
Economics Working Paper 49

**Control of the Costs of Quality
Management: a Review of Current
Practice in Spain***

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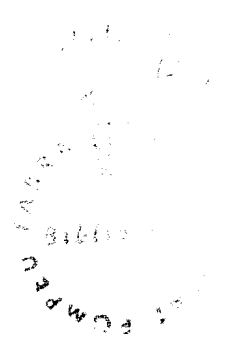
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Abstract

This paper reports on a survey of 1426 managers of Spanish businesses on their experiences of total quality management. It reports in detail on the breakdown of implementation of such schemes by industrial sector and by region; the paper also reports on the extent to which quality circles and employee suggestion schemes are used. The survey also explored financial controls used for quality costs. An analysis of business costs shows a wide variation in quality costs by industrial sector. The paper discusses the practical methods used by those who do quantify intangible costs and identifies a range of ratios computed by managers to assess control of quality costs.

CONTROL OF THE COSTS OF QUALITY MANAGEMENT: A REVIEW OF CURRENT PRACTICE IN SPAIN

INTRODUCTION

In a competitive environment there is constant pressure to control all costs, including costs relating to quality. Consequently for some years many Spanish businesses have been introducing programmes for quality improvement or total quality management. To evaluate these quality improvement programmes it is necessary to calculate all the costs relating to quality issues, identifying both:

- a) The costs of measures taken to evaluate quality achievement and to prevent quality failure.
- b) The costs that arise as a result of any failure to meet quality standards.

This paper presents the conclusions of a research project that considered Spanish businesses of various sizes and from a range of economic activities. The project involved gathering information on current Spanish business practice in the following areas:

- i) The introduction of schemes of quality improvement and total quality management.
- ii) The use of company suggestion schemes and quality circles.
- iii) Management's views on the outcomes of such schemes.
- iv) Systems used to identify the costs of quality management and quality failure.
- v) Methods used to quantify the intangible costs of quality failure.
- vi) Some estimate of the costs of quality management and quality failure in different business sectors.

INTRODUCTION OF TOTAL QUALITY MANAGEMENT SYSTEMS

There are many definitions of total quality management. One offered by the ISO is:

"That aspect of the overall management function that determines and implements the quality policy and, as such, is the responsibility of top management".
(ISO 8402,1986)

Total quality management involves a combination of approaches and techniques which make it possible to satisfy customer needs at reasonable costs while at the same time boosting the motivation and job satisfaction of employees. To summarise, the basic objectives of total quality management is to maximise satisfaction for both customers and employees at a reasonable cost.

THE SAMPLE

A questionnaire was completed by 1426 managers of Spanish companies of various sizes and from a range of business sectors and geographical regions.

Companies fell within the following size bands:

Small	941
Medium	312
Large	173
<hr/>	
	1426
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The size limits used are those in Spanish accounting law, derived from the EC fourth directive. Companies were classified as small or medium if they fell within two of the following three size limits:

	SMALL	MEDIUM
Total assets under	230 million pesetas	920 million pesetas
Sales under	480 million pesetas	1920 million pesetas
Employee numbers under	50	250

All companies above those size limits were classified as large.

The questionnaire asked if any part of the equity of the firm was held by foreign investors. The replies indicated that the number of firms with foreign shareholders tends to increase in proportion to size:

	WITHOUT FOREIGN SHAREHOLDERS	WITH FOREIGN SHAREHOLDERS
Small	93%	7%
Medium	69%	31%
Large	64%	36%

The geographical location of these businesses, based on location of their head office, was:

Andalucia	63
Aragon	123
Basque Country	95
Catalonia	441
Galicia	51
Madrid	301
Navarre	73
Valencia	82
Other	197
	<hr/>
	1426
	<hr/>

The questionnaire was completed by managers who participated in management development programmes in various Spanish academic institutions in early 1993. Thus the only basis for selecting business to participate in this study is that one of their managers has participated in a management development programmes.

Completion of the questionnaire was voluntary; in practice, almost all those approached did respond. In some cases, where a manager did not know the answer to a question, a reply came in later following consultation with colleagues.

The specific questions asked are reported in detail below. The questionnaire was supplemented by interviews with quality control managers and cost accountants in 15 businesses.

IMPLEMENTATION OF TOTAL QUALITY MANAGEMENT

In Spain, as in other developed countries, there has been considerable interest in the topic of total quality management in recent years. However, as discussed below, there is still considerable further scope for development in this field.

As shown in table 1, 29% of businesses in this survey have introduced a total quality management programme. This is in line with similar studies of Spanish business. For example, Galan (1993) found in a survey of Catalan business that some 20% had implemented a total quality management system (p18). However, there is some evidence that comparable countries have a higher proportion of such systems. For example, Toscano and Ostinelli (1993) report on a survey of a similar sample of businesses in Italy, where 75% were operating total quality management (p10). That study found that 60% of businesses had introduced total quality management in the past three years.

As far as specific techniques are concerned, 24% of the businesses have a system of 'quality circles' and 26% have an employees suggestion scheme. 62% of businesses with an employees suggestion scheme provide a financial reward for employees who make suggestions which save money for the business. The most common basis for computing this reward is as a proportion of the savings achieved in the first year of implementing the suggestion, with some upper limit on the reward. In most cases this upper limit was between one and two million pesetas.

Virtually all the businesses where a system to improve quality has been introduced feel that it has been a success, with a reduction in errors, better customer satisfaction, and improved employee motivation, leading to improved profitability. Those findings are in line with the conclusions of another recent study of Spanish Business (Andersen Consulting 1993, p4 - 14).

TABLE 1 - ANSWERS TO QUESTIONS ON QUALITY MANAGEMENT IN THE BUSINESS

	YES	NO
Has your business introduced a programmes of total quality management?	29%	71%
Split of answers to the above question by size of business -		
Small	6%	94%
Medium	71%	29%
Large	79%	21%
Distribution by region of answers to the first question above:		
Basque Country	43%	57%
Navarre	41%	59%
Catalonia	35%	65%
Madrid	31%	69%
Other	18%	84%
Distribution by industrial sectors of answers to the first question:		
Foods	65%	35%
Graphic Arts	16%	84%
Car Manufacturers	100%	0%
Car Components	91%	9%
Soft Drinks	80%	20%
Construction	12%	88%
Publishing	10%	90%
Education	8%	92%
Electricity	100%	0%
Electronics	84%	16%
Lending Institutions	90%	10%
Show Business	0%	100%
Pharmaceuticals	100%	0%
Hotels	72%	28%
Machinery	48%	52%
Metal	22%	78%
Furniture	41%	59%
Chemicals	92%	8%
Paper	32%	68%
Restoration	7%	93%
Insurance	78%	22%
Textiles	86%	14%
Transport	14%	86%

	YES	NO
If your company has introduced a system of total quality management. has this been profitable?	96%	4%
Does your company have a system of quality circles?	24%	76%
Does your business have a suggestion scheme for employees?	26%	74%
If your company has a suggestion scheme, is there any financial reward for employees who make suggestions that save the business money?	62%	38%

A number of interesting features of businesses tending to introduce total quality management emerge.

The likelihood of a business introducing a total quality management programme increases with the size of the business. As table 1 shows, only 61% of small businesses had introduced such a scheme compared with 71% of medium and 79% of large businesses. However, a number of managers of small businesses told us that their business had plans to introduce some form of total quality management scheme in the near future.

There was considerable variation between business sectors. Generally, there is a higher level of total quality management schemes in the manufacturing sector (covering car manufacturing and components, pharmaceuticals, electricity, electronics, chemicals and textiles) and in the service sector (covering lending institutions, insurance companies, and hotels),

There were also significant regional differences, with a relatively high percentage of schemes in some communities, such as the Basque Country (43%) and Navarre (41%), lower percentages of 35% in Catalonia and 31% in Madrid, and in the rest of Spain an even lower average percentage of 18%. These regional variations should be considered with caution because they may be attributable to the different distribution of size of business and industrial sector in the different regions. That is, the regions with the highest incidence of total quality management schemes may have a higher proportion of industries inclined to use such schemes and a lower proportion of small enterprises.

Although the relations between cause and effect have not been investigated, there appears to be some correlation between increases in both sales and return on capital employed on the one hand and, on the other hand, the implementation of total quality management programmes. The results of the study show that the businesses with total quality management programmes tended to have above average increases in sales and return on capital employed, while the converse applied to businesses which did not have total quality management programmes.

It was found that the businesses which have implemented total quality management programmes were more likely to be those with foreign businesses amongst their shareholders.

It will be interesting to analyse these relationships in more detail in a future study.

On the basis of the above, the characteristics of businesses which have implemented total quality management programmes appear to be:

- a) They appear to be the large or medium sized businesses.
- b) They are particularly common in sectors such as the automobile industry, pharmaceuticals, electronics, electrical goods, chemicals, textiles, banks, hotels, and insurance.
- c) They enjoy increases in sales and in return on capital employed.
- d) They often have foreign businesses amongst their shareholders.

CONTROLLING THE COSTS OF QUALITY AND OF QUALITY FAILURE

A key aspect of controlling costs is to compute the costs of quality failure and the costs of avoiding failure (Spitzer 1992, p16). Moreover, with this information it is easier to evaluate the benefits of a total quality management programme.

Quality management involves two types of cost. One type, costs of prevention, embraces all the measures taken to avoid production errors. The second type, costs of assessment, relate to actions taken to detect errors as early as possible, and particularly before products or services are delivered to clients.

Prevention costs may include:

- a) Related training costs
- b) Value analysis
- c) Changes in systems and designs
- d) Preventive maintenance
- e) Inspection procedures at suppliers
- f) Manuals of procedure
- g) Quality circles
- h) Suggestion schemes.

Costs of assessment may include:

- a) Audit
- b) Inspection
- c) Obtaining appropriate certificates
- d) Corrections
- e) Testing laboratories
- f) Training inspectors.

Cost of quality failure include: damaged materials, reprocessing costs, after sales service, honouring guarantees, and accidents.

As shown in table 2, 31% of businesses with a total quality management system had a system for analysing quality costs. Toscano and Ostinelli (1993) found a similar proportion for Italian firms, at 36% (p21). As shown in table 3, either the cost accounting department or the quality control department most commonly had the responsibility for collecting data on quality costs. There was general agreement amongst businesses collecting this data that it was useful and a substantial number of other businesses were planning to introduce such a system within two year. Most of the managers at the companies interviewed felt that data on quality costs would help reduce those costs in the future; a further perceived benefit was to enable the quality control department to identify the most damaging areas of quality failure and revise their priorities accordingly.

TABLE TWO - NUMBER OF BUSINESSES WITH A SYSTEM FOR ANALYSING COSTS

	YES	NO
Is there a system for identifying the costs of quality control and quality failure?		
All Businesses	9%	91%
Businesses with a system of total quality management	31%	69%

TABLE THREE - VIEWS OF BUSINESSES WITH A SYSTEM FOR ANALYSING QUALITY CONTROL COSTS

	YES	NO
Does the benefit obtained from the information on quality costs justify the cost of obtaining it?	92%	8%
Are quality costs covered by a budgetary control system?	64%	36%
	—	—
Which department is responsible for analysing quality costs?		
Cost accounting	44%	
Quality control	31%	
Production	16%	
Others	9%	
	—	
	100%	

SOME DATA ON THE SIGNIFICANCE OF QUALITY COSTS

Costs of total quality management vary depending on industrial sector. Table 4 gives the average costs as a percentage of sales for each industrial sector where estimates of costs were obtained for at least 3 firms. There is wide range of figures. However, these should be used with caution because:

- a) For most sectors, the number of firms is small.
- b) The methods for computing costs varies between businesses.

TABLE FOUR - TOTAL TANGIBLE COSTS OF QUALITY AS A PERCENTAGE OF SALES

	QUALITY FAILURE COSTS	QUALITY CONTROL COSTS	TOTAL
Lending Institutions	0.7%	0.9%	1.6%
Car Manufacturing	1.4%	1.1%	2.4%
Insurance	1.6%	1.2%	2.8%
Transport	1.5%	1.6%	3.1%
Car Components	1.9%	1.6%	3.5%
Electronics	1.8%	1.7%	3.5%
Publishing	2.4%	1.1%	3.5%
Furnishing	2.5%	1.4%	3.9%
Food	3.5%	1.6%	4.1%
Machinery	2.1%	2.0%	4.1%
Soft Drinks	2.3%	2.2%	4.5%
Chemicals	3.1%	1.8%	4.9%
Paper	3.1%	1.9%	5 %
Graphic Arts	4.1%	1.1%	5.2%
Hotels	2.4%	3.1%	5.5%
Pharmaceuticals	3.8%	2.1%	5.9%
Textiles	3.8%	2.2%	6.0%
Metal	4.7%	2.8%	7.5%
AVERAGE	2.4%	2.1%	4.5%

CONTROLLING THE COSTS OF QUALITY FAILURES

The costs of failure of quality procedure, the 'price of non fulfilment' (Barclays 1993, p2) can be divided into the tangible and the intangible (Lemaitre 1990, p126). The first are those which can be measured objectively and, generally, can be traced to specific cash flows. Basically, we are concerned here with the cost of labour and raw material incurred as a result of the failure. Intangible costs, however, termed the 'hidden costs' by Torres 1992 (p20), can only be measured on a subjective basis. Intangible costs are those that are due to the poor impression of the business that arises because of the impact of failure on customers.

Another distinction is between internal and external failures. The first type arise inside the business, being identified before the product or service reaches the customer. The second type are identified by the customer.

The cost of quality failure should be computed on a marginal costing basis. Thus it should include all extra costs and all lost income arising from the failure.

The data in table 4 above excludes the intangible costs of quality failure. As shown in table 5 below, only 24% of businesses with a system for accounting for quality costs included analysis of intangible costs in their analysis. There was almost unanimous agreement that such costs were significant, with 92% of companies not analysing such costs, nevertheless agreeing that quality failures have a negative impact on future sales. These firms appeared to attribute their failure to account for such costs to the practical difficulties.

METHODS FOR COMPUTING THE INTANGIBLE COSTS OF QUALITY FAILURE

Businesses which did attempt to quantify the intangible costs of quality failure, being the loss of sales arising from diminution in the suppliers standing because of product faults, tended to follow a similar path:

- a) It is necessary to analyse how the quality image of a business develops from the point of view of customers questionnaires on their degree of satisfaction with the products or services supplied.
- b) The next step is to formulate a model of how the level of customer satisfaction relates to future sales. To give two examples:
 - i) A car manufacturer estimated that a satisfied customer could lead to seven potential new customers. A dissatisfied customer would not lead to any new customers.
 - ii) A hotel chain estimated that a satisfied customer would, on average, make four return visits in their life. A dissatisfied customer would never return.
- c) On the basis of the data above, it is possible to compute the cost, in monetary amounts, of each dissatisfied customer. This is done by estimating first the lost sales, and then the loss of related profit, attributable to customer lost as a result of defects in quality.

As we have seen, the majority of businesses do not quantify the intangible costs of quality because of the high level of subjectivity in making the necessary estimates. However, all the managers in the survey agreed that quality failure would lead to some loss of sales; the reluctance to quantify this arose from the problem of producing verifiable estimates. Several managers pointed out that to be credible the basis of computation of such costs needed to be unchanged for several years so as to yield comparable data.

TABLE 5 ; TREATMENT OF THE INTANGIBLE COSTS OF QUALITY FAILURE

For businesses with a system for accounting for quality costs:

	YES	NO
Does this system include analysis of the intangible costs of quality failure?	24%	76%

For business answering 'No' to the above:

Do you believe that quality failure reduces future sales for the business?	92%	8%
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When asked why intangible costs of quality failure were not calculated the most common answers were:

- a) Lack of an objective measure of lost sales.
- b) Difficulty in justifying the method of calculation to management.
- c) Lack of information on which to base the calculations.

ANALYSIS OF QUALITY COSTS

Interviews with those responsible for analysis of quality related costs revealed a number of ratios used to assess these, listed in Appendix 1. Ratios relating costs to sales were the most commonly used.

As we have seen in table 3 above, 64% of businesses with a system of analysing quality costs did so within the framework of a budgetary control system, enabling them to identify variances and take corrective action during the financial year.

CONCLUSION

The implementation of total quality management systems in Spain has covered a substantial majority of medium and large firms. For small firms there is still a long way to go but there appears to be widespread interest in developing systems to improve quality. Most firms which have introduced such schemes feel they have benefited from doing so.

Similarly, firms which have introduced systems for identifying and analysing quality costs have reported benefits achieved both in cutting costs and in better allocation of resources.

Few firms analyse the intangible costs of quality failure, apparently accepting that these are significant but feeling that quantification is not practical. Some firms, however, have felt it necessary to pursue this analysis and have found some interesting methods for doing so.

In a future project it will be interesting to:

- a) Investigate whether an increased number of small firms do, in fact embrace total quality management.
- b) Analyse more specifically the range of factors such as foreign ownership, industrial sector, and regional location, that may coincide with a tendency to implement schemes of total quality management.
- c) Engage in further interviews with firms that have quantified intangible costs of quality failure.

APPENDIX A

THE MORE COMMONLY USED RATIOS TO EVALUATE COSTS OF QUALITY MANAGEMENT

a) Ratios of aspects of quality management in relation to total costs of quality:

Prevention Costs

Total Quality Costs

Evaluation Costs

Total Quality Costs

Costs of Internal Failure

Total Quality Costs

Costs of External Failure

Total Quality Costs

Quality Control Costs

Total Quality Costs

Quality Failure Costs

Total Quality Costs

b) Ratios of quality management costs to other accounting data.

Quality Costs

Sales

Quality Costs

Production Costs

Quality Costs

Production Cost of Own Output

Quality Costs

Total Costs

Quality Costs

Value Added

c) Ratios per employee.

Quality Cost

Number of Employees

Training Costs

Number of Employees

Number of Quality Circle Meetings

Number of Employees

Number of Suggestions

Number of Employees

Number of Faults

Number of Employees

d) Other ratios.

Quality Costs

Number of Hours Worked

Value of Returns

Sales

Number of Credit notes

Number of Invoices

Number of Complaints

Number of Invoices

Number of Accidents

Number of Employees

Days Lost Through Accidents

Number of Employees

e) Industry specific ratios.

AIRLINES	Quality cost per mile %age of flights cancelled %age of flights leaving and arriving on time %age of luggage errors %age of flights overbooked
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TRANSPORT	Quality cost per kilometre
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SCHOOLS	Quality cost per pupil % of classes cancelled % of pupils suspended
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HOTELS	Quality cost per bed per day Quality cost per room per day Room occupancy rate Number of complaints Number of letters of appreciation
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BANKS	Number of clients who close their accounts because of error Number of complaints Number of errors in accounting records
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BUSINESSES PRODUCING GOODS TO ORDER	average days to respond to order
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