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# Global Electronics, Inc.: ABC Implementation and the Change Management Process

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**ABSTRACT:** Descriptions of activity-based-costing (ABC) systems have become a standard part of managerial accounting texts. While ABC implementation issues are the focus of a number of articles, these issues are often not addressed in a typical textbook. This case is designed to familiarize you with the behavioral and technical variables that can aid or impede successful ABC implementation. Anderson's (1995) factor-stage model provides a template to organize the discussion of ABC success factors. In this case, you will be cast in the role of a business consultant. You are asked to synthesize the case study's key "change management" insights into a report that could be shared with co-workers in an intranet-based knowledge management system. In addition, you may be expected to prepare a formal presentation of the report for your peers.

> Implementing change in an organization is about ninety percent cultural and ten percent technical. This is because the organization dynamics, politics, and search for a champion that go on are the real issues that make or break the project. One of the reasons we were able to implement ABC successfully was because the right people became champions.
>
> —Chris Richards, Director of MIS, Global Electronics, Inc.

## BACKGROUND

Global Electronics, Inc. (GEI), headquartered in Sarasota, Florida, designs, manufactures, and markets discrete power semiconductors and analog, digital, mixed-signal, and radiation-hardened integrated circuits for signal-processing and power-control applications. Its products are used in such applications as antilock braking systems, air-bag systems, computer keyboards, modems, disk drives, and cellular telephones. The company employs about 2,300 people at its three U.S. fabrication facilities (located in Huntsville, Alabama; Evansville, Indiana; and Reading, Pennsylvania), and has 4,000 employees at its assembly and test facility in Kuala Lumpur, Malaysia.

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GEI's manufacturing process consists of two primary phases. The fabrication phase is comprised of four main processing procedures: photolithography, etch, diffusion, and circuit probe. The assembly and test phase consists of six main processing procedures: wafer saw, die attach, wire bond, mold, solder dip, and final inspection. The entire manufacturing process had become more technologically diverse and intense with each passing year; accordingly, by 1999 direct labor represented less than 10 percent of total manufacturing cost. The company produces a variety of electronic goods ranging from power and logic commodity products to analog and digital specialty products, and the company's customer base exhibits a high level of purchase volume diversity within any given product line.

In 1999, GEI's profitability spiraled downward with operating losses reaching $100 million on sales of approximately $650 million, causing management concern about the accuracy of the company's standard cost system. There was a feeling that the standard cost system could not truly identify which of the company's products were profitable and which were not. The lack of an understanding of product profitability, a flawed product mix, and poor marketing and pricing decisions could have contributed to GEI's financial problems. A combination of internal problems and external threats in an industry characterized by increasing global competition, decreasing product life cycles, product proliferation, and exploding technological capability led to a shake-up of the company's top management in February 2000. As part of the shake-up, GEI installed a new president, Mike Alberts, and a new controller, Steve Shannon, for the express purpose of strengthening the company's position in the market and improving its financial performance.

## THE STANDARD COST SYSTEM

GEI's standard cost system assigned manufacturing overhead costs to products based on direct labor dollars. From 1994–1999, the predetermined manufacturing overhead rate had spiraled upward from 300 percent to more than 600 percent of direct labor. As the manufacturing process became more technology-driven, management worried that high-volume products and/or less complex products were being overcosted and that low-volume products and/or more complex products were being undercosted. Indeed, GEI seemed unable to compete with the low prices offered by its competitors on high-volume, commodity business. The inability to compete in these segments was thought to be responsible for GEI's growing finished goods inventory. Conversely, GEI consistently captured high-margin, low-volume specialty business opportunities. The comments of a product engineer sum it up:

> I think the labor-based cost system is fairly inaccurate and creates some misperceptions. For example, the logic product line, which is a mature high-volume product, is bearing a lot of the total factory costs, thereby making the new lower-volume specialty products look cheaper. The perception is that we are doing well on all sides, except for logic, which looks marginally unprofitable. We can't just keep throwing money at the new products and let the more mature product lines take up the slack, actually covering their costs falsely.

GEI's product engineers intuitively understood the shortcomings of the existing labor-based standard cost system. For example, they knew that producing low-volume, specialty orders added complexity to the manufacturing process that

was not reflected in the cost system. Accordingly, in January 1999, the product engineers created an offline costing system called Product Unit Cost (PUC) in an attempt to rectify the company's product-cost-distortion problems. The PUC system used time as a driver, in addition to labor, by looking at the elapsed time a product spent in fab, probe, assembly, and test. This approach eliminated some of the distortion; however, rather than reconcile the difference between the PUC system and the direct labor-based standard cost system, both costs were tracked. With two sets of cost data available, managers could choose the figures that made their departments look best. Managers spent more time arguing about which costs were correct than focusing on the actual problems at hand. The confusion created by the irreconcilable cost figures eventually led to the demise of the PUC system by January 2000.

As a response to the PUC system failure that occurred immediately before his arrival, Mike Alberts decided to create an executive committee to formulate a solution (using just one set of cost numbers) that would alleviate the product-cost-distortion problems inherent in the direct labor-based standard cost system. Given GEI's declining financial performance, he wanted a solution to materialize as a quickly as possible.

## THE INTRODUCTION OF ACTIVITY-BASED COSTING

In May 2000, the executive committee decided to adopt an activity-based costing (ABC) system. ABC systems assign resource costs to activities, and they use volume and nonvolume-related cost drivers to assign activity costs to products. Chris Richards, Director of MIS, was asked to head the implementation process. An employee involved with the ABC implementation commented:

> I feel the reason ABC came about was because Chris Richards came to GEI with some ABC background and was a very good salesman, in a positive sense....It was very important to have someone who could deliver the message to senior management in such a format that it did not intimidate people, and they listened, and they all agreed...he just did a real good job of educating and bringing people together.

Chris was very competent in ABC, and with the assistance of an academic consultant as well as an external consulting firm, he used his interpersonal skills and extensive knowledge to gain the support of top management. Of course, the other factor that helped the change process was GEI's operating performance at the time. Ann Conners, the Director of Manufacturing Finance put it this way:

> The number one thing we had going for us was an "urgency factor." I truly believe people would not have given us the time of day with respect to ABC if we were making 10 percent return on sales. Having operating losses of $100 million causes people to listen.

The executive committee formed a steering committee to oversee the ABC implementation, with Chris Richards serving as the chairman. Other members of the steering committee came from finance, product engineering, operations management, marketing, plant management, and the external consulting firm. In June 2000, the steering committee formed a project team of MIS and finance personnel from corporate headquarters to travel to each plant to define the activities, assign resource costs to those activities, select activity drivers and determine driver

quantities, and calculate ABC rates. Ann Conners was chosen as the director of the project team. The steering committee and project team both had the complete support of Mike Alberts, Steve Shannon, and the entire executive committee.

The clearly stated short-term objective of the initiative was to improve product cost accuracy and optimize the product mix as quickly as possible in order to help improve GEI's unsatisfactory financial performance. The long-term objective was to evolve toward the practice of Activity-Based Management (ABM). More specifically, GEI anticipated that the ABC data could be used to help its product engineers project the cost impact of product design changes, and to help its process engineers and operations managers identify and prioritize process cost-reduction opportunities.

Before visiting the plants to begin the ABC data-gathering process, the project team had to make two important decisions related to the issue of scale. First, GEI needed to decide if it would use a pilot-study approach or a worldwide "blitz" approach. The project team originally favored conducting a pilot study at one of the front-end fabrication facilities, but the product line manager on the steering committee was quick to point out that knowing only half a product's cost was useless. Ann Connors commented:

> At one point, we thought about only doing the Reading plant. Then one of the product line managers said, "That doesn't do me any good. My product starts in Reading and ends up in Malaysia." So, we decided that doing it piecemeal was not going to support our main objective of improving "front-to-back" product cost accuracy.

Furthermore, the pilot-study approach was much too slow for the project team given the sense of urgency communicated by Mike Alberts. Accordingly, the project team shifted its focus to calculating a complete "front-to-back" ABC cost for each product line. This required calculating ABC costs at the "front-end" fabrication facilities and linking those costs by product line to the ABC costs calculated at the offshore "back-end" assembly and test facility in Kuala Lumpur.

The second scale-related issue dealt with systems integration. The external consultants advocated an offline approach, whereby the ABC cost data would be maintained separately from the existing direct labor-based standard cost system and financial reporting system. Conversely, Ann Connors steadfastly advocated an integrated approach because of the data integrity lessons learned from the previous PUC experience.

Chris Richards eventually opted to support Ann's push for an integrated ABC system, primarily due to the need to motivate employee behavior:

> The problem with a nonintegrated approach, even though it is certainly a lot simpler and less risky, is how do you affect behavior?...For example, you can't run the marketing organization based upon achieving some desired gross margin when they are relying upon bogus costs to push the stuff that you don't want them to be pushing....But, how do you motivate these people to go after the right set of products if you've got a bunch of accountants sitting over here who have knowledge derived from some offline system that nobody else is aware of?

The project team concluded that an offline system would create data integrity problems and behavior motivation problems, so the executive committee approved the use of an integrated approach. This integrated approach would interface with

GEI's general ledger, standard cost, and financial reporting systems, as well as its production planning, factory control, bill of material, and materials management systems. GEI created its own customized ABC software called ACCURATE to capture the data inputs, interface with the standard cost subsystem, and calculate product costs.

In July 2000, the project team was given an entire week of ABC training by an outside consulting firm prior to starting the plant visits. Once trained, the project team created an ABC implementation timetable that allowed for just nine months to complete a worldwide ABC rollout that would be integrated into GEI's financial and operational reporting systems. Although this represented an ambitious timetable, with highly visible support from Mike Alberts and Steve Shannon, the project team considered it feasible. Exhibit 1 summarizes the relevant events leading up the ABC implementation and the sequence of plant visits that were conducted in accordance with the nine-month timetable.

## Implementing the ABC System

The ABC implementation was completed in the nine-month time frame, as planned. Based on a total of 88 interview sessions, 674 activities and 254 activity drivers were identified across all five plants and entered into the standard cost

**EXHIBIT 1**
**Global Electronics, Inc.**
**The ABC Implementation: A Chronology of Events**

| Date | Description of Event |
|---|---|
| January 1999 | The PUC system is created. |
| January 2000 | The PUC system is abandoned. |
| February 2000 | The new President and Controller are installed. |
| March 2000 | The President forms an executive committee to solve product-costing problems. |
| May 2000 | The executive committee decides to adopt ABC and the steering committee is formed. |
| June 2000 | The project team is formed, and with input from the steering committee, decides to create an integrated system and to use a "blitz" implementation strategy. |
| July 2000 | The project team is given one week of ABC training. |
| July 2000 to September 2000 | The team completes the data-gathering process at the Hunstville and Reading plant locations. |
| August 2000 to January 2001 | The team completes the data-gathering process at the Malaysia plant. |
| November 2000 to January 2001 | The team completes the data-gathering process at the Evansville plant. |
| March 2001 | The ABC model-building and systems-integration processes are completed and all data items are input into ACCURATE software. |
| September 2001 | The company begins the first revaluation process of the ABC system. |
| January 2002 | The ABM "kickoff" and training are scheduled to begin. |

subsystem that provided data for the financial reporting system. The project team streamlined the implementation process by only including activities within the cost model that it believed could materially affect strategic product-pricing and mix decisions. In the forthcoming ABM phase of the implementation, the project team planned to do detailed activity analyses of high-cost activities that, based on the data obtained from the initial implementation, could be identified as the prime targets for continuous improvement. Chris Richards described this implementation strategy as follows:

> You have to know where to focus because you have only so many resources. Therefore, the first thing you want to do is narrow your scope. So, first you go in at a macro level to identify your high-cost activities and your optimal product mix. Then, you take those high-cost activities and drive the analysis down to the micro level so you can truly understand what is driving your cost and what type of performance measures are appropriate. Notice, it is important to realize that you don't have time to analyze all of the activities....I think usually the first thing you have to address is where are the cost distortions? That is typically why people get into ABC.

The ABC model-building and data-gathering processes at each plant were managed by members of the centralized/functional project team. Plant-level employees were expected to provide activity definition in addition to resource driver and activity driver information, while the project team's role was to supervise the implementation across plants. Ann Connors commented on the strengths and weaknesses of relying upon a centralized and functional project team:

> In terms of centralization, having a core project team that coordinated everything helped ensure consistency across plants...we made the mistake of sending a whole new core team to Malaysia that really wasn't involved in the front end as much, and when we got to Malaysia, it was getting out of control....In terms of our project team's functional orientation, we lost credibility in the eyes of many folks out on the manufacturing floor because we signaled to them that ABC was about accounting and not operational decision making.

The training provided by the project team for the plant-level employees was negligible. Rather than spending time on explanations and training, the focus at the plant level of this top-down implementation was on making people participate in the ABC process regardless of their personal beliefs. The decision to implement ABC had been made at headquarters. Plant-level personnel were not consulted prior to the decision, but were subsequently expected to accommodate the demands of the project team in a timely manner. In retrospect, Ann Conners agreed with the view that the plant-level training her team provided was inadequate by saying:

> When we went to the plants to do training, it was like a whirlwind tour; we just showed them some charts and said, now sit down and we are going to ask you some questions....I don't think we put ourselves in our internal customers' shoes. We paid very little attention to their constructive concerns or their need to truly understand ABC.

### The Benefits of ABC

There was a strong consensus across the plants that the ABC system resulted in both improved product-cost accuracy and greater product-cost visibility relative to the direct labor-based system. In spite of the lack of training, nonaccounting

personnel intuitively believed that ABC captured the economics of the business better than the labor-based system. At a strategic level, this contributed to better marketing and product-mix decisions, and at the plant level, ABC improved relations with GEI customers. A product engineer commented:

> We get a lot of telephone calls from customers asking, "What does this cost?" or "Why is this so expensive?" In the past, we did not have the capability to answer these types of questions with any data-based knowledge. We did not have access to any data that would validate our claims of why it cost what it did. Heck, we had a hard time justifying to ourselves why a product cost what it did using our old cost system. The whole price justification process was very confusing to our customers and very frustrating for us. Now, when someone calls, I can say this is what the flow is, this is what those activities cost, and this is how much your product is going to cost. This has been extremely helpful for our customers and us.

### Maintaining the ABC System

To keep the ABC system's resource-driver and activity-rate information current, GEI's accounting department initiated what was termed the "revaluation process" in September 2001 (as shown in Exhibit 1). Initially, the plan was to conduct revaluations every six months. However, this practice was viewed as being too expensive, thus the revaluation time frame was extended to one year. The accounting department was charged with updating the ABC system and supervising the revaluation process. This was viewed favorably by one operations manager:

> The more you go involving manufacturing personnel with ABC, the more you make them seem like accountants. We don't want them to be accountants. We want them to go out there and make products the most efficient way they know how, with the highest yield and the best cycle time...that is why we are here, right? So, I think what is important here is that the accountants need to be the accountants and the manufacturing people need to be the manufacturing people, and where they need to communicate to develop, improve, and use ABC, then so be it, but I don't believe you ever want a manufacturing person to be an ABC expert.

From the finance side, there was agreement with this observation:

> There is a real fine line regarding the level of involvement that operations people want in creating and maintaining the data. They want usage of the data if it is going to help them, but if you start getting them in too deep, the immediate comment is hey—that's an accounting issue, we make products....There is no doubt that if you involve them too much, it is going to alienate them because they don't want to do what the accountants are supposed to do.

## THE MIGRATION TO ABM

The long-term objective of GEI's ABC initiative was to evolve from ABC to ABM. ABM focuses upon proactively using activity-based information to optimize product- and process-design costs. The first phase of the implementation was completed in March 2001 in the sense that the ABC model had been built, thereby enabling Mike Alberts and his senior management team to rely upon the output from the model to optimize the product mix. The second phase of the ABC initiative, due to kick off in January 2002 (as shown in Exhibit 1), involved training

employees to use process analysis tools and relational databases in conjunction with ABC data to enable them to compute real-time product reengineering cost projections, and to prioritize and realize process cost reduction opportunities.

The response to these ABM-oriented applications of the ABC data was less than enthusiastic. The top-level management support that existed for ABC did not exist for ABM. While Mike Alberts appreciated the product line profitability "snapshot" that ABC provided, he did not rally behind the use of ABM to improve the business. Furthermore, Chris Richards, steering committee chairman and ABC champion, suddenly left the company. Without extensive and visible top-management support, ABM was not able to influence the behavior of many GEI employees, primarily due to the overall workload. A plant accountant from Reading commented:

> When we take a look at strategic and operational planning, some of the assignments or goals should revolve around activities. This would require the manufacturing and engineering functions to be educated on ABM, which would allow them to become more involved. At GEI, you don't find resistance to people using ABM. The problem is that everybody has so much to do that if their job does not demand that they become totally conversant in ABM, they will simply skirt around it.

The lack of top management support created additional problems that hindered the infusion of ABM throughout the organization. Not only was training at the "kickoff" stage of the ABC implementation minimal, but the commitment of resources to training during the ABM stage was virtually nonexistent. An operations manager from Malaysia commented on the adverse effects of inadequate training:

> I think we need to train people how to use ABM because currently we are only crunching data. The people who need to use ABM are the operations people on the floor. I mean, if I know how to use it, but 1,300 of my people do not know how to use it, I can't do much. So, the managers and supervisors on the shop floor must learn how to look at ABC data and use it to lower costs.

Beyond training, resources were not committed to building the technology capability needed to support ABM. This created frustration on the part of potential ABM users and accounting personnel who each had to deal with the lack of symmetry between the desired pace of system refinement and reality. A product engineer commented:

> I would like to have a relational database with all the activities and rates in it....The way I see ABM is that all your costs should be available in such a way that you can slice and dice them to look at any cross-section you want....You know, let me Pareto chart our test-activity rates by site or by sector. Then, I could look at these types of data and say, how come this tester costs twice as much as another? Also, I need "what-if" capability to look at changes in cost flows....If I change three yields—the test yield, probe yield, and assembly yield—what is the revised cost? Right now, I have to grind through these calculations line by line.

A plant accountant from Huntsville expressed some frustration as well:

> I have never seen a management team yet that truly understood the complexities of a cost system....They are always very aggressive and they want it done immediately, like an overnight-type thing....Is our system being implemented as fast as management would

> like? Probably not. Is it being done as fast as humanly possible? Yeah, everybody is doing what is humanly possible. I just think expectations that have been set are too aggressive given the complexities of what we are dealing with....It's like going to a candy store—you want everything, and you want it now. People are going to have to be patient.

The frustration surrounding the lack of technology resources was exacerbated during the kickoff stage of the ABC implementation. In an effort to generate interest at the plant level, the project team masterfully marketed the ABM-oriented benefits that would eventually be realized by engineers and operations managers. However, the amount of time needed to create an integrated and fully relational ABC system to provide these benefits was not satisfactorily discussed. The steering committee and project team did not truly understand the complexity associated with creating an integrated ABC system, and the steering committee did not anticipate that the resources needed to upgrade the system to provide relational-data-analysis capability would disappear. The end result of the marketing campaign was an unintentional overselling of the pace at which the capability of the activity-based system would evolve. Ann Conners observed:

> We did oversell this....I believe that wholeheartedly...therefore, the project team paid a high penalty stroke to keep up as much as we could. For example, we had to bring in four IBM experts to make the "front-to-back" system work....The complexity and volume were more than we dreamed of....I think we initially had good intentions, but then it became apparent that this was a lot bigger than we had envisioned.

Top-level management was also responsible for establishing organizational structure, managing employee access to corporate data sources, and granting decision-making rights. At GEI, 60 out of the 6,300 employees at its four plants had familiarity with the ABC system. While the vast majority of the 6,300 employees actually worked on the "front lines" fabricating or assembling and testing products, none of these employees had any familiarity with the ABC system. An operations manager from Malaysia voiced concern about how this approach to granting data access and decision-making rights would limit the potential application of ABM at the process level:

> Most employees are good employees. They would like to help improve the bottom line. However, because of old conventions, we are still constantly saying this is confidential or that is confidential....Previously, we were unable to provide front-line workers with information they would really appreciate since it was organized by functional department rather than process. So, previously these people weren't able to see the cost of activities such as solder dip; now, thanks to the ABC system it is clearer. Nonetheless, activity-based cost information is still not being made available to our front-line workers.

While many factors impeded the widespread adoption of ABM principles, there were "pockets" of ABM advocates across the plants. These people appreciated that the ABC system presented cost information in a language that was intuitive to them. For example, a product engineer from Huntsville commented on using ABM to support product-design and process-cost-reduction efforts:

> The strategic marketing people go out and talk to customers to see what they want and what they are willing to pay. Based on target pricing, they simply work backward to

> determine what the cost needs to be to make the desired profit. The strategic marketing people come to me and say we have to sell this part for $3.00. With ABC, I'll say, you have several problems here. One is you want to sell multiple grades of the part, which means you have to have multiple test insertions, and if you want to test these particular parameters, you have to use this tester and that currently costs $1.47 per insertion. So, I can quickly see here that without any die cost or anything else, you already have a couple of dollars of test insertions, which will put you over your mark. That means we need to develop an alternate solution before we proceed. Before ABC, we would not have been able to make a knowledge-based decision on whether to accept this type of business.

Similarly, an Evansville product engineer commented:

> I have a couple young engineers working on a project where we would buy a wafer from our vendor with a layer on the back for an extra dollar. However, thanks to that extra layer, we could eliminate three or four process steps and take out three or four dollars in cost and probably get a couple percent yield improvement. The ABC data helped us capture the net cost reduction associated with this project, which helped us sell this project and get approval to buy the more expensive wafer.

Further support came from an operations manager in Reading, who commented on using ABM for process cost reduction:

> If I find that I spend 30 percent of my cost in one particular activity, it creates an awareness that didn't exist before. This pushes us to go in and do more detailed activity analyses in high-cost areas. For example, we start by doing process characterizations and process mappings in high-cost areas to determine whether some of the things we are doing are non-value-added.

A plant controller in Huntsville discussed a "bill of activities" report he created to help engineers and operations managers focus on product and process cost drivers:

> To help manufacturing and product engineering, we have created a bill of activities report. In this example, the cost of the product that we are looking at is about $1,859. We can see that its raw material cost is about $649, and the total activity costs are about $1,210. The biggest activity cost pertains to a technology-intensive activity that actually defines the circuit structures on an integrated circuit. We refer to this activity as the photo stepper, and in this example it costs about $442 for this particular product. This type of ABC information can lead us to ABM because it provides product-cost visibility. We can take a look at the bill of activities and see that the big costs are in the stepper, and then we can look for ways to reduce the number of times this product goes through that activity. That is one approach to ABM. Another approach is to look underneath, that is to say, gee whiz, it costs us $26 to do a stepper? What can we do to reduce that activity cost?

As shown by the ABC systems usage data for a six-month period ended August 2001 (see Exhibit 2), three things seemed clear. First, product engineers were using ABC data to enhance decision making. They accessed GEI's ABC system, either directly or via a plant accountant, a total of 781 times (580 direct queries + 201 indirect queries). Second, marketing managers accessed ABC data 322 times (172 direct queries + 150 indirect queries) to support their decision-making

**EXHIBIT 2**
**Global Electronics, Inc.**
**Summary of ABC System Usage for the Six Months ended August 31, 2001**

**Panel A: Number of Direct ABC System Queries by Department**

| Department | Number of Queries | Percent of Total |
|---|---|---|
| Finance | 1,469 | 71 |
| Product Engineering | 580 | 22 |
| Marketing | 172 | 7 |
| Operations Management | 0 | 0 |
| Process Engineering | 0 | 0 |
| Total | 2,221 | 100 |

**Panel B: Number of Indirect ABC System Queries by Non-Finance Departments**

| Department | Number of Queries | Percent of Total |
|---|---|---|
| Product Engineering | 201 | 51 |
| Marketing | 150 | 38 |
| Operations Management | 26 | 7 |
| Process Engineering | 19 | 4 |
| Total | 396 | 100 |

Many nonfinancial managers indicated that the ABC system was too difficult for them to access directly. Accordingly, they channeled their ABC system queries through the Finance Department. In other words, a Finance Department employee would actually query the ABC system and forward the requested data to the appropriate nonfinancial manager. Therefore, the total number of ABC system queries by Finance Department employees for the six-month period was 1,865 (1,469 queries were to fulfill their own job responsibilities and 396 queries were per the request of a manager outside the Finance department).

processes. Third, operations managers and process engineers were not using ABC data much at all. None of the operations managers or process engineers directly accessed the ABC system over a six-month span. Only 26 and 19 times, respectively, did they seek access to ABC data via their respective plant accountants. What contributed to such differences in behavior? One potential explanation relates to the maxim, "What gets measured gets done." Ann Connors commented on how flowing activity-charge rates through the standard-costing and financial reporting systems motivated GEI's product engineers and marketing managers to converse and manage in terms of activities:

> The single system approach helps because if the product engineers don't improve their product costs, the income statement will continue to look the same. As they improve product costs, it shows up on their income statement. Since they can see the impact of changes on standard margins, that is where you get the payoff because they get positive reinforcement....Likewise, the marketing managers are compensated using product-line income statements that rely upon ABC data....They are motivated to sell products that ABC has identified as winners.

Conversely, top-level management did not adapt the operational performance measurement system used to evaluate operations managers and process engineers to conform to the language of activities. An operations manager from Evansville commented on the critical relationship between performance measurement systems and employee behavior:

> We are not measured on ABC costs. We are measured on other things. People do what they are measured on. I can guarantee you that from my perspective, nobody comes to me on a monthly, weekly, or even annual basis and says, "Your ABC cost of implant is $17 per wafer and you need to get that down to $14 per wafer."...We spend all this time thinking about yield and productivity enhancements....We have a great tool (i.e., ABM) for giving us some strategic insight into where we need to be placing that improvement effort from a financial point of view, but nobody holds us accountable for using this tool to manage the operations of the business.

**The Future of ABM**

Prior to 2000, GEI was not generating satisfactory profits. However, from 2000 through 2001, profitability not only returned to satisfactory levels, but also continually improved. According to Mike Alberts, this was due, in part, to the ABC system and its effect on mix, marketing, and pricing decisions. When the "urgency factor" subsided, Alberts shifted GEI's focus from cost containment to generating sales growth in the product lines that ABC revealed as most profitable. Ann Connors talked about how this related to the practice of ABM:

> I believe the perception is that ABM focuses more on downsizing than on growth. When people are struggling with so many things, they don't want to focus on downsizing if the "urgency factor" is gone. If you are growing and trying to increase sales 10–15 percent a year, to focus on eliminating things doesn't go over very well.

With the focus on sales growth, many of the operations' managers began turning their attention to the Theory of Constraints (TOC). They believed that: (1) identifying system constraints, (2) optimizing the throughput generated by constraining resources, and (3) elevating the throughput generating potential of constraints were the three keys to sales growth in their highly fixed cost, machine-paced manufacturing environment. One process engineer from Malaysia commented on how he believed the ABC system hindered accomplishment of the primary TOC objectives:

> Let's say we are contemplating taking on some new business. The first thing we do is to cost the new product using the ABC system. So, a piece of my salary gets allocated to this new business. Pieces of my subordinates' salaries get allocated to this new business. Some machine costs get allocated to this new business. Before you know it, the ABC cost of this product exceeds the revenue it will generate and the business gets turned away. Yet, for the past six or seven years, I have not had a single increase in headcount. Our machines are sunk costs as they will be here regardless of this particular new business opportunity. When the Taiwan plant closed a few years ago, many products transferred in to us without a single increase in headcount. So, how is my salary relevant to costing new business? It makes no sense!

An operations manager talked about how the ABC system influenced product routings:

> Right now, we often juggle product routings based on ABC charge rates. We might take something off an expensive piece of equipment and put it on a cheaper piece of equipment to lower the ABC cost. But, this is frequently being done without paying any attention to the bottlenecks within the plant. What good does it do us to lower a product's ABC cost in a fixed cost environment, when the net result of this decision may actually lower the throughput generated by the plant?

## CONCLUSION

It appeared that GEI's two-phased implementation plan had been partially successful. The first phase succeeded in delivering timely, revised product-cost information for strategic pricing and mix decision making. The second phase struggled to deliver upon its promise of delivering productivity improvement and cost reduction. With the increasing emphasis on revenue growth, the prospects for ABM appeared dismal.

## REQUIREMENTS

Assume the role of a business consultant for a professional services firm. The case that you have just read summarizes your ABC implementation experience at GEI. Your task is to share your ABC implementation experience with your co-workers by preparing a report for your employer's intranet-based knowledge management system. You should also create a slide presentation that would support a formal presentation of the report to your peers. The report should address the following issues:

1) What preexisting conditions (or warning signs) should exist within a company to warrant considering ABC as a possible solution?
2) When the preexisting conditions identified in Question 1 exist, why does ABC offer a better solution than traditional cost systems? What are some limitations of ABC of which consultants should be aware?
3) From a technical perspective, what are the steps to designing an ABC model?
4) What are the success factors that lead to or impede successful ABC implementation? Summarize your success factors using a framework known as the factor-stage model (Cooper and Zmud 1990; Anderson 1995). Do the success factors that you have identified tend to be more behavioral or technical in nature?
5) Are the success factors for ABC and ABM the same or different? How so?

## CASE LEARNING OBJECTIVES AND IMPLEMENTATION GUIDANCE

### Learning Objectives

This case focuses on one company's experience with a faulty costing system and its efforts to implement an ABC system. The case is based on the experiences of a real company. The quotations included in the case were all obtained from interviews performed with employees of the company. However, for confidentiality purposes, the name of the company, the locations of the plants, and the names of the characters have all been disguised.

The primary objective of the case is to provide a platform for examining the behavioral variables that can influence the success of an ABC implementation. While numerous case studies provide the opportunity to explore technical issues related to ABC systems, such as properly designing an ABC model and using it to evaluate product, customer, or service profitability, the authors are not aware of cases that focus *primarily* on the behavioral change management aspects of ABC implementation.

Exhibit 3 summarizes 30 ABC case studies and their respective learning objectives. Of the cases listed, only two (AT&T Paradyne and Maxwell Appliance Controls) offer students an opportunity to discuss ABC implementation-success factors. However, in each case, the behavioral issues discussed are of secondary importance to a wide array of other primary topics. For example, the AT&T Paradyne case focuses on target costing, benchmarking, cost system design, integrated vs. nonintegrated systems, monthly reporting issues, stakeholder performance measurement, and behavioral issues. While, the AT&T Paradyne case is an effective teaching tool, it does not provide an opportunity to conduct an in-depth exploration of the drivers and impediments to ABC implementation success. Given the evidence of high ABC implementation failure rates (Innes and Mitchell 1996; Roberts and Silvester 1996), and the realization that behavioral variables are primarily responsible for these failures (Cooper et al. 1992; Argyris and Kaplan 1994; Shields 1995; Anderson 1995), the GEI case helps fill a critically important void in the ABC case literature.

The secondary learning objectives of the case include helping students to identify:

- The signs that a costing system may not be supporting management decision making.
- The differences between traditional volume-based cost systems and ABC systems in terms of their ability to support management decision making.
- The steps associated with designing an ABC model.

### Implementation Guidance

This case can be used in a junior- or senior-year cost accounting course at the undergraduate level and in either an introductory or advanced management accounting course at the graduate level.

#### *Background Knowledge*

For the case to be taught effectively, students need to have familiarity with ABC and ABM. Terms such as "activities" and "activity driver" are used in the case. Also, the case discusses using ABC for strategic product pricing and mix decisions vs. using ABM to facilitate product-design and process-cost reduction. If students have not been exposed to the mechanics of designing ABC systems and using those systems for strategic and operational decision making, this case could be difficult to comprehend.

**EXHIBIT 3**
**Survey of ABC Case Studies**
**Primary Learning Objectives**

| Title of Case Study | Primary Learning Objectives |
|---|---|
| *Harvard Business School:* | |
| AT&T Paradyne | Target costing, benchmarking, cost-system design, stakeholder performance measurement, integrated cost systems, and behavioral issues |
| Cambridge Hospital | Cost system design in a healthcare setting |
| Classic Pen Company | Product-line profitability |
| The Co-Operative Bank | Customer profitability in a service industry |
| Euclid Engineering | Product design and development decision making |
| Hewlett Packard: Roseville | Engineering design decisions |
| Indianapolis (A) | Strategic sourcing, process redesign |
| Insteel Wire Products | Cost allocation with excess capacity |
| John Deere | Product pricing, design, and mix |
| Kanthal | Customer profitability analysis |
| Lehigh Steel | Product-mix decision making |
| Maxwell Appliance Controls | Operational control, cost-system design, the balanced scorecard, and behavioral issues |
| MICRUS | Operational measurement and improvement |
| Owens & Minor (A) | Costing for order-fulfillment activities |
| Pillsbury | Business process reengineering |
| Schrader Bellows | Cost-system design and decision making |
| Siemens EMW | Customer order costing |
| Stream International | Operational measurement and improvement |
| Tektronix (A) | Using cost information to influence behavior |
| Winchell Lighting | Costing for marketing and distribution expenses |
| *Issues in Accounting Education*: | |
| Buckeye National bank | Cost-system design and decision making in a service industry |
| ITT Automotive | Activity/Process analysis |
| Metalworks | Activity/Process analysis |
| Pecos Products | Cost-system design and decision making |
| Wilson Electronics (A) & (B) | Resource usage vs. resource spending, product-mix strategy |
| *Cases in Cost Management*: | |
| Allied Office Products | Customer profitability |
| Bridgewater Castings | Product and channel profitability, process redesign |
| Sloan Styles | Product/Customer profitability |
| Tijuana Bronze Machining | Product-line profitability analysis |
| *Darden Business School*: | |
| Deluxe Corporation (A–E) | Strategy, cost-system design, and decision making |

Some of the titles to the case studies have been shortened to simplify the process of creating the exhibit. The full citation for each case study is included in Exhibit 4.

**EXHIBIT 4**
**Unabbreviated Bibliography to Exhibit 3**


Bamber, L., and K. Hughes. 2001. Activity-based costing in the service sector: The Buckeye National Bank. *Issues in Accounting Education* (August): 381–408.

Cooper, R., and R. Kaplan. 1987. *Winchell Lighting, Inc. (A).* Case No: 9-187-074, 1.16. Boston, MA: Harvard Business School Publishing.

———, and P. Turney. 1991. *Tektronix: Portable Instruments Division (A).* Case No: 9-188-142, 1.14. Boston MA: Harvard Business School Publishing.

———, and K. Wruck. 1993. *Siemens Electric Motor Works (A): Process-Oriented Costing.* Case No: 9-189-089, 1.8. Boston, MA: Harvard Business School Publishing.

Kaplan, R. 1989. *Kanthal (A).* Case No: 9-190-002, 1.13. Boston, MA: Harvard Business School Publishing.

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———, and N. Klein. 1996. *Activity-Based Management at Stream International.* Case No: 9-196-134, 1.25. Boston, MA: Harvard Business School Publishing.

———, and S. Datar. 1997. *The Co-Operative Bank.* Case No: 1-995-196, 1.17. Boston, MA: Harvard Business School Publishing.

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———. 1998c. *Classic Pen Company: Developing an ABC Model.* Case No: 9-198-117, 1.4. Boston, MA: Harvard Business School Publishing.

———, J. Schiff, and A. Stanley. 2001. *MICRUS: Activity-Based Management for Business Turnaround.* Case No: 9-101-070, 1.19. Boston, MA: Harvard Business School Publishing.

March, A., and R. Kaplan. 1987. *John Deere Component Works (A).* Case No: 9-187-107, 1.19. Boston, MA: Harvard Business School Publishing.

Narayanan, V., and R. Sarkar. 1998. *Insteel Wire Products: ABM at Andrews.* Case No: 9-198-087, 1.9. Boston, MA: Harvard Business School Publishing.

———, and L. Donohue. 1998. *Lehigh Steel.* Case No: 9-198-085, 1.15. Boston, MA: Harvard Business School Publishing.

———, and L. Brem. 2000. *Owens & Minor, Inc. (A).* Case No: 9-100-055, 1.17. Boston, MA: Harvard Business School Publishing.

———, R. Moore, and L. Brem. 2000. *Cambridge Hospital Community Health Network: The Primary Care Unit.* Case No: 9-100-054, 1.14. Boston, MA: Harvard Business School Publishing.

Palmer, R., and L. Green. 1999. ITT Automotive North America: A case study requiring use of benchmarking, activity/process analysis, and reengineering concepts. *Issues in Accounting Education* (August): 465–496.

Shank, J., ed. 2001a. Allied Office Products. In *Cases in Cost Management: A Strategic Emphasis,* 9–15. Cincinnati, OH: South-Western Publishing.

———, ed. 2001b. Bridgewater Castings. In *Cases in Cost Management: A Strategic Emphasis,* 49–52. Cincinnati, OH: South-Western Publishing.

———, ed. 2001c. Sloan Styles. In *Cases in Cost Management: A Strategic Emphasis,* 215–229. Cincinnati, OH: South-Western Publishing.

———, ed. 2001d. Tijuana Bronze Machining. In *Cases in Cost Management: A Strategic Emphasis,* 243–248. Cincinnati, OH: South-Western Publishing.

Turney, P. 2000. *Deluxe Corporation (A).* UVA-G-0548, 1.9. Charlottesville, VA: Darden Graduate School of Business Administration.

Wisner, P., and H. Roth. 1998. Metalworks Company. *Issues in Accounting Education* (November): 1043–1058.

Professors can exercise discretion when deciding how much additional background to give students when analyzing the case. For example, professors can provide supplementary readings to introduce students to change management before teaching this case. With this approach, students will seek to apply knowledge from the assigned readings to the GEI case. Alternatively, professors can use the GEI case as a vehicle to motivate students to conduct their own outside-of-class research into the area of change management. The annotated bibliography included with the case offers suggested readings that can be used to enrich students' background knowledge in areas deemed appropriate by the professor.

***Teaching Methods***

The case can be taught in a 75–90 minute class, or it can be used as an outside-of-class assignment. In the latter case, students can be asked to hand in PowerPoint slides for grading and/or use the slides to make oral presentations to their classmates or to an external panel. For example, we have had student groups make oral presentations to a panel of Big 5 consultants. For professors who prefer to add structure to their in-class lesson plan or to their students' outside-of-class research, we recommend providing students with a blank version of Exhibits 1 and/or 2 from the Teaching Notes. Exhibit 1 (in the Teaching Notes) specifies the warning signs of an obsolete cost system. It can be used to guide students in answering discussion Question 1. Exhibit 2 (in the Teaching Notes) summarizes Anderson's (1995) factor stage model, and it can be used to guide students in answering discussion Question 4.

When we teach the case in class, we follow the sequence of the discussion questions. We also adhere to the time parameters for each question as shown in the Suggested Solutions section (Teaching Notes). When students make oral presentations, we also recommend that they follow the sequence of the questions. Since the purpose of the assignment is for each group of students to offer a contribution to a hypothetical consulting firm's intranet-based knowledge-management system, the students should organize their PowerPoint slides in a manner that is most beneficial to their hypothetical co-workers. Since their co-workers will be interested in leveraging the PowerPoint slides to gain new ABC clients and to effectively manage an ABC implementation once a contract has been awarded, we have sequenced our questions with this goal in mind. While we do not include recommended PowerPoint slides in the Teaching Notes (because the possibilities are infinite), the Suggested Solutions to the discussion questions provide a large body of information that can be used to help evaluate the contents of students' slides.

In a graduate class, professors can add one additional requirement to the case that is not shown in the discussion questions. As an extension to Question 4, students can be asked to identify similarities and differences between GEI's implementation experience and the findings of research studies that have relied upon the factor-stage model. Anderson (1995) applies the factor-stage model to General Motors, and Krumwiede (1998) uses a survey to apply it to 225 companies. This additional assignment would introduce students to accounting research and it would enable them to see that many of the findings from the GEI case generalize to the findings of these research studies. Exhibit 8 from the Suggested Solutions provides a comparative analysis of GEI's experiences with the findings of the aforementioned research studies.

***Classroom Assessment***

This section summarizes survey data from 18 undergraduate students who completed (this case) during the Spring 2002 semester. The class was taken by

seniors who had completed Principles of Management Accounting during their sophomore year and Cost Accounting during their junior year. The case was used as an outside-of-class assignment. Students were required to formulate answers to the discussion questions, and present their solutions to two business consultants employed by a Big 5 professional services firm. In addition, each student group was required to prepare a five- to seven-page paper explaining the insights summarized in the PowerPoint slides used for their oral presentations to the consultants.

Exhibit 5 summarizes the survey results for the 18 students enrolled in the class. A five-point Likert scale was used to assess their answers to eight questions (1 = strongly disagree and 5 = strongly agree). The exhibit presents the questions themselves, response frequencies for each question, and the mean responses. The results demonstrate that the students thought the case provided a realistic context for studying ABC implementation (mean = 4.28) and its behavioral aspects (mean = 4.50). The students also thought the case provided a behavioral orientation that differed from other ABC cases that they had previously studied (mean = 4.33). In addition, the students believed that the case provided a beneficial opportunity to practice their oral presentation skills (mean = 4.33). Overall, students believed the case was a beneficial learning experience (mean = 4.33), an effective group project (mean = 3.94), and a reasonably effective unstructured problem-solving exercise (mean = 3.78). Assuming the role of a consultant added modest incremental appeal to the assignment (mean = 3.61).

**EXHIBIT 5**
**Classroom Assessment Data**
**(n = 18)**

| | Response Frequencies | | | | | |
|---|---|---|---|---|---|---|
| | Strongly Disagree | | | | Strongly Agree | |
| **Survey Questions** | **1** | **2** | **3** | **4** | **5** | **Mean** |
| 1. The Global Electronics case provided a realistic context for studying ABC implementation. | 0 | 0 | 1 | 11 | 6 | 4.28 |
| 2. The Global Electronics case provided a realistic context for studying the behavioral factors that aid or hinder ABC adoption. | 0 | 0 | 1 | 7 | 10 | 4.50 |
| 3. The Global Electronics case provided a behavioral perspective of ABC systems that differs from other ABC cases that you have studied in management accounting classes. | 1 | 0 | 1 | 6 | 10 | 4.33 |
| 4. Assuming the role of a business consultant added to your level of interest in the Global Electronics case. | 1 | 2 | 4 | 7 | 4 | 3.61 |
| 5. The Global Electronics case provided a beneficial opportunity to practice your oral presentation skills. | 0 | 0 | 3 | 6 | 9 | 4.33 |
| 6. The Global Electronics case was an effective unstructured problem-solving exercise. | 0 | 1 | 6 | 6 | 5 | 3.78 |
| 7. The Global Electronics case was an effective group project. | 0 | 0 | 4 | 11 | 3 | 3.94 |
| 8. Overall, the Global Electronics case was a beneficial learning experience. | 0 | 0 | 2 | 8 | 8 | 4.33 |

## ANNOTATED BIBLIOGRAPHY

Cooper, R. 1989. You need a new cost system when.... *Harvard Business Review* (January–February): 45–51.

This article can be used to supplement discussion Question 1. It identifies warning signs of an obsolete cost system.

Cooper, R., and R. Kaplan. 1992. Activity-based systems: Measuring the cost of resource usage. *Accounting Horizons* (September): 1–13.

This article can be used to supplement discussion Question 2. It defines the resource usage model and explains it applications and misapplications.

Brewer, P., R. Campbell, and R. McClure. 2002. Supercharging your ABC: Use revenue data! *The Journal of Corporate Accounting and Finance* (March/April): 13–26.

This article can be used to supplement discussion Question 2. It identifies two limitations of ABC: namely that ABC rates do identify relevant costs and they do not capture opportunity costs associated with forgone revenue.

Shields, M., and S. Young. 1989. A behavioral model for implementing cost management systems. *Journal of Cost Management* (Winter): 17–27.

This article summarizes a behavioral model that students can use to structure their analysis of discussion Question 4. It provides an alternative to the factor-stage model that is used in the Suggested Solutions in the Teaching Notes.

Argyris, C., and R. Kaplan. 1994. Implementing new knowledge: The case of activity-based costing. *Accounting Horizons* (September): 83–105.

This article summarizes a behavioral model that students can use to structure their analysis of discussion Question 4. It provides an alternative to the factor-stage model that is used in the Suggested Solutions in the Teaching Notes.

Cooper, R., and R. Zmud. 1990. Information technology implementation research: A technological diffusion approach. *Management Science* 36: 123–139.

This article provides a detailed description of the factor-stage model. While Anderson (1995) provides an overview of the factor-stage model, the majority of the article's 51 pages focus on applying the model to the case of General Motors. The Cooper and Zmud article is much shorter and it focuses solely upon explaining the components of the factor-stage model.

Shields, M., and M. McEwen. 1996. Implementing activity-based costing systems successfully. *Journal of Cost Management* (Winter): 15–22.

This article can be used to supplement discussion Question 4. It summarizes the empirical results of a study that identifies ABC implementation success factors. It can be applied to the GEI case in the sense that students can analyze to what extent GEI's experiences are consistent with the findings of this research.

Krumweide, K. 1998. ABC: Why it's tried and how it succeeds. *Management Accounting* (April): 32–38.

This article can be used to supplement discussion Question 4. It summarizes the empirical results of a study that identifies ABC implementation success factors. It can be applied to the GEI case in the sense that students can analyze to what extent GEI's experiences are consistent with the findings of this research.

Reeve, J. 1996. Projects, models, and systems—Where is ABM headed? *Journal of Cost Management* (Summer): 5–16.

This article can be used to supplement discussion Question 5. It provides an overview of three different levels of ABC sophistication. It can help students distinguish between the level of sophistication that is needed for strategic product pricing and mix decision making vs. the level of sophistication that is needed for the ABM-oriented applications discussed in this case.

Cooper, R., and W. Chen. 1996. Control tomorrow's costs through today's designs. *Harvard Business Review* (January–February): 88–97.

This article can be used to supplement discussion Question 5. It explains the type of ABM-oriented applications that were most relevant to GEI's product engineers.

Stratton, A. 2000. Using ABC for intelligent process reengineering. *Emerging Practices in Cost Management* G1 1–7.

This article can be used to supplement discussion Question 5. It explains the ABM-oriented applications that were most relevant to GEI's process engineers and operations managers.

## TEACHING NOTES

Teaching Notes are available through the American Accounting Association's new electronic publications system at http://aaahq.org/ic/browse.htm. Full members can use their personalized usernames and passwords for entry into the system where the Teaching Notes can be reviewed and printed.

If you are a full member of AAA and have any trouble accessing this material please contact the AAA headquarters office at office@aaahq.org or (941) 921-7747.

## REFERENCES

Anderson, S. 1995. A framework for assessing cost management system changes: The case of activity-based costing implementation at General Motors, 1986–1993. *Journal of Management Accounting Research* 7: 1–51.

Argyris, C., and R. Kaplan. 1994. Implementing new knowledge: The case of activity-based costing. *Accounting Horizons* (September): 83–105.

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———, R. Kaplan, L. Maisel, E. Morrissey, and R. Oehm. 1992. *Implementing Activity-Based Cost Management: Moving from Analysis to Action*. Montvale, NJ: Institute of Management Accountants.

Innes, J., and F. Mitchell. 1996. A survey of activity-based costing in the U.K.'s largest companies. *Management Accounting Research* (June): 137–154.

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Roberts, M., and K. Silvester. 1996. Why ABC failed and how it may yet succeed. *Journal of Cost Management* (Winter): 23–35.

Shields, M. 1995. An empirical analysis of firms' implementation experiences with activity-based costing. *Journal of Management Accounting Research* 7: 148–166.