Building an Objective Data Foundation for Activity Based Costing

By Michael A. Crane, Ph. D.

Abstract

All too often, Activity Based Costing models are built on *subjective* assumptions about activity cost drivers. This article describes a cost-sampling approach for developing a data foundation for ABC based on *objective* measurement of resource use. The approach further provides a means for developing important insights into product cost allocation and into the economics of supporting different types of customers and transactions in service organizations.

The cost-sampling methodology and findings described are based on studies performed at a number of different companies. The fictitious insurance company Commercial Mutual is used as a vehicle for presenting the material.

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A large commercial insurance company uses a "Snapshot" cost-sampling approach to better understand its operating costs.

When Commercial Mutual Insurance Company implemented an Activity Based Costing system in its Underwriting Division in the mid-1990s, its objectives were those often sited for ABC efforts: improve the allocation of expenses to product lines, increase the accountability of profit center managers, and enhance the understanding of the business' cost drivers to improve management decision-making.

The process of introducing ABC at Commercial Mutual was similar to that followed in many organizations:

- Identify key work activities;
- Estimate the percent of resources dedicated to each activity;
- Identify cost drivers for each activity; and
- Apply the cost drivers in order to allocate each activity's cost to the different product lines and profit centers.

Commercial Mutual, however, faced difficulties similar to many other organizations, particularly service-oriented ones. Most of the costs to be allocated were people-related, and most of their employees supported multiple activities, multiple types of transactions, and multiple product lines. There was no data readily available to determine the appropriate allocation of resources to the activities, or to determine appropriate values for cost drivers. It was commonly believed that the resources required to handle a particular type of transaction (e.g. issuing a new insurance policy) differed greatly from one product line to another but there was no data available to quantify these differences. Further, it was impractical to obtain this information from direct measurement (such as a time study) since employees typically worked simultaneously on many different transactions, with bits and pieces of activities performed intermittently for any given individual transaction.

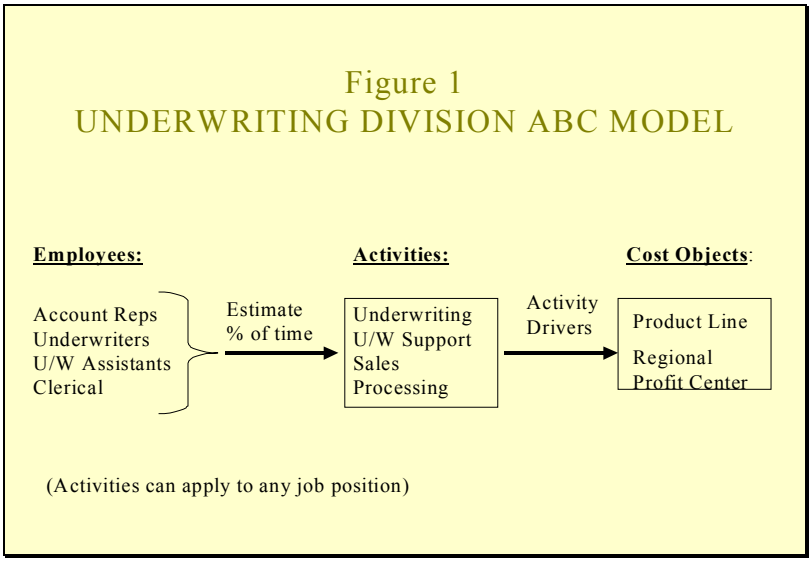
Commercial Mutual approached these issues as many other companies do: they relied heavily on subjective estimates obtained through interviews of its managers. Managers estimated the percent of time each type of employee spent on each activity, and they also estimated the relative amount of resources required to handle various types of transactions for various products. These estimates then translated to cost drivers to be applied each month to actual transaction counts, allocating costs to products and profit centers.

The subjective basis for many of the ABC cost parameters led eventually to serious questions of credibility for the system. Like many ABC implementations, the system essentially drove costs off of objective transaction data applied to a *subjective* foundation of assumed activity cost drivers. Profit center managers lacked confidence that the allocations reflected the true cost picture. Cost drivers were frequently changed in order to achieve an end result more in line with managers' intuitive beliefs about appropriate end-product allocations. In addition, many managers were disappointed that the system did not attempt to distinguish cost differences driven by the size of transaction, or shed more light on the economics of the business. These concerns led ultimately to a decision to conduct a study that would evaluate the accuracy of the cost driver assumptions that formed the foundation for ABC.

ABC in the Underwriting Division

This article focuses on that area of the company that had the largest expense and was also the most difficult to quantify, namely the Underwriting Division, which has responsibility for policy sales, underwriting, and policy servicing. Figure 1 shows the structure of the ABC model that was implemented in this area of the company.

Figure 1
UNDERWRITING DIVISION ABC MODEL



The objective of the ABC system was to allocate costs in the Underwriting Division to the various product lines and regional profit centers. In order to accomplish this, the Division identified four major activities:

> Underwriting – the activity of accepting or declining business, pricing, quoting, issuing, and approving changes to insurance policies.
>
> Underwriting support – Paraprofessional activities performed to assist in the underwriting activity.
>
> Sales – Agency visits, mailings, or any activity related to promoting the company and acquiring new business in general.
>
> Processing – Policy level data entry related to writing new and renewal business, contract status, policy administration and filing.

By interviewing Underwriting Division managers, the company developed estimates indicating the percent of time that each classification of employee spent on each of the four activities. This allowed costs to be assigned to the activities. Finally, for each activity, the company developed cost drivers to allocate the activity costs to the final cost objects of product and region. In other words, the company followed the typical two-step ABC implementation process.

The cost drivers used in this approach were various counts of company transactions, such as number of new policies issued, number of policy endorsements, etc. However, the relative cost parameters that were applied to these counts were based on manager judgment. Likewise, the allocation of employee time and cost to the four major activities was also based on judgment.

Table 1 shows the basic structure of the product transaction drivers for one of the activities – Underwriting. Each *row* of the table represents a different product

Table 1
ABC Drivers – Underwriting Activity
(Product A Renewal = 100)

	Accept/ Decline	New Quote	New Issue	Policy Renewal	Endorse
Product A	6	73	67	100	10
Product B	2	30	28	41	4
Product C	2	31	30	45	5
Product D	1	11	11	16	2
Product E	5	63	60	90	9

(type of insurance policy). Examples of products include Automobile, Workers' Compensation, Commercial Property, Umbrella Coverage, etc. Each *column* represents a different type of transaction. The major types of transactions include: determining whether to accept or decline the insurance risk, providing a premium quote for a new risk, issuing a new (first-time) policy, issuing a renewal policy, and issuing a policy endorsement (change in conditions).

The entries in Table 1 indicate the estimated (relative) amount of resources (labor cost) required to handle the particular transaction for the particular product. For example, the resources to handle a policy renewal were set arbitrarily at 100 for Product A, which was the largest product line. By looking at the Renewal column in the table, we see that the estimated resources required for Product D were assumed to be much less, or only 16% of the resources required for Product A. Likewise, the resources required for Product B were assumed to be just 41% of the resources needed for A.

Each *row* in the table provides a comparison of the resources required for different types of transactions for a single product. For example, looking at the Product A row, the weight given for handling an insurance endorsement (policy change) was set at 10, versus 100 for a policy renewal, indicating that the resources required for the endorsement were estimated to be only 10% of the resources needed to handle the renewal.

Table 1 can be thought of as the core engine driving the ABC model. The parameters in this table were multiplied by the various transaction counts for the different products to obtain a total resource metric for the final cost objects. For example, the number of Product A endorsements were multiplied by 10, the number of renewals by 100, and so on. Adding the resulting values for all products and all transaction types, these relative resource values were applied to actual transaction counts to develop the weighted counts used to allocate the employee costs to products and to profit centers.

While the parameter values in Table 1 embodied the critical assumptions driving the ABC model, they were developed based on consensus opinions of company managers as to the relative resource requirements of the different products and transactions. The company did not have a source of data that could be used to quantify these parameters

in a more objective fashion. Likewise, there was no data available to allocate employee time and cost to the four key activities, so these allocations were also based on consensus opinion.

Because it was necessary to build the ABC system on a foundation of subjective opinion, the system faced continuing questions and challenges as to its accuracy. Consequently, the company commissioned a study to assess the ABC system. The questions posed by the study included:

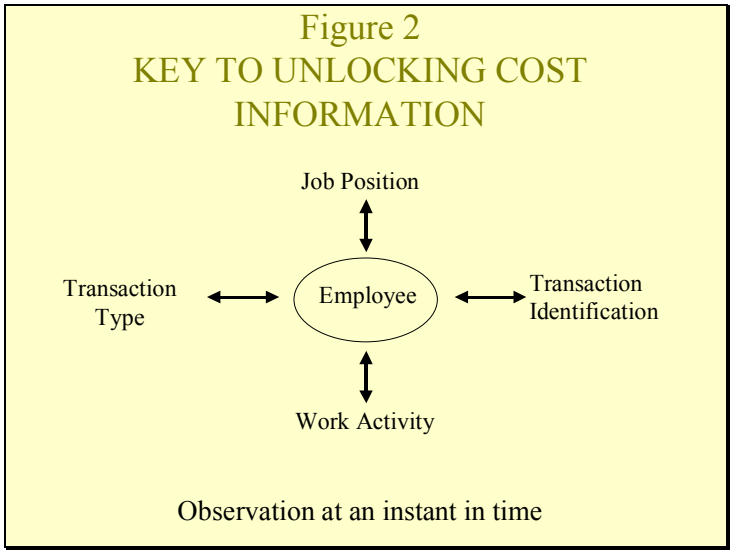
- Did the allocations to activity accurately reflect the true use of resources?
- Were the cost driver parameters (Table 1) realistic?
- Bottom line, how accurate were the allocations to the final cost objects?
- Could the model be refined to reflect the impact of different size customer accounts? This question was crucial for gaining a better understanding of the economics of the company's business segments.

The overall study approach was to seek *objective* data on resource utilization as a means of comparison to the *subjective* parameters driving the ABC model. This was accomplished by use of a "Snapshot" time sampling methodology described in the next section.

The Snapshot Approach

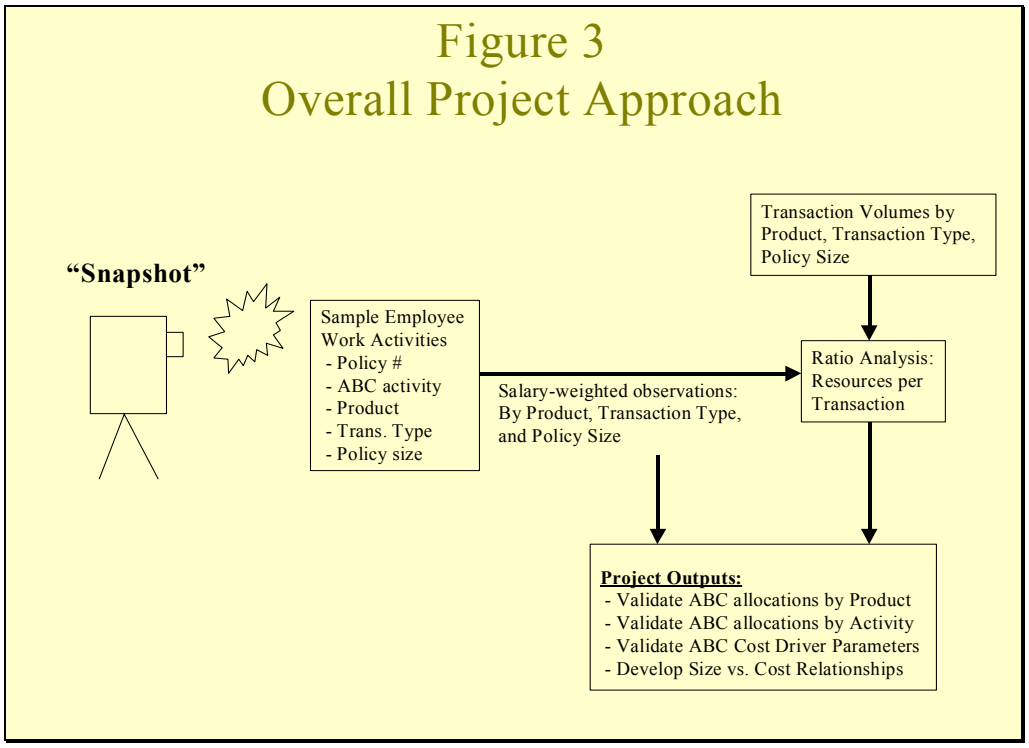
Developing information on cost utilization in service organizations can be a major challenge. Typically in these organizations, the major share of General and Administrative expense is people-related – salary and benefits and office space, equipment, and computer support. Understanding costs boils down to understanding how employees spend their time. However, it is typical that each employee may support multiple products, multiple types of customers, and multiple activities or transactions, all at the same time. For example, the underwriters at Commercial Mutual spend part of their time marketing, part of their time underwriting, and part of their time processing. They handle several products simultaneously, and at any given time might be handling a variety of new business, renewal, or policy endorsement transactions. Trying to measure the amount of time for specific activities, products, and transactions is problematic, as an employee during the course of a day will jump many times from one piece of work to another, often interrupting work on one item to answer a brief phone call on another, or perhaps a question from a co-worker or manager on a yet another. The total time spent on a particular transaction may be spread over a long period of time – weeks or even months, so capturing the total time on a specific transaction is exceedingly difficult.

The "Snapshot" time-sampling approach provides a feasible means to develop information on the allocation of employee resources. The basic idea is to collect a statistically valid sample of employee activities at selected points in time. In contrast to traditional time studies, this methodology enables an organization to develop accurate cost information with minimal disruption to the organization and minimal use of resources. Figure 2 provides an overview of the "Snapshot" concept. A wealth of information can be developed based on systematic sampling of employee work activities. For any single employee at a single point in time, we can determine the type of transaction being handled (e.g. a new policy quote versus a renewal, etc.), the specific work activity (e.g. underwriting versus sales), the job position for that employee and the resulting cost, and finally the identification of the specific transaction item (e.g. the policy number for the transaction). From the transaction identification, additional information can be obtained, such as market segment, product line, policy size, customer location, age of account, etc.



This information only becomes useful as it is repeated over observations of many employees and perhaps over several different points in time. The result is a database that provides a profile of the percentage of time and resources spent for various products, market segments, activities, and transaction types.

Figure 3 shows the specific application of this approach at Commercial Mutual. All employees from each of the major employee groups (underwriters, account reps, underwriting assistants, and clerical) were surveyed at an instant of time once daily over



a one-month period. The observations were spread around to various times during the day to get a representative sampling of the workday. Altogether, about 6,000 "point in time" observations were obtained. Each observation captured data on the work being

performed: policy number, ABC activity (sales, underwriting, etc.), product, transaction type, and policy size. A study coordinator in each office interrupted employee work at the designated times, captured the data for each observation, and recorded the information on a one-page data form. This typically required less than a minute for each observation, so that the process was minimally disruptive. After entering the observations into a database, each observation was weighted by the salary level of the associated job class for the employee.

The database of salary-weighted observations was used to develop total resource estimates for the different products, transaction types, activities, and policy sizes. At this point, the results could be compared to the ABC model with respect to the total allocation to product line and to activity. However, the analysis was much more meaningful when the data was related to information on total transaction volume, by product, type of transaction, and policy size. This then allowed us to develop resource per transaction information, to compare to the ABC cost driver parameters. It also allowed us to analyze cost per policy and cost per revenue dollar for various size customer accounts, providing valuable insight into the economics of the company's business.

Results of the Study

Accuracy of the ABC End-Product Allocations:

In implementing the ABC system, the company's first priority was to produce accurate expense allocations to product line. Thus, the first task for the "Snapshot" study was to assess the bottom-line accuracy of the ABC allocations. The following table shows a comparison of the ABC expense allocation to the indicated use of resources developed from the "Snapshot" study:

	Percent of Resources	
Product	ABC Allocation	Snapshot Result
A	31%	35%
B	15%	6%
C	8%	16%
D	13%	8%
E	33%	35%

While the ABC system appeared to do a fair job distinguishing the highest resource consuming products from the lower resource products, there were some significant misallocations, particularly for products B, C and D. The allocation for product B was about 2.5 times higher than the percentage indicated from the objective "Snapshot" data. Likewise, the Product D allocation was about two thirds higher than indicated from the data. On the other hand, product C was being subsidized by the other products, as the indicated percent of resources was twice as high as the value assigned by the ABC system. Of course, these differences translated to a significant impact on the expense ratios for these products, with a resulting distortion in their reported profitability.

Accuracy of ABC Model Assumptions:

The above comparison provided an evaluation of the "output" of the ABC system, namely the final expense allocations to product line. However, it was also very important to evaluate the parameter assumptions in the ABC model itself. These parameters would impact the accuracy of the system over time, due to changes in the mix of the different

transaction counts. The key ABC parameters to be tested were the allocation of resources to the four activities, and the driver values which were applied to transaction counts by type of transaction and by product line (Table 1).

The following compares the ABC assumptions regarding resource distribution by activity to that found in the "Snapshot" study:

	Percent of Resources	
Activity	ABC Allocation	Snapshot Result
Sales	21%	18%
Underwriting	54%	51%
Underwriting Support	5%	6%
Processing	20%	25%

The study indicated that the ABC allocation to the more clerical activities of processing and underwriting support were somewhat understated, while the allocations to the decision-making activities of sales and underwriting were slightly overstated.

As discussed earlier, the specific transaction driver parameters (Table 1) were perhaps the most critical ABC assumptions. Since these parameters were developed through manager interviews rather than measured objectively, it was a high priority of the study to evaluate their accuracy. The "Snapshot" data allowed us to determine the actual division of resources for the different products and transaction types. Relating this information to the actual transaction counts by product and transaction type produced a measure of resources per transaction, by product and type of transaction. From this, we developed a "Snapshot" version of Table 1, now based on real data rather than manager opinion. This new "data-based" matrix of drivers could be compared, item for item, against the manager-supplied parameters in Table 1.

The comparison showed that the indicated "Snapshot" values for the transaction parameters differed considerably from the ABC driver weights. As an illustration, Table 2 gives the result of this comparison for a single *row* of the matrix. The table compares

Table 2
Comparison of ABC Drivers to Snapshot Findings for a Single Product

ABC Drivers

	Accept/ Decline	New Quote	New Issue	Policy Renewal	Endorse
Product A	6	73	67	100	10

Snapshot Findings

Product A	14	35	41	100	8

the ABC weights for the Underwriting activity to the "Snapshot" study results for Product A. In both cases, the weight values are indexed to 100 for a policy renewal transaction. The table indicates that less resources are spent per transaction for quoting and issuing new policies than implied by the ABC assumptions. On the other hand, the resources required for deciding the acceptability of an insurance risk are more than double the amount assumed in ABC. These discrepancies are worrisome in that future ABC allocations to final cost objects could be further off the mark depending on changes in the mix of transactions. For example, if the transaction count were to shift more toward "Accept/Decline" for a certain product line, the ABC allocation to the product line would show an increasing shortfall.

As a further illustration comparing the study results to the ABC driver assumptions, Table 3 compares the ABC weights to the "Snapshot" results for a single *column* of Table 1, namely the policy renewals transaction. Again, significant discrepancies were observed, particularly for Product B and Product E.

Table 3
Comparison of ABC Drivers to Snapshot Findings for a Single Transaction Type

	ABC DRIVERS	SNAPSHOT
	Policy Renewal	Policy Renewal
Product A	100	100
Product B	41	25
Product C	45	45
Product D	16	19
Product E	90	60

Thus, while the ABC model did a "fair" job in its final allocations to the product lines, it appeared that the foundation of the driver assumptions had some very serious deficiencies, casting doubt on the long-term reliability of the allocations.

Understanding the Economics of Customer Retention and Account Size

Insurance company professionals have long sought information to help understand the relative costs for handling new business versus renewal business, and for handling different size accounts. The conventional wisdom is that renewal business can be handled more efficiently (since much more information is known about the details of the insurance risk), and that larger accounts also require fewer resources per dollar of revenue generated. However, it has been very difficult for most companies to quantify these beliefs because they have been unable to isolate the costs to do the necessary comparisons.

At Commercial Mutual, the ABC model was of no help in developing these cost relationships. Therefore, the company looked to the "Snapshot" study to provide insight on these issues.

The "Snapshot" time sampling methodology provided the means to analyze the economics of customer retention and account size. By linking each employee observation to new business versus renewal business and also to policy size, the distribution of resources to type and size of business could be determined. This was then related to policy counts and to revenue dollars by type and size of business, enabling us to develop a relative comparison of cost per policy and expense ratio to premium revenue.

The data below illustrates this approach for Commercial Mutual. The resources required to issue new business policies versus renewal policies was compared to an average new business policy of 1.0:

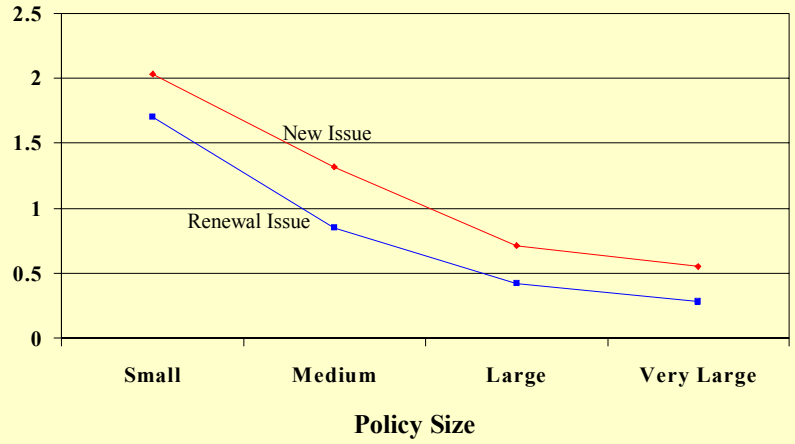
Relative Resources Per Policy Issued – Product A

Policy Size	New Issue	Renewal Issue
Small	0.4	0.3
Medium	1.1	0.7
Large	1.8	1.0
Very Large	2.8	1.8
All sizes	**1.0**	**0.6**

As expected, the cost per renewal policy was consistently less than the cost per new business policy. Likewise, the cost per policy showed an increasing relationship with the size of the policy, although it turned out that this increase was, relatively speaking, less than the increase in revenue generated by the larger policies.

It is important to observe that, while policy size appeared to have a significant impact on resources per policy, neither size nor complexity had been built into the ABC model at Commercial Mutual.

Figure 4
RESOURCES PER PREMIUM DOLLAR
Product A – Average New Issue = 1.0



We were able to develop this analysis further, computing a relative "expense ratio" of resources per premium revenue dollar for new business versus renewals, and for each policy size range. This was done by taking the ratio of the resources for each policy size to the corresponding revenue dollars in the same size category. The results are shown in Figure 4 above. Because the cost per policy increased at a slower rate than the revenue per policy, the result was a declining expense ratio. In other words, Figure 4 indicates that as the policy size increased, the ratio of expense to revenue declined, indicating an "economy of scale" associated with policy size. The figure also shows that the expense ratio for new business was consistently higher than for renewal business.

However, this was not the complete picture, as it included only the cost to issue a policy and not the screening and quoting of policies in each size range. It turned out that for larger policies, only a small percentage of the new business policies that were quoted were ultimately issued, with the others lost to competing quotes from other companies. Consequently the resources devoted to screening and quoting larger policies were high relative to smaller policies. Again, the "Snapshot" analysis allowed us to quantify this relationship. Using the "Snapshot" data, we could calculate the *total* resources (including screening and quoting) as a ratio to the resources required only to issue a policy for the same size group:

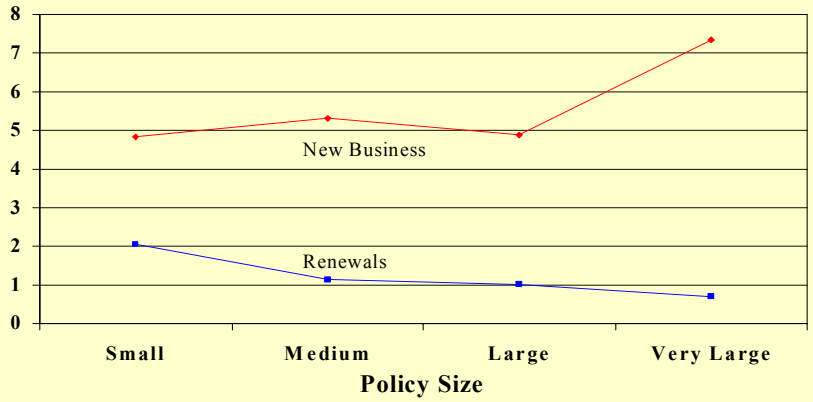
Policy Size	Ratio Total Cost to Issue Cost Only
Small	2.1
Medium	3.6
Large	6.2
Very Large	13.4

Thus, for the larger policies, the policy issue cost was a very small part of the total cost: over 13 dollars were being spent screening, quoting, and issuing such policies for every dollar spent in the issuing task alone. The largest portion of this cost resulted from the screening and quoting cost for the many policies in that size range that were lost to the competition, and therefore never issued. Of course, those quotes did not generate any revenue.

The same relationship was found to be true for renewal business, although the differences by size range were not as dramatic, since the majority of renewal quotes were being successfully converted to actual policies.

Therefore, when we looked at the total cost per revenue dollar, including screening and quoting for the lost quotes, a different economic picture emerged, as shown in Figure 5. For new business, the relative cost per revenue dollar was now flat, rather than declining, as the policy size increased from small to large, and the expense ratio showed significantly *higher* values for the very large policies. However, renewal business still had a declining expense ratio with policy size, since fewer renewal quotes were being lost to the competition. The lesson: for new business, the efficiencies of policy size (relative to revenue) were cancelled out by the extra quoting and screening effort required to attract larger accounts. In fact, it was very expensive to acquire the largest accounts, but once acquired, those accounts exhibited efficiencies in subsequent renewal cycles.

Figure 5
RESOURCES PER PREMIUM DOLLAR
Product A – Quote & Issue Combined
Average Renewal = 1.0
(Including Lost Quotes)



As this analysis illustrates, the very simple act of observing employee work at a sampling of times provided some profound insights into the economics of the company's business. The key analytical process was the linking of those observations to the various characteristics of the business being handled.

Conclusion

The "Snapshot" time sampling study at Commercial Mutual provided the first objective review of the company's ABC model and helped focus management's attention on improving the allocation process. It also gave the company a better understanding of the economics of its business and the relative costs associated with different types of transactions. The types of questions answered by this study are just a few examples of the difficult cost questions faced by many service organizations.

As we have seen, subjective judgment often falls short in attempting to quantify cost issues for a company. There is a need for objective approaches for answering questions such as:

- Which customer segments require the greatest amount of resources?
- How profitable are the smaller product lines?
- Do "new" customers cost more than established customers?
- What percent of resources are spent on various processing steps and activities?
- Does it cost more to handle customers from particular geographic regions?
- How does productivity differ for transactions supporting different product lines, and how should staffing models accommodate these differences?

Likewise, we have seen the pitfalls of building an ABC model on a foundation of subjective judgment. The "Snapshot" approach provides a quantitative means for answering questions such as those posed above, as well as developing an objective data foundation for ABC. The approach offers an inexpensive, easy to administer, non-intrusive tool for analyzing how people spend their time at work and understanding an organization's cost structure.

About the author: *Dr. Michael A. Crane is president of Michael A. Crane, Inc., a management consulting firm in Berkeley, California, which focuses on private and public sector service organizations. He designed and directed the "Snapshot" studies described in this article. He may be reached at (510) 527-9575 or by email at cranemike@comcast.net.*

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