Using Cost of Quality in a University Environment: A Case Study

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RR-97-01 (NT)
March 1997

USING COST OF QUALITY IN A UNIVERSITY ENVIRONMENT:
A CASE STUDY

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ABSTRACT:

Quality Cost was the measurement tool used by two improvement teams in determining the potential savings, then tracking of the savings once the recommendations had been implemented. the results showed that cost of quality is a very effective measurement tool for improvement.

KEYWORDS:

cost of quality, improvement, measurement tool

BACKGROUND:

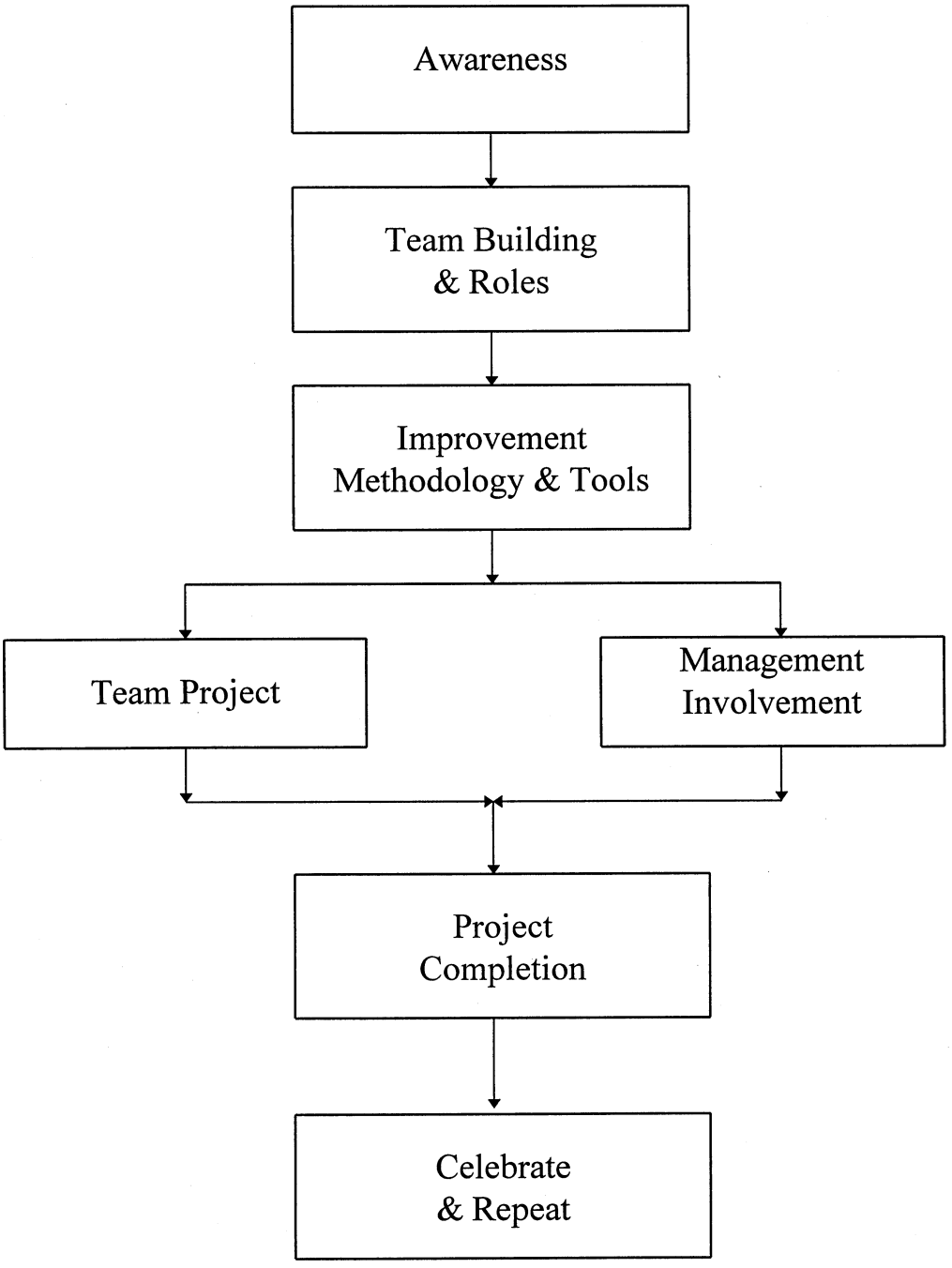
In 1992 the University of Western Ontario formed a Quality Center to drive quality and productivity improvement within the university. Their early efforts with process improvement teams were not as successful as management had hoped. One of the major areas that had not been addressed was an effective means of measuring the opportunity for the teams and of measuring the savings to be realized by the improvements recommended.

Cost of Quality (COQ) had been used very effectively by manufacturing organizations for many years to identify opportunities and track improvements (for example, see Grimm, 1987). With the service sector's increased interest in quality improvement, COQ has also been used as a measurement tool for their projects. It was felt that COQ had excellent potential in a university environment as well.

The Manager of Financial Systems, in the Department of Finance was convinced of the value of COQ as an effective quality improvement measurement tool. He volunteered his department and identified two pilot projects - Major Equipment Replacement and Telephone System Review. Dennis Beecroft would be the project facilitator and trainer.

The major concern was to ensure that the application of COQ would be viewed as a "management tool" rather than a "financial tool". As a management tool, COQ would enable the process improvement teams to manage their improvement efforts: COQ used by

FIGURE 1: PROCESS IMPROVEMENT TEAM METHODOLOGY



management, as a financial tool, would be seen as just another method to "beat upon" the employees.

For the pilot project to be successful, it was necessary that the approach and methodology be seen as equally important as the COQ measurement tool *(See Figure 1)*. Extensive training was given to the team members. This training consisted of a disciplined approach to process improvement. An integrated process improvement and potential problem solving model was used supported by the appropriate tools such as brain storming, process mapping, Cost of Quality and the 7 basic quality tools - Pareto diagram, check list, cause and effect diagram, scatter diagram, histogram, control chart and run chart.

Another key factor in the success of the pilot projects was management's role in the support and guidance of the improvement teams. One of the most significant challenges faced by the management team was to free up time for the improvement team members to work on their projects. The team members spent 25% of their time on the project. This meant that part of their daily work had to be off loaded or delayed. Some areas were more successful than others in reassigning work. It was essential that the teams see quality improvement as part of their job and not something else to be added to their duties. The key role of the management team was to monitor the progress of the team by focusing on the activities or steps of the team's process and not the results of the team efforts. By ensuring the team followed all the appropriate steps the results would follow.

1. MAJOR EQUIPMENT REPLACEMENT PROJECT

The purpose of this first project was to develop a process within the Finance Department for equipment replacement. Equipment included personal computers, copiers, facsimile, microfiche, and microfilm. The project would need to address individual needs assessment, training and communication. The team consisted of six members from the Financial Department.

The team initially documented and flowcharted the current equipment replacement process. They found that the decision to replace equipment was being made by one individual, using a very informal process based on his/her best assessment of the need. The team then conducted customer focus group meetings to gather information on perceptions of the current process. What was found was that there was a lack of communication with staff members on the current equipment replacement process and the existing procedure did not provide feedback to the individual if their request for equipment was not approved. The perception was that the current method was not objective. In many cases, input from the individuals requesting the equipment was not used.

The team then surveyed a sample of members of the Department of Finance to determine the level of equipment and training satisfaction. Using the information collected, the team was able to estimate the Cost of Quality for the existing process. The results of this data are shown

in Figure 2. They based an estimate of loss in productivity on the level of dissatisfaction expressed by those surveyed. They determined the number of individuals using that type of equipment. As a result it was possible to calculate the annual COQ by multiplying the number of individuals, times hours per year, times an average hourly salary rate of $28. The annual COQ for equipment was approximately $210,000. They also calculated the COQ for computer training to be approximately $145,000, bringing the total annual COQ to almost $355,000.

The team then developed an equipment replacement process using a team approach. This included annual budget preparation, repairs, reserve appropriations, and computer training to be centralized within the Department of Finance. The team then presented management with a list of seven recommendations complete with implementation costs *(See Figure 3)*.

RESULT

The recommendations had a one time cost of $2,200 and an annual cost of $12,500. The savings represented a payback period of less than one month!

UPDATE (NOVEMBER 1996)

The Equipment Replacement team is still operational and has been extremely successful and the benefits many, both tangible and intangible. For example, in the fall of 1995 during university exercises to cope with large provincial funding cut backs all appropriated reserves for administrative equipment replacement were either closed by central administration or substantially reduced **with the exception** of Financial Services. Because of the work done by this team there was ample evidence of a formulated approach applied consistently with a clear vision of the future requirements to support the $240,000 in reserves.

2. TELEPHONE SYSTEM REVIEW PROJECT

The purpose of this second project was to review the existing telephone system and make recommendations for improvement to maximize customer satisfaction in a cost effective manner. Six members of the Department of Finance volunteered to participate on this project.

The team developed a Telephone System Review checklist to understand better the magnitude and types of calls being made to the Department of Finance. Next the team conducted a customer focus group to determine the problems that were being experienced by individuals contacting the Department of Finance.

FIGURE 2: COSTS OF QUALITY
DEPARTMENT OF FINANCE, EQUIPMENT AND TRAINING)

Description	(a) Total Replies	(a) Weighted Average of Satisfaction Level (10=max)	(b) Weighted Average Level of Dissatisfaction	(b) Estimated Productivity Loss	(c) Finance Total Staff	(d) Estimated % of Staff Involved	(e) Weekly Average Hours Used	Weeks Per Year	(f) Average Hourly Salary	Estimated Annual Cost of Quality
Personal Computer	17	7.3	2.7	27% x	45 x	89% x	10 x	46 x	$28 =	140,324
Copiers	19	7.1	2.9	29% x	45 x	100% x	2 x	46 x	$28 =	34,166
Fax	17	6.4	4.6	46% x	45 x	89% x	1 x	46 x	$28 =	23,661
Micro Fiche	10	5.8	4.2	42% x	45 x	53% x	0.3 x	46 x	$28 =	3,644
Micro Film	10	4.0	6.0	60% x	45 x	53% x	0.4 x	46 x	$28 =	7,321
									Estimated Cost of Quality for equipment	$209,316
Computer Training (g)	19	7.5	2.5	25% x	45 x	100% x	10 x	46 x	$28 =	$144,900
									Estimated Cost of Quality for equipment and training	$354,216

Notes:

(a) These schedules are based on the survey of 19 members in the Department.

(b) A satisfaction level of 10 (100%) indicated full productivity. A satisfaction level of 7 indicated a 70% level of productivity and accordingly a 30% loss in productivity.

(c) Approximate number of non-managerial staff in the Department of Finance.

(d) Estimated % of staff involved is the number of responses divided by the sample size (19). (e.g., 17/19 = 89%)

(e) Average weekly hours that equipment is used was determined by the survey.

(f) Average hourly salary for non-managerial staff is estimated at $28 per hour.

(g) When we asked people in the survey if they were adequately trained to use their computer, only 2 people felt that they were adequately trained to perform computer related functions. On a weighted average basis, staff in the survey felt that they were 75% trained to use their computers. Accordingly, lack of training is estimated to reduce productivity of personal computer usage by 25%.

FIGURE 3: ESTIMATED IMPLEMENTATION COSTS
Cost Considerations
Department of Finance, Equipment and Training

Start up costs:

Initial assessment of inventory and training	50 hours @$28 =	$1,400
Data base design	14 hours @ $33 =	462
Data base approval	4 people @ 2 hours @$44 =	352
	Approx.	$2,200

Annual Costs:

Annual time for team meetings	12 meetings @ 3 hours for 3 people @ $33 =	$3,564
Ongoing support time for team meetings	12 meetings @ 3 hours for 3 people @ $33 =	3,564
Maintenance of inventory	1 hour per month @ $33 =	396
Communications time	7 hours per month for 1 person @ $33 =	2,772
Estimated annual costs	Approx.	$10,300

Total estimated costs for implementation $12,500

(a) Average hourly salaries:

Non-managerial	*$28/hr*
PMA	*$33/hr*
Managerial	*$44/hr*

The most frequent problems identified were:

1. Transferring calls to the wrong area
2. Incomplete messages received
3. Picking same phone
   Picking same phone with disconnect
4. Not telling someone when leaving their office
5. Person needs immediate help - expert not there
6. Inexperienced or temporary help answering calls
7. General calls go to Director of Finance
8. Not using available options
9. Secretary clearing phonemail box

The team then summarized the Cost of Quality for the current process. *(See Figure 4.)* They first determined the time it would take to correct the problem for each of the first seven problem types. For example the time wasted when a call had been transferred to the wrong area was 6.5 minutes. For the last two problems - paying for options not used and clearing phone mail -they calculated the cost of each. Clearing phone mail varied from department to department depending on who was involved and the number of messages. Based on the information collected through the checklist they then calculated the COQ for each type of problem. Again these varied in cost from area to area depending on frequency of errors. The total COQ for the Telephone Systems Review project was approximately $65,500 per year.

The team then developed an employee telephone survey to solicit input from the users on suggestions for improvement. Using input from their customers the team developed recommendations in 11 areas. The Cost of Quality were recalculated based on these recommendations. *(See Figure 5.)*

RESULT

The COQ after implementation of the recommendations would be about $18,900 per year. Part of the new COQ included approximately $1,600 for training. This project resulted in an annual savings of about $46,600!

UPDATE (NOVEMBER 1996)

The recommendations of this project team were implemented and the initial benefits realized. However, with many staff reductions and merging of work groups since the end of the project there was no continuous process put in place. In hindsight, it is now obvious that as part of the implementation of any project that some continuous process should be put in place in order to achieve maximum long term benefits.

FIGURE 4: COST OF QUALITY - BEFORE TELEPHONE SYSTEM REVIEW DEPARTMENT OF FINANCE

	FABA†	GEN. ACCT.	AUDIT	FEES	RESEARCH	GENERAL	TOTAL
1. Transfer call to wrong area 6.5 min		7/day 4447.63	1/week 190.61	10/day 6353.75			10991.99
2. Message not complete 6.5 min						1/day 635.38	635.38
3. Picking same phone 6.5 min		3/day 1906.13	5/day 4765.31	6/day 3812.25			10483.69
Picking same time with disconnect 8 min		4/day 3128.00		2/day 1564.00			4692.00
4. Not telling someone when leave office 6.5 min	8/day 7624.50						7624.50
10 min		3/day 2932.50		2/day 1955.00	3/day 2932.50		7820.00
13 min					1/day 1270.75		1270.75
5. Person needs immediate help-expert not there (e.g., student awards systems problem) 15 min	1/day 2199.38	1/day 1466.25	6/week 2639.25	2/day 2932.50			9237.38
6. Inexperienced or temp help 5 min						160 days 1st month 1/person (8) 306.67	306.67
7. General calls going to Director 10 min						4/week 1564.00	1564.00
8. Having options not used Paying for options not activated						660.24	660.24
9. Clearing the phonemail box	6524.81	1466.25	2199.38				10,190.44
						TOTAL	**65,477.02**

5 days, 51 weeks
0.383333 Staff (423/hr)
0.575 PMA ($34.5/hr)
0.766666 Sen. PMA ($46/hr)

† FABA = Financial Analysis and Budget Administration

FIGURE 5: COST OF QUALITY - AFTER TELEPHONE SYSTEM REVIEW DEPARTMENT OF FINANCE

	FABA†	GEN. ACCT.	AUDIT	FEES	RESEARCH	GENERAL	TOTAL
1. Transfer call to wrong area 0 min		7/day 0.00	1/week 0.00	10/day 0.00			0.00
2. Message not complete 0.5 min						1/day 48.88	48.88
3. Picking same phone 0 min		3/day 0.00	5/day 0.00	6/day 0.00			0.00
Picking same time with disconnect 0 min		4/day 0.00		2/day 0.00			0.00
4. Not telling someone when leave office 2.5 min	8/day 2932.50						2932.50
2.5 min		3/day 733.13		2/day 488.75	3/day 733.13		1955.00
2.5 min					1/day 244.38		244.38
5. Person needs immediate help-expert not there (e.g., student awards systems problem) 2.5 min	1/day 366.56	1/day 244.38	6/week 439.88	2/day 488.75			1539.56
6. Inexperienced or temp help 0 min	160 days 1st month 1 call /person (8 new people)) 0.00						0.00
7. General calls going to Director 0 min						4/week 0.00	0.00
8. Having options not used Paying for options not activated						0.00	0.00
9. Clearing the phonemail box	4985.25	1466.25	2639.25				10557.00
10. Training 1 hour						25 @$23 21 @$34.50 6 @$46	1575.50
						TOTAL	**18852.81**

† FABA = Financial Analysis and Budget Administration

CONCLUSION

These two pilot projects clearly demonstrated that Cost of Quality is an excellent management tool. Unfortunately, the Cost of Quality tool was not incorporated into subsequent improvement projects at the University of Western Ontario in any consistent or complete manner. It is conclusive however that COQ can be used very effectively to identify opportunities and track improvements not only in manufacturing and service sectors, but also in the university community.

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