

IMPACT OF TOTAL QUALITY MANAGEMENT (TQM) ON PROFITABILITY AND EFFICIENCY OF BALDRIDGE AWARD WINNERS

Deepak Subedi*
Suneel Maheshwari**

*I*N recent years, US manufacturers have shifted their focus from evaluating short-term measures to measures based on quality. Total Quality Management (TQM) movement was led by the Japanese electronic and auto goods manufacturers. This change in focus was due to the fact that the companies focusing on quality were more profitable in the long run. Baldrige Award recognizes the achievement of excellence in Quality. Our paper compares the performance of Baldrige Award winners to their counterparts in similar industry. Overall, the findings show that increase in earnings and sales growth for Baldrige Award winners is more than for the control group.

Keywords: Total Quality Management, TQM, Baldrige Award Winners.

Introduction

Traditionally, American managers were driven by short-term and accounting based measures valued by the Wall Street. However, commitments to high quality demand focus on issues related to routine operations, such as reduction on customers' complaints, machine breakdowns, defects and scraps etc. Similarly other metrics of interest can be reduction in cycle time, late delivery rate, and new production introduction time (Wruck and Jensen, 1994). Japanese managements' internal focus and, commitment to make incremental but continuous improvement eventually placed them ahead of the American competitors despite the superior technology of the latter (Grant, 1985). Loss of market shares by Americans manufacturers of electronic goods and automobiles, in the US itself, to the Japanese competitors, starting in 1980's, is mostly attributed to the higher quality of Japanese products (Garvin, 1983; Grant, 1985). In this paper we test the premise whether improvement in quality could lead to overall better performance in the long run.

Importance of quality is now universally acknowledged. Baldrige Award, which is the most prestigious award on quality in the United States, does not have financial performance on its evaluation criteria (Garvin, 1991). In the face of newfound importance of operations, American managers' focus on quarterly earnings can seem "myopic" (Coats, et. al; 2002). Especially, when companies highly admired for quality start massive downsizing or file for bankruptcy, the very role of quality practice in the competitive marketplace becomes suspect (Jay and Peter, 1992). This lack of direct relationship between quality and bottom line has troubled many others.

Researchers have since 80's, looked into various aspect of Quality and Operating Performance. The very act of reducing scrap, defects, improving performances of products and customers' satisfaction

* Assistant Professor, Division of Management and Marketing, Lewis College of Business, Marshall University, Huntington, USA.

** Associate Professor, Division of Accountancy and Legal Environment, Lewis College of Business, Marshall University, Huntington, USA.

should lead to increased profitability (Wruck and Jensen, 1994). Garvin (1983) indicated that earnings and market shares are positively affected by higher quality. Similarly, Hendricks and Singhal (1997), empirically compared profitability, sales growth and cost of the companies that have won quality related awards with the otherwise similar ones in the control groups. They found that award winners have advantage on profitability, growth and cost over those in the control group.

Our paper follows and extends Hendricks and Singhal (1997) and compares profitability, market share, and cost for Baldrige award winners with the control group. Our sample includes award winners from 1988 to 2003.

First reason to extend Hendricks and Singhal (1997) is that theory building requires replication. Conclusions of every scientific study are tentative, further research with new data either strengthens these conclusions or improves upon them (Frohlich, and Dixon, 2001).

Secondly, technologies and management practices diffuse (Frohlich, 1998) over time and, what was once competitive advantage of one or fewer companies become standard practice for everybody. For example, with mass production using automated assembly line, Ford captured seemingly unassailable position in car manufacturing at the turn of the last century. However, after twenty years its rival GM not only successfully deployed assembly line but also used it to wrestle the topmost position. Capabilities related to quality and efficiency were considered “order winners” in the past. Now they are “qualifiers”.

Our study also compares the inventory level of the Baldrige Award winners and the control group, because it is said lean management and total quality management are closely related. For example: Toyota, a leader in lean manufacturing, is known for its excellence in both of these aspects (Fujimoto, 1999).

Literature Review

Malcolm Baldrige Award recognizes the excellence in quality. It is the most prestigious award for public or private sector organizations in the United States. It was established in 1987 in order to reorient American business towards high quality, in areas of service and production. Its evaluating criteria are “leadership, information and analysis, strategic quality planning, human resource utilization, quality assurance or products and services, quality results, and customer satisfaction” (Garvin, 1991). Next few paragraphs explain the logic and established links between quality and key financial indicators to measure the performance of a company. We have also used evidence from existing literature to support the choice of variables for this study.

Quality and Profitability

There are as many disappointment and failures in the quality movements as there are success stories. Whether or not quality improves the businesses’ bottom line is an important question. In past, some business fell into financial hardships soon after winning prestigious awards like Deming award (from Japan) and Baldrige award in United States (Jay and Peter, 1992). On the other hand, Toyota known for it best quality product is also most profitable auto manufacturer. Furthermore, empirical studies done in the past have also shown links between the profitability and quality. Garvin (1983) and Hendricks and Singhal (1997) are important examples of such studies. Researchers have used earning before interest and tax (EBIT) as a measure of profitability. We have tested whether or not award winners have higher EBIT compared to the control group. Increases in sales growth and /or profit margin can increase EBIT. Again, Profit margin can be increased either by commanding premium price in the market or reducing the cost of production.

Quality and Sales

One of the aims of quality management is to satisfy customers. Baldrige award gives a very high importance to customer satisfaction (Garvin, 1991). It is expected that satisfied customers will lead to increased market share via more sales. Many practitioners understand this link and embark on quality management in order to increase their market, and only handful of them reported success (Jay and Peter, 1992). On the other hand, Toyota is now the number one car manufacturer (Economist, 2005, 2004). The success of Toyota is based on their reputation for high quality. Besides, empirical studies by Garvin (1983) and Hendricks and Singhal (1997) suggest a link between high quality and the market share. Thus, we have used change in sales for Baldrige award winners to that of the control group.

Quality and Cost

Wruck and Jensen (1994) consider total quality management (TQM) as “organizational technology” that allowed firms to increase their “productivity.” In fact, a need to save on production cost might have been one of the reasons for Toyota to pursue TQM. Toyota management observed that rework took considerable time and production cost for mass manufacturers like Ford, and rightly thought that doing things right in the very first time as an effective cost cutting measure (Womack et al., 1991; Fujimoto, 1999).

Further, cost cutting and improving efficiency can be focus of managers who are not as successful in implementing total quality management or are not even interested in it. On efficiency American car producers’ performances have improved a lot, making it comparable to their Japanese counterparts. However, they still lag with respect to quality (Holweg and Pil, 2004).

Although high quality may eventually lead to lower cost, however, application of high quality management techniques (which may require things like learning, shorter work shift to reduce fatigue) may lead to increased costs in the beginning. For example, in order to avoid rework, Toyota had to encourage its workers to focus of fixing the defects soon as they were found. Workers were also required to identify what went wrong in order not to repeat the mistake. They could stop the assembly line if required. Needless to say, the assembly lines were stopped a lot in the beginning. It took some time before they could realize the cost savings (Womack et al., 1991; Fujimoto, 1999).

Our study compares Cost of Goods Sold of Baldrige award winners to that of in the control group.

Quality and Profit Margin

High quality good or service may command premium price. When premium price is charged firms can enjoy high profit margins, even when their cost structures are comparable to that of their competitors. However, premium prices and market share may not be complimentary.

For example, Toyota and Honda despite their reputation of high quality do not charge premium. They are more interested in increasing their market share. Prices of different models of Toyota and Honda cars are average compared to same category cars produced by their competitors (Power report, the, 2002). There is a possible link, therefore, between quality and profit margins. Thus we compared the profit margins of award winners with those of control groups. Profit margin is measured as $(\text{Sales} - \text{Cost of good sold})/\text{Sales}$.

Quality and Inventory

Organizations undertaking total quality management focus on errors. Even though, 96% success may be good news, total quality management, however, requires company to analyze and understand remaining 4% errors (Wruck and Jensen, 1994). Toyota Production system requires that “what,

when, where, why, whom and how” be asked and answered for each defects. TQM requires defects to be analyzed as they occur. It tolerates stopping of the whole assembly line while such analysis is carried (Womack et al., 1991).

While total quality management requires errors to be exposed, inventory helps to hide the same. If defective part goes to inventory, there will be a time lag between the manufacturing and detection of defects. Information required for analysis can be lost. Further, defective parts many pile on before some one detects. So for effective TQM process a low inventory is required (Cachon and Terwiesh, 2006).

Again same argument we used for cost cutting is valid here. Organizations who may not be as effective in TQM may have succeeded in lowering the cost including reduction of inventory. In this study, we have compared the inventory level per unit of sales of Baldrige award winners with that of control group.

Research Method

For this research, publicly available financial data for Baldrige award winner is used. Financial data was downloaded from CompuServe database. Data for fifteen Baldrige award winners from 1989 to 2003 was available and used in this study.

Following Hendricks and Singhal (1997), the year on which a particular firm won award was considered year zero. Data for up to year ‘-6’ and ‘+5’ were included in the study. In order to make control group for each award winner two firms belonging to the same industry (as indicated by four digit industry standard code) were chosen. Based on the SIC code, financial data of the companies similar to award winners was also downloaded. Thus a total of 15 award winners were compared against 30 in the control groups. Variable relevant for this research are Total Asset, Sales, Cost of Goods Sold, EBIT (earning before interest and tax) and Inventory.

Results

First the total asset of award winners and control groups were compared. It was found that they were not significantly different in any year. So, award winners and control groups were comparable in their size.

Comparison of change in EBIT

Changes in EBIT were compared in two ways. First, annual changes in EBIT of award winners were compared against the changes for the control group. Annual changes mean change from year ‘-6’ to year ‘-5’, year ‘-5’ to year ‘-4’ and so on up to period ‘3’ to ‘4’. Besides, changes in EBIT for longer periods were also considered. The periods considered were, changes from year ‘-6’ to ‘-1’, ‘-5’ to ‘-1’, ‘-4’ to ‘-1’, ‘-3’ to ‘-1’. Similarly, years ‘-6’ to ‘0’, ‘-5’ to ‘0’, ‘-4’ to ‘0’, ‘-3’ to ‘0’ and ‘-2’ to ‘0’ were also considered. Following time periods after year zero were also considered: ‘0’ to ‘2’, ‘0’ to ‘3’, ‘0’ to ‘4’ and ‘0’ to ‘5’.

The change in EBIT for award winners was expected to be positive for each of the time period considered. And, it was also expected that improvement in EBIT for award winners will be significantly more compared to that of the control groups.

Table 1 shows the results of comparison of the mean annual changes in EBIT between the Baldrige Award Winners and Control Group. Award winners can be expected to outperform control group. While it seems that Change in EBIT for Award winners are higher compared to the same for control groups, these changes are statistically significant only twice.

Table 1: Comparisons of Annual Change in EBIT

	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Year '-6' to Year '-5'	-.607	29.987	.549	-.1760	.29010	-.76850	.41643
Year '-5' to Year '-4'	.790	11.059	.446	.6059	.76699	-1.08118	2.29292
Year '-4' to Year '-3'	2.395	34.644	.022	.3918	.16360	.05957	.72405
Year '-3' to Year '-2'	1.596	37.939	.119	.4502	.28204	-.12075	1.02124
Year '-2' to Year '-1'	.751	31.542	.458	.2993	.39864	-.51317	1.11175
Year '-1' to Year '0'	1.948	40.851	.058	.2811	.14428	-.01035	.57247
Year '0' to Year '1'	1.024	29.031	.315	6.6576	6.50475	-6.64545	19.96075
Year '1' to Year '2'	.957	41.423	.344	.2046	.21381	-.22710	.63623
Year '2' to Year '3'	1.504	27.950	.144	.8241	.54794	-.29839	1.94659
Year '3' to Year '4'	-1.846	20.261	.080	-1.6501	.89392	-3.51320	.21307

In 9 out of 10 periods average annual change in EBIT of the award winners were higher than those in the control group. However, most of these differences were statistically insignificant. For the period of - '4' to -'3' the difference was marginally significant. For the year '-1' to '0', it was marginally significant.

Table 2 compares the mean changes in EBIT between the award winners and control group. The numbers of years considered are different for different years. Award winners can be expected to outperform control group. While it seems that Change in EBIT for Award winners are higher compared to the same for control groups, these changes are statistically significant only twice. When the changes in EBIT for varying periods were tested, the difference in EBIT changes from year '-4' to year '0' and '-1' to year '1' from were statistically significant, showing the improvement in EBIT for award winners to be significant.

Comparison of Change in Sales

Change in sales was also compared between the two groups (award winners and control group) the way EBIT was compared. Here one company in the control group was outlier. Its change in sales was way above the mean of the rest of the group. The data from this firm were taken out from the comparison. When the differences in change in sales for varying periods were considered award winners clearly had higher level of sales change for the period year '-5' to year '-1'. The statistical significance of the difference was also marginally significant for the periods year '-3' to year '-1', year '-5' to year '0' and from year '-2' to year '0'.

Table 3 compares the mean changes in sales between the award winners and control group. This comparison is done after the outlier is taken out. The numbers of years considered are different for different years. Award winners can be expected to out perform control group. While it seems that Change in sales for Award winners are higher compared to the same for control groups, these changes are statistically significant only four times. One significant difference is for a change from year '-5' to year '-1'. The difference is marginally significant other three times.

Table 2: Comparisons of Change in EBIT for Variable Periods

	t	df	Sig.	Mean	Std. Error	95% Confidence	
						Difference (2-tailed)	Difference
						Lower	Upper
Year '-6' to Year '-1'	.182	29	.857	.0969	.53382	-.99483	1.18872
Year '-5' to Year '-1'	1.273	29	.213	1.0943	.85991	-.66444	2.85298
Year '-4' to Year '-1'	1.590	34	.121	.6190	.38941	-.17236	1.41038
Year '-3' to Year '-1'	.506	37	.616	.2793	.55216	-.83943	1.39813
Year '-6' to Year '0'	.179	26.249	.859	.0759	.42409	-.79541	.94726
Year '-5' to Year '0'	1.554	29	.131	1.8826	1.21148	-.59516	4.36033
Year '-4' to Year '0'	2.234	33.914	.032	.7546	.33783	.06795	1.44117
Year '-3' to Year '0'	-.202	37	.841	-.1044	.51615	-1.15027	.94137
Year '-2' to Year '0'	1.193	41	.240	.5456	.45741	-.37813	1.46939
Year '0' to Year '2'	1.087	28.176	.286	3.0928	2.84657	-2.73644	8.92213
Year '0' to Year '3'	-.709	31.265	.484	-.7823	1.10404	-3.03319	1.46867
Year '0' to Year '4'	-.888	28.672	.382	-1.7118	1.92865	-5.65827	2.23472
Year '-1' to Year '1'	1.794	34.537	.082	.5785	.32240	-.07633	1.23330
Year '-1' to Year '2'	1.273	40.321	.210	.4500	.35350	-.26430	1.16426
Year '-1' to Year '3'	.571	29.683	.572	.4208	.73681	-1.08468	1.92622
Year '-1' to Year '4'	.377	31.151	.709	.3538	.93947	-1.56183	2.26953

Table 3: Comparisons of Change in Sales for Variable Periods

	t	df	Sig.	Mean	Std. Error	95% Confidence	
						Difference (2-tailed)	Difference
						Lower	Upper
Year '-6' to Year '-1'	1.253	21.754	.223	.2455	.19591	-.16103	.65210
Year '-5' to Year '-1'	1.834	17.257	.084	.3387	.18465	-.05046	.72782
Year '-4' to Year '-1'	1.462	27.619	.155	.2237	.15299	-.08992	.53724
Year '-3' to Year '-1'	1.615	18.902	.123	.2120	.13124	-.06277	.48681
Year '-6' to Year '0'	1.005	26.554	.324	.2809	.27939	-.29284	.85457
Year '-5' to Year '0'	1.550	22.812	.135	.3916	.25269	-.13136	.91456
Year '-4' to Year '0'	1.055	32.486	.299	.2430	.23037	-.22597	.71198
Year '-3' to Year '0'	1.259	25.040	.220	.2334	.18541	-.14841	.61524
Year '-2' to Year '0'	1.439	29.980	.161	.1989	.13822	-.08344	.48115

Other Comparisons

The difference in changes in Cost of Goods Sold was also compared. The differences in all the cases were not significant. Similarly, the differences in profit margins were also not significantly different in any of the years.

Ratio of change in (Inventory/Sales) was also compared (Gaur et al., 2005). Inventory/Sales is expected to shrink each year. Therefore, the values of changes are expected to be negative and, changes for award winners are expected to be more negative compared to those for control group. While there were some signs that award winners improved their Inventory/ Sales ratio more than that of the control groups, none of the differences were statistically significant. Table 4 shows the results of comparison.

The ratio of Inventory/Sales is more negative for the Award winners (A) for six out of 10 comparisons. But, none of these differences are statistically significant.

Table 4: Annual Comparisons of Inventory/Sales

		N	Mean	Std. Deviation	Std. Error Mean
Year '-6' to Year '-5'	A	9	.0155	.22906	.07635
	C	20	-.0006	.16529	.03696
Year '-5' to Year '-4'	A	9	.0740	.28828	.09609
	C	21	-.0604	.16166	.03528
Year '-4' to Year '-3'	A	10	.0073	.23758	.07513
	C	25	.0534	.56019	.11204
Year '-3' to Year '-2'	A	11	-.0049	.15891	.04791
	C	26	.1169	.37847	.07422
Year '-2' to Year '-1'	A	12	-.0659	.17301	.04994
	C	28	-.0100	.25650	.04847
Year '-1' to Year '0'	A	13	-.0117	.17422	.04832
	C	28	-.0291	.28026	.05296
Year '0' to Year '1'	A	13	-.0572	.27232	.07553
	C	28	.0311	.34559	.06531
Year '1' to Year '2'	A	12	.1863	.49144	.14187
	C	28	-.1237	.33782	.06384
Year '2' to Year '3'	A	10	-.0694	.24773	.07834
	C	23	.0118	.28253	.05891
Year '3' to Year '4'	A	10	-.0040	.09648	.03051
	C	23	.0886	.26837	.05596

Limitations and Conclusions

The findings show that increase in earnings and sales growth of Baldrige Award winners is more than that of the control group, indicating that total quality management can have positive impact on the bottom line. The results also give some indication that lean inventory and quality management go hand in hand. However, with total quality management, firms may or may not gain advantage in cost or in ability for premium pricing as discussed above.

This study is a pilot phase of a large-scale study. Further data needs to be collected so that issues discussed here can be explicitly hypothesized and tested. Such study will also have to explicitly test whether or not competitive advantage that can be gained from total quality management is eroding. In addition, there might be other non-financial variables that influence the performance of the company. These variables have not been considered in this study.

References

- Cachon, G. and Terwiesch, C. (2006) “*Matching Supply with Demand and Introduction to Supply Chain Management*”, McGraw- Hill Irwin.
- Coats, T.T. and McDermott, C.M. (2002) An Exploratory Analysis of New Competencies: A Resource-Based View of Perspective, *Journal of Operations Management*, 20, p.435-450.
- Frohlich, M.T. (1998) How do you Successfully Adopt Advanced Manufacturing Technology, *European Management Journal*, Vol.16, No.2, p.151-159.
- Frohlich, M.T. and Dixon, R.J. (2001) A Taxonomy of Manufacturing Strategies Revisited, *Journal of Operations Management*, 19, p.541-558
- Fujimoto, Takahiro (1999) “*The Evolution of a Manufacturing System at Toyota*”, New York: Oxford University Press.
- Gaur, V., Fisher, M. and Raman, A. (2005) An Econometric Analysis of Inventory Turnover Performance in Retail Services, *Management Science*, Vol.51, No.2, Feb., p.181-194.
- Garvin, D.A. (1983) “Quality on the Line”, *Harvard Business Review*, 61,4, p.65-75.
- Garvin, D.A. (1991) “How the Baldrige Award Really Works”, *Harvard Business Review*, 69,6, p.80-94.
- Grant, R.M. (1985) The Resource Based Theory of Competitive Advantage: Implication for Strategy Formulation, *California Management Review*, Vol.63, Issue 2, p.143-149.
- Hendricks, Kevin B. and Singhal, Vinod R. (1997) “Does Implementing an Effective TQM Program Actually Improve Operating Performance? Empirical Evidence from Firms that have Won Quality Awards” *Management Science*, Vol.43, No.9 (Sep.), p.1258-1274.
- Hill, T. (2004) “*Manufacturing Strategy, Text and Cases*”, Irwin McGrawHill.
- Holweg, Matthias and Pil, Frits K. (2004) The Second Century Reconnecting Customer and Value Chain through Build-to-Order, Massachusetts Institute of Technology.
- Mathews, Jay, Katel, Peter (1992) “*The Cost of Quality*”, Newsweek, July, 09, Vol 120, issue 10, p.48.
- The Economist (2005) Toyota the Car Company in Front, http://www.economist.com/PrinterFriendly.cfm?Story_ID=3599000, (Jan 27)
- The Economist (2004) Perpetual Motion, http://www.economist.com/survey/PrinterFriendly.cfm?Story_ID=3127302, (Sept 2nd)
- The Power Report, Toyota Car Topping Ford and Chevrolet? (2002) JD Power and Associate, p.12-17, http://www.jpda.com/businessservices/automotive/publications/powerreport/200301/0103_Toy1.htm
- Womack, J.P., Jones, D.T. and Roos, D. (1991) “The Machine That Changed the World”, Rawson Associate, New York
- Wruck, K.H. and Jensen, M.C. (1994) “Science, Specific Knowledge and Total Quality Management”, *J Accounting and Economics*, 18,3, p.247-287.