

Cost Modeling

The increasing pressure on appraisal firms to expand quality and services has brought about a new emphasis on cost as well as revenues. By developing a cost modeling system, an appraisal firm can better manage its expense structure, determine profitability, make strategic decisions, and establish an equitable pay scale. This article addresses the concept and practical uses of cost models.

A cost model is a system designed to monitor the hourly costs of preparing appraisals and provide important feedback on the cost structure of a firm's services. The model requires that an appraiser list the number of hours spent per assignment, which ultimately enables the firm to track the cost per assignment. This allows the firm to apportion that cost among fixed costs, variable costs, owner contributions, and employee wages.

Cost modeling is not a new concept. Major accounting firms that expanded into real estate appraisal services have been using it for more than two decades. Many national appraisal companies actively use cost modeling. The same benefits derived by these large firms can be easily applied to smaller appraisal companies.

A COST MODELING SYSTEM

There are four steps involved in developing a cost modeling system.

1. Develop a time sheet that all employees complete daily and submit weekly.
2. Input the employee costs into a software program that provides various types of reports to be used in decision making.
3. Analyze the reports and make decisions based on the data.
4. Establish a feedback system to implement changes when necessary.

Advantages of cost modeling

There are many advantages of cost modeling:

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- Management can take a critical look at the entire cost structure of the firm. Breaking a firm into its component parts such as fixed costs, variable costs, ownership return, and the employee reward system gives added insight into the firm's short- and long-term profit potential.
- A fee quote can more closely reflect the actual time it will take for an appraiser to perform an assignment. This provides for more exact scheduling of assignments.
- A fee quote can reflect the actual cost of doing business. If you know the cost per hour of an assignment and how many hours it typically takes, you can provide a more realistic fee quote to the client.
- Fixed costs can be closely scrutinized, leading to relevant questions: Are fixed costs excessive? Which costs are excessive and which ones are profitable? Is the staff too large? Are the company's library resources being used? If so, are they cost effective?
- Variable cost overruns can be isolated easily.
- The return to the owners can be factored into each appraisal as a cost of doing business. This offers owners greater assurance that they will receive the required return on their investment, more so than if they just look at the net profit at the end of the year.
- The employee reward system can be directly tied to each employee's performance. The productivity of one appraiser can be measured against those of other appraisers on an hourly job-cost basis. A bonus system can be established using the information derived from the cost modeling system. The contribution of staff can be isolated, both in aggregate and for each appraiser, and decisions about staff utilization can be made more easily. Areas of weakness of the appraisers and staff can be better isolated, thus leading to solutions. Areas of specialization may also evolve from a comparison of each appraiser's cost per hour for jobs involving different property types.

Disadvantages of cost modeling

There are several disadvantages of a cost modeling system:

- The system requires that all employees complete additional paperwork, including time sheets.
- An employee may feel that his or her performance is too carefully scrutinized. This "big brother" atmosphere can lead to added stress for the employee.
- If used improperly, cost modeling could become a tool for monitoring employees instead of for planning. This will invariably result in too great an emphasis being placed on hourly performance.

A PRACTICAL EXAMPLE

The following example is presented to highlight the setup and implementation of a cost modeling system.

XYZ Company is a small, seven-person appraisal firm. There are three appraisers, one market research analyst, one secretary, and two owners. The firm has implemented a cost modeling system for the three appraisers.

Table 1 shows the time sheets for a typical two-week period. Table 2 depicts the cost per job for all three appraisers. At first glance, it might appear that Appraiser 3 is the most productive worker, whose fast pace translates into a much higher hourly rate than Appraiser 1 or Appraiser 2 has. While Appraiser 3's hourly rate is very high for industrial and subdivision appraisals, it is much lower for office building appraisals. If this is a long-term trend, it would indicate that the company's industrial and subdivision reports should be handled by Appraiser 3. It would also be in the best interests of the owners to try to get enough industrial and subdivision assignments to keep Appraiser 3 busy and productive. The marketing of the firm should be directed toward these specialties.

Table 3 presents the variances between estimated and actual hours worked for each job. Appraiser 3 has done well and has worked significantly faster than the estimated or allotted hours for assignments. Appraiser 2 has not done well in terms of allotted time, and Appraiser 1 has demonstrated a mediocre performance.

TABLE 1 Appraiser Time Sheets

Employee: Appraiser 1		Hours Worked Week of January 4, 1993							
Appraisal	File #	Mon.	Tues.	Wed.	Thu.	Fri.	Sat.	Sun.	Total
123 Main Street	1000	8	5	2	0	5	3	0	23
1000 Smith Street	1002	0	3	0	8	6	0	0	17
									Total hours worked: 40
Employee: Appraiser 1		Hours Worked Week of January 11, 1993							
Appraisal	File #	Mon.	Tues.	Wed.	Thu.	Fri.	Sat.	Sun.	Total
123 Main Street	1000	8	6	2	0	4	3	0	23
1000 Smith Street	1002	0	3	3	5	6	0	0	17
									Total hours worked: 40
Employee: Appraiser 2		Hours Worked Week of January 4, 1993							
Appraisal	File #	Mon.	Tues.	Wed.	Thu.	Fri.	Sat.	Sun.	Total
88 Front Street	1005	0	8	4	1	4	0	0	17
10 Jackson Lane	1010	8	0	5	5	4	0	0	22
									Total hours worked: 39
Employee: Appraiser 2		Hours Worked Week of January 11, 1993							
Appraisal	File #	Mon.	Tues.	Wed.	Thu.	Fri.	Sat.	Sun.	Total
88 Front Street	1005	0	2	5	8	1	0	0	16
10 Jackson Lane	1010	8	5	4	0	4	2	0	23
									Total hours worked: 39
Employee: Appraiser 3		Hours Worked Week of January 4, 1993							
Appraisal	File #	Mon.	Tues.	Wed.	Thu.	Fri.	Sat.	Sun.	Total
44 Industrial Avenue	1012	0	8	0	5	4	0	0	17
44 New Clifford Street	1015	8	0	0	5	4	0	0	17
									Total hours worked: 34
Employee: Appraiser 3		Hours Worked Week of January 11, 1993							
Appraisal	File #	Mon.	Tues.	Wed.	Thu.	Fri.	Sat.	Sun.	Total
1004 Main Street	1011	9	8	6	8	8	0	0	39

Incentive or bonus pay should be tied to a combination of the hourly billing from Table 2 and the variance from estimated hourly completion time from Table 3. It appears that Appraiser 3 should receive the highest bonus and Appraiser 1 the lowest. As indicated by Table 4, Appraiser 1's average hourly rates have been declining for the past two years. Appraiser 2, however, has shown a steady increase in billable per-hour rates over the

past two years. Even though Appraiser 2 is below the hourly billing rate necessary for the firm to break even, the hourly-rate improvement suggests that it may not be fair to give a proportionately low bonus. This is where the feedback system plays a part. The manager or owner should have a meeting with each appraiser to discuss his or her performance, long-term trends, specialties, and other areas of the work environment. Once realistic goals are set,

TABLE 2 Cost Per Job

Employee: Appraiser 1		Total Hours	Total Hours	Total Hours	Total Fee	Hourly Rate	Property Type
Appraisal	File #	Week of 1-4-93	Week of 1-11-93	Total Hours	Total Fee	Hourly Rate	Property Type
123 Main Street	1000	23	23	46	\$4,500	\$ 97.83	Office
1000 Smith Street	1002	17	17	34	\$2,700	\$ 79.41	Subdivision
Employee: Appraiser 2		Total Hours	Total Hours	Total Hours	Total Fee	Hourly Rate	Property Type
Appraisal	File #	Week of 1-4-93	Week of 1-11-93	Total Hours	Total Fee	Hourly Rate	Property Type
88 Front Street	1005	17	16	33	\$2,700	\$ 81.82	Industrial
10 Jackson Lane	1010	22	23	45	\$3,900	\$ 86.67	Office
Employee: Appraiser 3		Total Hours	Total Hours	Total Hours	Total Fee	Hourly Rate	Property Type
Appraisal	File #	Week of 1-4-93	Week of 1-11-93	Total Hours	Total Fee	Hourly Rate	Property Type
44 Industrial Avenue	1012	17	0	17	\$2,000	\$ 117.65	Industrial
44 New Clifford Street	1015	17	0	17	\$2,200	\$129.41	Subdivision
1004 Main Street	1011	0	39	39	\$3,900	\$100.00	Office

TABLE 3 Quotation Variance

Appraiser	Job #	Estimated Hours	Actual Hours	Percentage Variance	Variance in Hours
Appraiser 1	1000	50	46	- 8.00%	-4.00
	1002	32.5	34	4.62%	1.50
			Average Variance		- 1.69%
Appraiser 2	1005	30	33	10.00%	3.00
	1010	44	45	2.27%	1.00
			Average Variance		6.14%
Appraiser 3	1012	20	17	- 15.00%	-3.00
	1015	22	17	-22.73%	-5.00
	1011	45	39	- 13.33%	-6.00
			Average Variance		- 17.02%

each appraiser will know what his or her accountabilities are, and a multiple-tier bonus system thus can be arranged. If an appraiser meets or exceeds his or her budgeted profitability (i.e., total yearly fees and hourly billing rate), one level of bonus is earned. A second or third bonus tier can be established for greater productivity. If an appraiser is the most profitable overall, another, more generous incentive bonus could be allocated.

A firm's salary scale can also be modified using cost modeling. For example, consider Appraiser 3, whose performance is extremely good. Because cost modeling enables a firm to measure and tie compensation directly to performance, Appraiser 3's pay should reflect this profitable performance. But as indicated in Table 5, all three appraisers are being paid equally. This is unfair because Appraiser 3 is far more profitable per hour than the other appraisers. The multiple-tier pay scale mentioned earlier would correct this problem and also help retain this valuable employee.

Table 5 also presents the expenses of the firm. These include entrepreneurial overhead, fixed costs, and variable costs. All expenses are broken down into a cost-per-desk figure, which is based on the number of appraisers actually doing the work. In this example, the total cost is \$87.25 per appraiser-hour, which mandates an average appraisal fee of \$4,188 if

the firm is to break even (based on the volume of prior years). This translates into a yearly appraisal billing of \$174,500 per appraiser.

Table 4 indicates that Appraiser 2 is currently working below the break-even level of revenue per hour, and Appraiser 1 is only slightly above the level. If Appraiser 3 were to leave and be replaced by an appraiser who could not work at a per-hour rate exceeding the break-even hourly rate, the company would not break even. The result is a direct reduction of the owners' salaries by the amount of the shortfall. Clearly, the owners should recognize this from the cost modeling system and do all that they can to retain their best employee, Appraiser 3, or expand with the intent of getting more profitable employees to cover any loss of personnel.

Lessons learned

XYZ Company learned some important things by cost modeling. First, Appraiser 3 is not only a valued employee but also the primary vehicle for productivity. Although the hourly rates of two of the three appraisers currently meet the break-even level, thus guaranteeing the owners' salaries, Appraiser 3 provides most of the profit above the break-even level. Compensation should reflect this profitability.

Second, the firm's overall profitability is heavily dependent upon this one appraiser's productivity. Expanding the

TABLE 4 Yearly Billable Productivity Totals

Appraiser	Year to Date Variance	Year to Date Average Rate	1991 Average Variance	1991 Average Rate	1990 Average Variance	1990 Average Rate
Appraiser 1	- 1.69%	\$ 88.62	-0.22%	\$ 93.66	2.25%	\$104.49
Appraiser 2	6.14%	\$ 84.25	4.45%	\$ 80.81	4.10%	\$ 74.42
Appraiser 3	17.02%	\$115.69	-6.68%	\$106.63	-5.51%	\$120.11

TABLE 5 Cost-Per-Desk Calculation

Item	Cost
Mr. Owner's return	\$ 100,000
Ms. Owner's return	\$ 100,000
Entrepreneurial overhead	\$200,000
Fixed costs	
Appraisal library	\$ 15,000
Office rent	\$ 30,000
Total fixed costs	\$ 45,000
Variable costs	
Telephones	\$ 7,000
Utilities	\$ 10,000
Supplies	\$ 2,000
Auto reimbursement	\$ 4,000
Miscellaneous	\$ 500
Total variable costs	\$ 23,500
Labor costs	
Secretary	\$ 30,000
Part-time market researcher	\$ 15,000
Appraiser 1	\$ 60,000
Appraiser 2	\$ 60,000
Appraiser 3	\$ 60,000
Benefits	\$ 30,000
Total labor costs	\$255,000
Total costs	\$523,500
Number of appraisers	3
Cost per desk (breakeven)	\$ 174,500
Number of workable hours in a year	2,000
Breakeven cost per hour	\$ 87.25
Total costs	\$523,500
Number of appraisals in 1991	125
Breakeven cost per appraisal	\$ 4,188

number of appraisers would provide some cushion in the event that Appraiser 3 were to leave, although this would require a special marketing effort from the owners and a reevaluation of projected expenses. Another solution would be to reduce some expenses or increase the average fee, if that is possible to do without losing market position or work volume.

Third, it appears that Appraiser 3 has a special talent for industrial and subdivision appraisals. It would be in the company's best interest to see that this appraiser receives as much of these assignments as he or she can handle. This will significantly increase profitability.

CONCLUSION

Cost modeling is an excellent vehicle for examining employee productivity and profitability in the context of total company revenues, expenses, and profits. Relationships and trends are highlighted by examining the numbers. Many major firms use this type of system to carefully monitor their costs while observing the hourly productivity of their key appraisers. A cost modeling system can be used to tie employee pay scales to performance, to highlight dependence on key appraisers, and to show the amount of risk inherent in the owner's required return.