims that the conditions that promote ABC system development inhibit the transition from ABC to ABM. It is too early assess this in GM; however, it is useful to consider what managers believe to be the greatest challenges, because moving from ABC to ABM is a prominent objective of those charged with managing ABC:

GM's big challenge for the future is to start looking at the information and using it to make decisions... not to just crank it out every month... It needs to become a decision-making system, and not just a product cost system. We need people to take a look at what activities cost--- where the money is going--- and link it to the other strategies and systems.

If the factors that influence IT routinization and infusion are those that influence the later stages of ABC implementation, then, to the extent that managers are aware of critical success factors, they are in a strong position to devise effective ABM implementation strategies. The following section examines managers' response to the question, "As you consider the future of ABC at GM, what concerns, if any, do you have,

and what advice would you give top managers about the ABC project?" Their responses are organized under four of the five factors that were investigated in the analysis of implementation from initiation to acceptance: individuals, organizational structure, technology, and the external environment.

Individuals

The most frequently voiced concern about GM's ABC system is that ABC data are used only for routine product cost quotes. As one employee said, "we can't point to widespread use yet and we need to start understanding why." This failure is attributed to a fundamental inability of cost system designers to build models contingent on users' information needs:

I don't hear people talking about using ABC data. I think that it could fail if they don't continue to try to identify users and their needs... people don't know how to do that. An implementation team doesn't necessarily know how to identify their users and what their needs are and how to translate those into system design criteria. A plant manager would say 'I want to use this to affect DFM [design-for-manufacture] decisions,' but people on the implementation team were not experts in DFM and if they talk with someone who is involved with DFM they might not be able to translate what they are told into an appropriate ABC design.

Echoing the results of Cooper, et. al. (1992), one person who was involved with ABC from its inception, believes that a new approach and new people are needed to facilitate the transition:

We've done a good job installing ABC as the replacement for labor-based costs. Now we need to work from the other direction... We need to start with where the decisions get made... We need to say 'Given the fact that we've got ABC data... how would we re-engineer the process of making decisions within GM?' That involves a different group of people than we have involved right now. We need to get people to sit down with us and say, 'This is the way we currently make decisions; how would it be different if we had activity-based information?'

It is unclear how the individuals needed for infusion, where ABC data would fundamentally reshape decision-making processes, should differ from original ABC implementors. One possibility stems from the observation that the GM ABC experience seems to suggest that production process knowledge is positively correlated with ABC success. If production process knowledge is critical for ABC's success as a product costing system, then decision-making process knowledge may be required in the transition to ABM, or infusion. A second possibility, is that individuals are not the problem.

A second issue relates to matching the right individual skills to different stages of ABC implementation concerns system maintenance. ABC systems were typically developed by multi-disciplinary teams with broad production experience. The assignment was often a special assignment from which individuals returned to their original positions. As early as the first CSMC pilot study,

problems maintaining systems were encountered after system design was completed. Maintenance, a routine task lacking the creative aspects of system design, is an unattractive assignment for individuals who found system design challenging and rewarding. One manager suggested developing a formal organizational structure for ABC maintenance at the plant level to replace the organic structure of the initial design team, but was concerned about the implications for managing varied training needs of individuals involved in different ABC implementation stages.

Finally, a concern that emerged in every interview, relates to continuity of the ABC effort after losing several vocal proponents of ABC. In Fall 1992, the Finance Director of CPC retired. His retirement corresponded to the reorganization of the finance functions of BOC and CPC into the new North American Operations Group (NAO). The new Vice-president of Finance supports ABC, although without the “missionary zeal” attributed to his predecessor. In May 1993, after a brief but debilitating illness, the ABC Sponsor died. Earlier remarks attest to the profound influence both men played in shepherding the ABC project. In the latter case, the Sponsor’s sudden departure and the absence of a successor left the ABC organization without mid-level management expertise. Although managers expressed concern about whether new leaders would emerge, there was guarded optimism that the transition would create an opportunity. ABC at GM was inextricably linked to two individuals. This engendered a belief that ABC was their pet project rather than a widespread corporate initiative. Without discounting the importance of the initial ABC sponsors, employees were hopeful that the cost of leadership discontinuity would be offset by a “changing of the guard” that brings managers who treat ABC as a routine corporate policy rather than “a mission.”

Organizational Structure

The organizational structure that emerged to support ABC development is specialized in skills related to technical ABC design and lacks the specialized knowledge related to specific classes of decision-making. This is evident in the earlier remark that ABC designers are unable to design models that meet managers’ information needs. One manager attributed this to the “biggest problem” with ABC-- that its ‘home’ is the Financial Department not manufacturing. A suggestion that emerged in virtually every interview was to move ABC to manufacturing.

Another concern was internal communications. One manager feared that the reason that evidence

of ABC usage is not widespread is that plant managers are censoring success stories:

It gives me a real uneasy feeling because I think that if we don't have a few people out there pretty soon saying, "Gosh, I used this information, I made this decision, and I saved a bunch of dollars for the corporation," that people are going to decide that it's just not worth the effort.

I don't know first-hand of many, if any, plants where they are saying "I don't know how I made the decision before I had this information," and that worries me. I have a sense that there are plants out there that have used the ABC data in their own decision making, but don't want to stand up in front of the world and tell everybody how they used the information for fear that they will get hit over the head with 'You saved \$100,000, give me that \$100,000 back.' They'd rather squirrel that money away.

Certainly if internal communication is essential to promoting infusion, then fear of reprisal must be mitigated. However, early evidence from the first two users meetings suggests that candid discussion of successes and failures is emerging.

Technological Factors

Technological influences of compatibility, complexity, and the relative improvement to traditional methods offered by ABC and ABM, figure prominently in managers' concerns for the future.

As was evident in earlier stages, issues of compatibility reflected concerns with both accurately reflecting the economics of production processes and "fit" with existing systems. The areas where ABC has not yet proven useful, vehicle assembly plants and administrative support groups, continue to trouble managers:

The vehicle assembly issue is still unresolved. For some people that is a real hang-up because it is a key business area... however, they perceive them to be a much larger portion of the cost of the car than they are. Total responsibility for a car is at the platform level. They don't realize that although they can't get ABC assembly costs they can still get ABC costs of each component.

When I left they were talking about extending ABC to the support groups and to non-manufacturing... [I don't know] how they will be able to bring these people on board.

Others were concerned with continued integration with financial and operating systems:

To get consistent use, you need to affect the systems, the general systems---- that make product cost data. People just keep using their routine sources for collecting cost information. One of the biggest problems in GM has been the lack of common systems. I think it becomes easier to push ABC as more of the other systems are commonized. Then ABC becomes routine... It's still too big a job trying to reconcile ABC with existing systems... it takes 2-3 months to implement and during that time volumes change... Since ABC is driven on non-volume related drivers it takes work to reconcile. People don't understand why you can't just change the volume in ABC to get new products costs...

Still others are concerned with compatibility of ABC data within GM:

There are still complaints of a lack of consistency within the corporation. That was intentional, so every plant would take ownership in their model and call it their own, but now it's causing problems that we have to address.

Finally, some managers are concerned that the reason ABC data are not widely used is that ABC is too costly to maintain relative to the perceived benefits to the plant:

They don't see the benefits in their operations because what they have today is good enough, it's a lot easier than ABC. 'I can't get engineers and manufacturing guys interested in the damn thing, so it becomes a financial exercise and it's a hell of a lot of work'--- those are the things I hear.

Others are less concerned about ABC's current disuse, believing that it reflects flaws in traditional performance measures. The Vice-President of NAO argues that planned changes in performance metrics will motivate managers to use ABC data and that the key challenge today is complete implementation and maintenance of ABC so that the system will be ready when managers realize their need for ABC data:

There's a methodology coming out of our synchronous activities, called Lead Time Reduction (LTR). They chart what happens to material--- longest lead-time--- from when we first order it until a car is sold to a customer. They're interested in costing processes out and the only tool we have is ABC. As we adopt LTR...[and shift] from looking at only product costs to the drivers of cost, we're going to be able to shift them [managers] to ABC as a tool...when you're focusing on processes, ABC costing systems can allow us to do that; our traditional cost systems can't.

External Environment

Uncertainty, turbulence, and competitiveness of the external environment and communications with firms that face similar challenges and have adopted similar approaches continue to be present in manager's concerns for ABC's future. Specifically, several managers were concerned that because many GM plants believe that they are far removed from threat of closure, that ABC is less likely to become the tool for continuous improvement that it should be:

The key factor with regard to the interest in ABC or lack of it is that metal stamping, and engines, and transmissions are core transportation business products. We are not going to outsource engines, transmissions and sheet metal. For that reason, there could be a very legitimate 'so-what?' attitude of a plant manager... and it's kind of hard to argue with sometimes... Metal stampings are considered a core business and are not subject to mass outsourcing ... they feel pretty safe. When we closed the Hamilton plant, I thought, 'Boy, that'll send a strong message.' That was naive of me... People aren't affected until their own jobs are threatened. So [ABC] cannot be done plant by plant. It has to be a message delivered from the highest levels.

Throughout 1986-93, increased awareness and adoption of ABC by other major US firms reinforced commitment to the ABC project in GM. Asked whether recent criticism of ABC in the popular press (Johnson 1992) damaged the ABC implementation project or reduced political support for the

project, managers responded that, while they were forced to reexamine their assumptions about ABC, they remain convinced that it is a necessary tool for promoting continuous improvement and supporting decision-making in the new manufacturing setting.

Summary

It is impossible to say whether GM's ABC project will succeed in negotiating the transition from acceptance and routinization of ABC--- where ABC is a replacement for the traditional, labor-based cost system--- to infusion, or ABM --- where cost data is used in fundamentally different ways to re-engineer business processes. However, if the IT literature is suggestive of factors critical to this transition, then there is evidence that, at least as a group, management is aware of the factors likely to influence their success. What is unclear, is whether this diffuse knowledge that key players in GM's eight year ABC journey possess, has been concentrated at the corporate level and used to devise strategies for successful migration from ABC to ABM. One manager expressed doubts that the organization had adequately addressed issues of organizational "memory loss":

The same old issues just keep coming up... Now that everyone is implemented we are starting to differentiate between plants that were implemented, plants that are maintaining and plants that have fallen by the wayside. We publish this and you see the plants that have gone the way of the dinosaur and then there is a lot of pressure to bring them back into the fold. We hope the visibility will cause these plants to come back on their own.

There was never any systematic analysis of the reasons that plants fall by the wayside. There was a lot of discussion about the liaisons' impressions about why they failed. A lot of times it just came down to the Plant manager didn't support it with personnel. But I think in some cases that indicates that we [corporate ABC management] haven't done a good enough job.

CONCLUSION

Activity based costing has been adopted by companies as a means to reconcile management accounting information with advanced manufacturing practices. In spite of its popularity among practitioners, there has been little systematic research on ABC implementation. This paper uses case study research to develop a framework for assessing cost system change and to identify important factors in ABC implementation success. The search for influential factors was guided by the information technology, organizational change, and cost management systems literatures and by anecdotal discussions of other ABC implementations. The role of evolutionary stages of implementation was also examined.

Evidence from GM's implementation of ABC is consistent with a context-sensitive, evolutionary model.

Three directions for future research seem most promising at this early stage of understanding the link between ABC implementation and organizational and technological change. First, this study examines ABC adoption from the perspective of the firm. However, ABC implementation has strong micro-foundations, in part because a perceived strength of ABC is the codification of plant-level knowledge. This suggests that understanding the unique factors influencing plant-level ABC implementation is an important avenue for refining our understanding of ABC implementation. Preliminary evidence suggests that plant level implementation does not move in lock-step with corporate implementation. Indeed plant-level success--- as defined by ultimate usage of ABC data--- did not figure prominently as a determinant of corporate ABC adoption. Virtually every manager interviewed acknowledged that there were few "shining stars" among the early ABC sites. Thus it appears that plant implementations are not epicycles of implementation, the success of which support and propel corporate implementation. Although plant implementations generate the impetus for a corporate ABC strategy, corporate implementation soon develops a life of its own that is loosely coupled to plant implementations. The relationship is dynamic, context dependent and symbiotic. This question will be taken up in the second phase of this research.

As more companies adopt ABC and evidence on sources of success and failure mounts researchers will have more opportunities to refine the model of ABC implementation. Conceptual lenses condition and shape our perceptions of reality. Consequently, a necessary second direction for future research is the application of alternative frameworks to ABC implementations. Finally, as competing theories emerge to explain ABC implementation success, and as a larger population of ABC adopters emerges, empirical studies to determine the relative merits of each model in explaining implementation outcomes will be needed. Thus, through continued iteration between empirical investigation and theory-building, researchers will gain an understanding of the complex socio-technical forces that influence cost management system change.

Footnotes:

1. Some might prefer "re-emerged," since there is evidence that General Electric pioneered ABC methods in the mid-1960s (Johnson 1992), that many firms began experimenting with alternative allocation mechanisms in the late 1960s (Johnson & Kaplan 1987), and that the beginnings of a theory were present in the academic literature (Drucker 1963, Staubus 1971). Nonetheless, ABC did not become widely adopted until the confluence of stiff competition, changing manufacturing methods and inexpensive information technology made cost systems a likely target for improvement (Cooper 1990b).
2. See Kwon and Zmud (1987) for a review of empirical studies of IT implementation.
3. Kwon and Zmud's (1987) sequential stages were modified by Cooper and Zmud (1990). I use Cooper and Zmud's stages, however the general framework is that of the earlier Kwon and Zmud study.
4. Production workers and union representatives are not included in this stage of the research because they were not part of the corporate ABC implementation decision. Production workers were occasionally members of plant implementation teams. Their contribution is discussed in (Anderson and Young 1995).
5. Since case study research includes subjective evaluation of qualitative data, the researcher's experience is an important environmental factor that the reader must consider in weighing the validity of research conclusions. The author worked as an engineer for GM's Pontiac stamping plant during 1985-7. During this period the author led the first pilot study of ABC. The author had no involvement in GM's ABC implementation after August, 1987. Although of necessity this study references the pilot study of ABC, the focus of this paper is on the migration of ABC from a local, plant experiment to a corporate-wide policy. The first exposure of ABC at the division level was coincident with the author's departure, in August, 1987. Thus the time period and key events under consideration in this study and seven of the ten GM interviewees were unknown to the author at the outset of this research. A variety of perspectives and documented reports from the period were sought in an attempt to insure balanced reporting of events that transpired during the author's employment. Having recognized the possibility of bias, it is also reasonable to mention the benefits that understanding the organization conferred, including gaining the trust of the interviewees and familiarity with internal policies and company jargon.
6. The names of company groups and committees that are frequently mentioned are spelled out in their first use with the common acronym placed in parentheses after the name. Thereafter the acronym is used to conserve space. Appendix A provides a glossary of frequently used company acronyms.
7. Stamping plants produce a wide variety of metal parts, including internal stampings (e.g. oil pan) as well as external automotive body panels (e.g. hood, fender), for automotive assembly plants. Transfer presses hold multiple dies and perform a series of stamping operations within one machine with automatic, internal transfer of the part from one die to the next.
8. Although managers could conceivably manage operations better with improved cost data, they were restricted to using traditional product costs in all reports to central office that included product costs. Managers' willingness to expend resources on experiments that had limited official use is unusual.
9. A pilot study conducted in summer, 1986, examined the relative indirect resource usage of two similar car hoods that had dramatically different production volumes but identical allocated unit overhead costs. The study's results motivated the plant manager to endorse a comprehensive study of product costs in one of the plant's two major facilities. The resulting ABC model, which was developed by a multi-disciplinary team using spreadsheets on a personal computer, was completed in late 1987. See Beajon and Singhal (1990) and Cooper (1990a) for details.

10. I use the term "ABC" to describe the Pontiac system; however, the language of "activities" did not emerge until later as a response to changing needs for cost information.
11. Interestingly, as the word is used in memos from the period, "user" typically referred to the local ABC design teams. Later, the word was used in the more conventional style of the IT literature to refer to managers who would use ABC data as an input to decision-making. For example, local ABC Design Teams were exhorted to "identify user needs for product costs" to ensure that they designed ABC models that could meet these needs. However, even in 1993 the corporation sponsored "ABC User Group Meetings" that were attended primarily by plant-level ABC Designers and Group-level Liaisons.
12. Minutes of the first CSMC workgroup meeting on January 11, 1989, confirm this view, stating, "the cost sub-team exists to focus on the application of ABC, determine benefits, select pilots, develop refinements, and draw conclusions about the program."
13. This goal reflects an anticipation of managerial resistance to change rather than union or worker resistance. In keeping with traditional uses of cost data, there was never any expectation that ABC data would be used by shop floor workers. Even by 1993, the Vice President of Finance for NAO indicated that there was no involvement of the union in ABC implementation, and although shop floor workers had occasionally participated on local ABC system design teams, typically shop floor workers were unaware of ABC because they were not expected to use cost data in their jobs.
14. Three reasons were cited for the failure of ABC to be used at the plant level. First, managers found the ABC model too complex for anything other than basic product costing and had difficulty relating it to operating decisions. Second, because the ABC model used as inputs actual costs from 1986, the data was viewed as "useless" by the time the model was completed in mid-1987. "There was a perception, because the traditional system reports costs as of that year or that point in time, that it was better than old ABC product costs." Finally, after Pontiac's Comptroller moved to CPC as the ABC Sponsor, the system was not maintained. The Director of NAO Product Costing commented that "Pontiac was actually the least successful in terms of providing data... the Pontiac location lost its momentum... [because] they believed that the plant would be closed."
15. The ABC Designer recalled, "some were volunteers and some agreed after a lot of arm twisting."
16. One plant bowed out of the study. It was implementing major changes to the manufacturing process and management believed that this turmoil precluded developing a meaningful ABC model.
17. The most controversial ABC failure occurred at the sole auto assembly plant in the pilot sample. Plant management contended that the plant produced one product, could do little to affect its cost structure, was predominantly influenced by labor costs, and consequently was well-served by a labor-based cost system. The cost workgroup disagreed, arguing that product and process variation was significant when one considered option packages. Unlike other ABC failures, that occurred in relatively small plants, the Council believed that ABC was limited as a corporate strategy if it could not be used in assembly plants, which represent a major portion of the vehicle production process. The team was asked to implement ABC in a second assembly plant. Subsequently, this implementation failed for similar reasons, and the issue of ABC for assembly plants was tabled indefinitely.
18. The "blitz" approach was pioneered as a cost effective means of implementing a simple ABC system. The local design team was instructed to collect data that was likely to be used in an ABC design, given their production processes. Then the ABC Sponsor and CPC's Group Liaison traveled to the plant and spent a week teaching the team ABC concepts and helping them design a rudimentary ABC model. Subsequently, the local team refined the model. Later the blitz method was applied to plants which met criteria related to plant size, process complexity, and data availability.

19. Perhaps the most exciting news of the meeting, which raised a cheer from the crowd was the announcement by the Director of Current Product Cost NAO that with complete implementation of ABC, the company's auditors had approved the switch to ABC product costs for purposes of component inventory valuation in 1994. Up until then, the auditor's had resisted ABC as a method of inventory valuation because they wanted to switch methods at one time, not year by year as new implementations became available. For the first time, ABC would be fully integrated with financial accounting.
20. There is not a one to one relationship between plants (single physical locations) and ABC models because some plants are subdivided for ABC modeling purposes.
21. In an interview shortly before his death, the ABC Oversight Team leader characterized his involvement with GM's ABC initiative this way, saying that championing ABC at GM was the professional accomplishment of which he was most proud.
22. The evaluations were: 1) 1986 expansion of two-product feasibility study to transactions cost pilot study at Pontiac; 2) 1987 report of Pontiac pilot results to CPC management; and, 3) 1990 evaluation of CSMC pilot study.

Appendix A

A Glossary of Acronyms for General Motors' Organizational Committees and Groups

- ACG Automotive Components Group. Includes divisions such as AC Rochester, Harrison Radiator. These groups typically sell to both internal GM divisions and to external customers.
- BOC Buick-Oldsmobile-Cadillac Group. Formed in the 1984 company reorganization. Subsumed under NAO in reorganization around product platforms.
- CPC Chevrolet-Pontiac-Canada Group. Formed in the 1984 company reorganization. Subsumed under NAO in reorganization around product platforms.
- CSMC The Cost Systems and Measurements Council. The CSMC workgroup was the support group to this executive level committee. The CSMC workgroup was comprised of two subgroups, the cost team, which was charged with evaluating ABC, and the performance measures subgroup.
- EDS Electronic Data Systems. Group responsible for company information and operating systems.
- GMPT GM Power Train. Consolidation of previously BOC and CPC powertrain operations that occurred with the formation of NAO and the reorganization around product platforms.
- GMR GM Research Laboratories. Corporate research and development group that conducts basic research used by all operating divisions.
- NAO North American Operations
- PSIC Production Scheduling and Inventory Control system. An integrated operations scheduling system that provides data to and receives data from the ABC system.
- SAC Science Advisory Committee. A group of external experts, many from academia, who conduct a brief study of some aspect of GM operations each year and report findings and recommendations to the Executive Committee.

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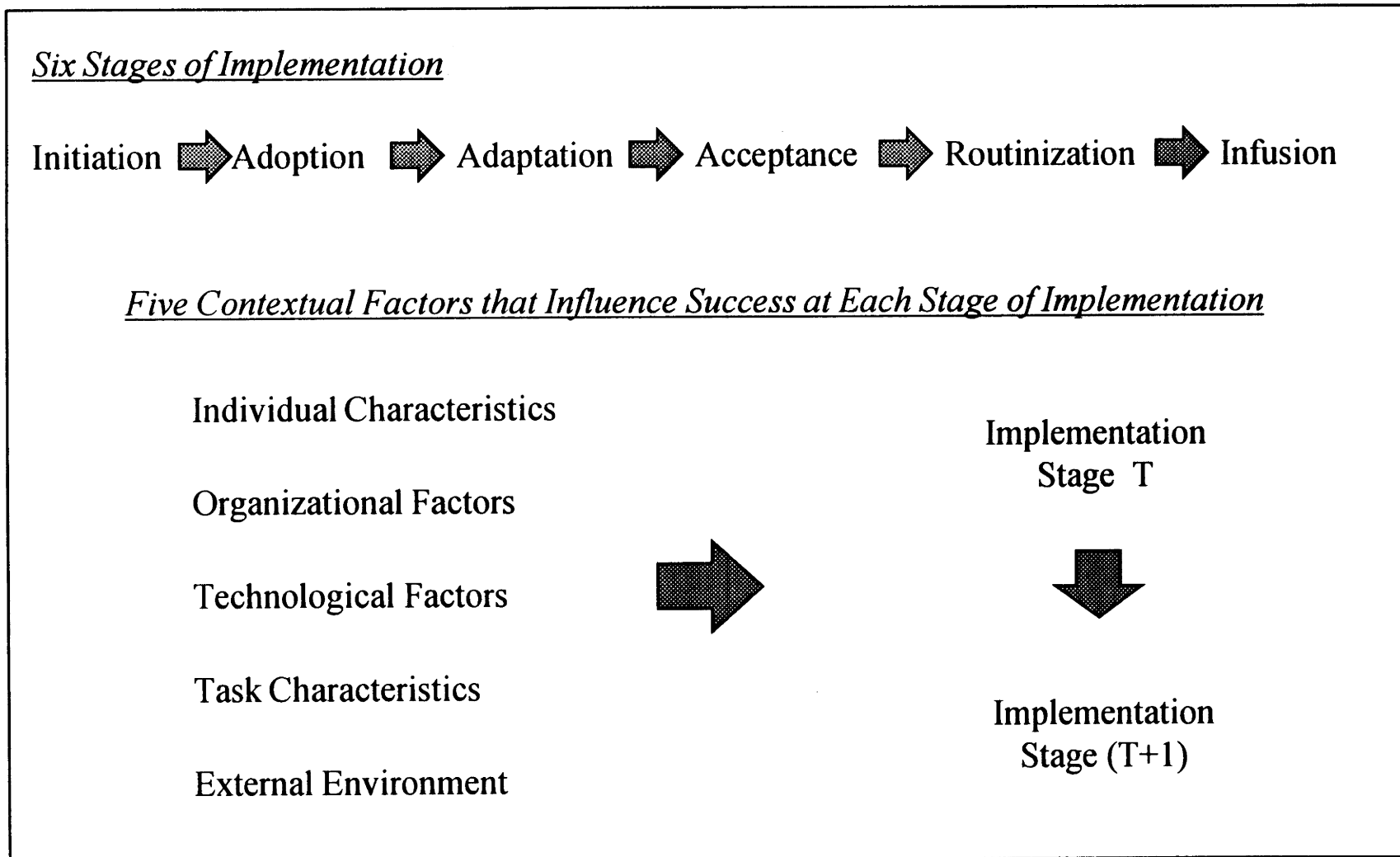
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Figure 1
A Factor-Stage Model of Information Technology Implementation



Adapted from Kwon and Zmud (1987) and Cooper and Zmud (1990)

Table 1

Candidate Variables for Exploratory Analysis of Factors Influencing Activity Based Costing Implementation Success by Literature Source

CONTEXTUAL FACTOR	IT Implementation Literature (Kwon & Zmud 1987)	Cost System Change Literature	Anecdotal Evidence from ABC Implementations
Individual Characteristics Disposition toward change/ Intrinsic reward in change Education Job Tenure Role Involvement Informal support (e.g., sponsors, champions)	X X X X	X X	X X
Organizational Factors Centralization Functional specialization versus Multi disciplinary approaches Internal communications Extrinsic reward systems Training investments	X X X X	X X X X	X X X X
Technological Factors Complexity for users Compatibility with existing systems Relative improvement over existing system (accuracy and timeliness) Relevance to managers' decisions	X X X	X X X	X X X X
Task Characteristics Uncertainty / lack of goal clarity Variety Worker autonomy Worker responsibility	X X X X	X X	X
External Environment Heterogeneity of demands Competition Environmental uncertainty External Communications	X X X X		

Table 2
Profile of Interviewees: ABC Project Involvement 1/86 - 12/93

<u>Person</u>	<u>Period of Involvement</u>	<u>Title</u>
A	6/86 - 3/88	Comptroller-Pontiac
	3/88 - 10/88	CPC ABC Project - Manager
	10/88 - 7/90	CSMC Cost Work Group - Manager
B	7/90 - 2/93	ABC Oversight Team, NAO - Leader
		ABC Steering Committee, NAO - Member
	9/86 - 8/87	Financial Analyst - Pontiac Plant
	8/87 - 3/88	ABC Project Leader - Pontiac
C	3/88 - 10/88	CPC ABC Project - System Support
	10/88 - 7/90	CSMC Cost Work Group - Member
	7/90 - 12/91	CPC ABC Liason to ABC Oversight Team
	1/86 - Mid '87	Involved with various cost experiments on CPC Financial Staff
D	Mid '87 - 12/93	Exposed to ABC while on CPC Financial Staff
		Director Current Product Cost - CPC;
		Director Product Cost Development - NAO
E	Mid '87 - 12/87	Exposed to ABC while on CPC Financial Staff
	1/88 - 12/89	Comptroller at assembly plant in CSMC ABC Pilot Study
	Early '90	Comptroller at a modernized CPC stamping plant
	Early '87 - 9/87	GM Research Labs - Researcher on Costing Project
F	9/87 - 8/88	ABC Project Member - Pontiac
	8/88 - 7/90	GMR & Member of CSMC Cost Work Group
	7/90 - 12/93	ABC Oversight Team - Member
	6/89 - 7/90	CSMC Cost Work Group
G	7/90 - Mid '91	ABC Oversight Team NAO - Facilitator
	7/91 - 9/92	ABC Oversight Team NAO - Facilitator
H	1/91 - 11/92	ABC Implementer AC Rochester
	11/92 - 12/93	ABC Oversight Team NAO - Facilitator
I	Late '88 - Mid '91	GM Assistant Comptroller
	Late '92 - 12/93	Vice President of Finance, NAO
J	Late '93 - 12/93	ABC Oversight Team, NAO - Leader
		ABC Steering Committee, NAO - Member

Table 2 (continued)
Profile of Interviewees: ABC Project Involvement 1/86 - 12/93

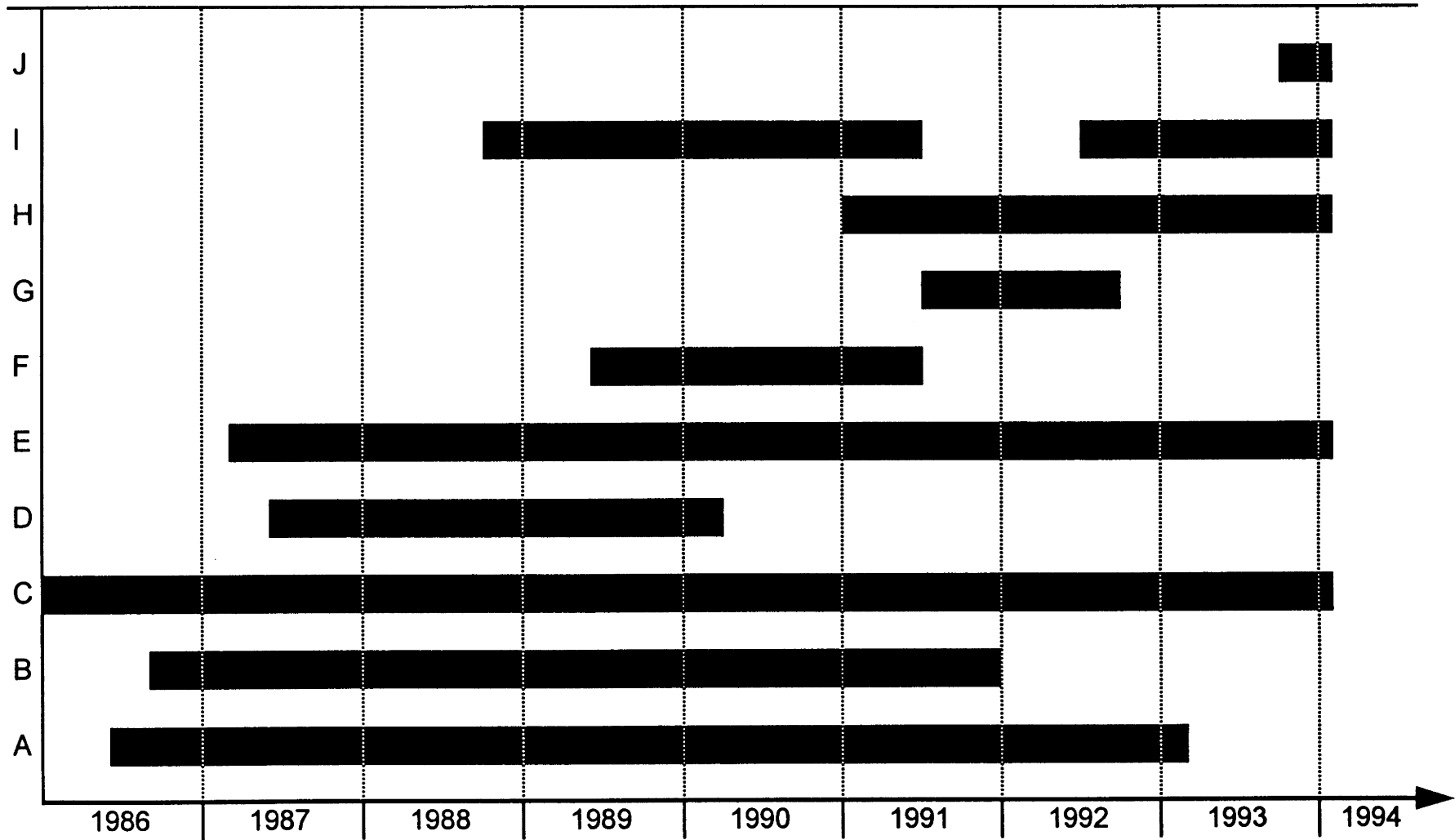


Table 3

Effect of Variables that Influenced ABC Implementation at GM

Each cell contains the observed influence of the variable on the implementation stage¹ and a brief reference to the evidence that supports the claim. Factors in *italics>* are those which emerged from the case analysis and were not identified initially as a candidate variable (Table 1).

CONTEXTUAL FACTOR	Initiation	Adoption	Adaptation	Acceptance
Individual Characteristics Disposition toward change/ Intrinsic reward in change Job Tenure/ <i>Process Knowledge</i> Role Involvement Informal support (e.g., sponsors, champions)	+: sponsor desire to make a difference +: centrality to Comptroller's job +: Pontiac Comptroller	+: strong advocate +: design skills and user buy-in +: centrality to Director's job +: CPC Director of Finance -: limited opportunity for debate	+: role of CPC leading change -: ABC design owners slowed commonization +: CPC Director of Finance	+ ABC User's Group
Organizational Factors Centralization Functional specialization Internal communications/ <i>Horizontal versus Vertical</i> Training investments	-: Cooney Rept. +: role of GMR +/-: parallel experiments -: specialists can't approach problem with clean slate + horizontal discussion among stamping plants - threatened traditional vertical communications + theory focus, aim to persuade about problem	-: CSMC slow assessment +: pilot study built support - horizontal discussion threatened controlled experiments of pilot study + codified implementation	+: commonization -: innovations originated with multi disciplinary local teams +: vertical communications aimed at supporting rather than directing local teams +: shift to ABM from ABC	+: "blitz" as codification of simple implementation -: "blitz" as means of satisfying requirements +: common cost systems committee +: CCL 2860 +: implementation versus use and maintenance training

CONTEXTUAL FACTOR	Initiation	Adoption	Adaptation	Acceptance
Technological Factors Complexity for users Compatibility with existing systems/ <i>Across ABC systems</i> <i>Representational accuracy of model</i> Relative improvement over existing system (accuracy and timeliness) Relevance to managers' decisions/ <i>Compatibility with firm strategies</i>	+: pragmatic +: failure to address 'fit' of ABC with other systems +: product cost changes	+: compared to alternatives +: intuitive appeal +: pilot study verification of product cost changes +: decision-support focus of pilot study	+: standardization +: negative effect of commonization	+: software modifications to support new ABM objectives
Task Characteristics Uncertainty / lack of goal clarity Variety Worker autonomy Worker responsibility/ <i>Personal Risk</i> <i>in task outcomes</i>	+: challenge, using expertise -: Cooney Rept., excessive +: freedom to design model -: Cooney Rept.	-: subjectivity in design -: subjectivity in design	+: plant originate innovations	+: lack of task variety in maintenance; "drudgery"
External Environment Heterogeneity of demands Competition Environmental uncertainty External Communications/ <i>Role of</i> <i>External Experts</i>	+: ABC value linked to process/ product diversity +: site of innovations +: threats of divestiture +: SAC, Cooper and Kaplan	+: threats of divestiture -: turbulence within plant +: Smith's talk to NAA	+: site of innovations +: bench marking other firms	-: auditor's preference for standardization before use

1. Four of Kwon and Zmud's (1987) six stages of implementation are considered.