



**THE ROLE OF QUALITY MANAGEMENT IN
STRATEGIC MANUFACTURING DECISION
MAKING**

Stuart Orr

*Working Paper 28/97
April 1997*

ABSTRACT

There has been little empirical research that determines the position and role of quality management in strategic manufacturing decision making. The Australian wine industry was chosen for this research because it has a major focus on quality in process and product. The research found that quality assurance and control rank as the second most important areas of manufacturing process decision making, after plant and equipment. It also found that quality is the most important competitive priority for wine producers, followed by product cost. Quality, plant and equipment and product cost were found to be strongly related and together formed the basis for domestic and international competition in this industry. An ANOVA was used to determine that there were no significant differences in the importance of quality for different organisational characteristics ($P < 0.05$) and a factor analysis determined that quality control and assurance are related to production planning and control in terms of their strategic positioning. They were found to form part of the manufacturing decision making process, but were not part of the strategic business decision making process.

THE ROLE OF QUALITY MANAGEMENT IN STRATEGIC MANUFACTURING DECISION MAKING

INTRODUCTION

Manufacturing strategy became a focus for research when Skinner's (1969) seminal article argued that manufacturing strategy provides a strategic link between manufacturing and business strategy. He observed that the capabilities of manufacturing were not considered when formulating or implementing business strategy and identified a number of elements of manufacturing strategy, which included quality. The role of quality has not been clearly identified in subsequent research - is it an element of manufacturing strategy or a strategy in itself (Voss, 1995; Mills, Platts and Gregory, 1995)? Corbett and Wassenhove (1993) indicated that quality management practices are a key element of manufacturing strategy when they suggested that manufacturing performance must be measured in the marketplace using customer-oriented criteria in place of internal measures. This paper seeks to define the relationship between manufacturing strategy and quality management.

Kim and Lee (1993, p.8) defined manufacturing strategy as "supporting corporate objectives providing manufacturing objectives including costs, quality, dependability and flexibility to offer a competitive advantage and focus on a consistent pattern of decision making within key manufacturing resource categories. The objective of manufacturing strategy is to create 'operationally significant performance measures' in which the competitive dimensions comprise cost, quality, dependability and flexibility". This was also identified by Minor, Hensley, Rhonda and Wood (1994). Swink and Way (1995) defined manufacturing strategy as the decisions and plans affecting resources and policies directly related to the sourcing, production and delivery of tangible products. A basic premise of the more recent literature, therefore, is that manufacturing strategy is most effective when synchronised with and supportive of business-level strategy.

With these perspectives in mind, the purpose of manufacturing strategy could then be described as linking the competencies developed internally with the competitiveness required in the market (Corbett and Wassenhove, 1993). This means that manufacturers should build competencies compatible with the prevailing competitive requirements and adapt those competencies to changing market demands. This requires a long-term vision which may result in conflict with the short term planning horizons used by many manufacturers and means that quality management has an important role to play in strategic manufacturing decision making. In fact, a review of the literature as shown in Table 1 below, indicates that quality is one of the four most commonly identified competitive priorities¹ for manufacturing.

¹ Kim and Arnold (1992) defined Competitive Priorities as a method by which an organisation can compete, in addition to producing at lower costs.

Table 1. Competitive Priorities Identified in the Literature and Research

Author/Source	Competitive Priorities							
	Cost	Quality (perceived)	Dependability	Flexibility	Innovation/Features	Speed/Response rate	Service	Market Scope
Skinner (1969)	✓	✓	✓	✓				
Tunälv (1992)	✓	✓	✓	✓				
De Meyer (1989)		✓	✓		✓			
Roth and Miller (1990)	✓	✓	✓	✓				✓
Corbett (1992)	✓		✓	✓	✓	✓	✓	
Kim and Arnold (1992)	✓	✓	✓	✓			✓	
Kim and Lee (1993) *	✓	✓	✓	✓				
Garvin (1993)	✓	✓	✓	✓				
Orr (1995)	✓	✓	✓	✓	✓	✓		✓
Samson et al (1993)	✓	✓	✓	✓	✓		✓	
Sweeney (1993)		✓		✓	✓	✓	✓	✓
Minor et al (1994) *	✓	✓	✓	✓	✓	✓	✓	
Swink and Way (1995)	✓	✓	✓	✓			✓	

* Review of other manufacturing strategy research.

Furthermore, as shown in Table 2, the use of quality practices such as quality control are one of the seven most frequently identified manufacturing decision areas² in the literature.

Table 2. Summary of Decision Areas Identified in the Literature

Author/Source	Decision Areas						
	Plant and Equipment	Facility Design	Role of the Workforce	Production Planning and Control	Quality Control	Capacity	Vertical Integration
Skinner (1969)	✓		✓	✓			
Wheelwright (1981)	✓	✓		✓	✓	✓	✓
Buffa (1984)	✓		✓			✓	✓
Haas (1987)		✓	✓	✓			✓
Tunälv (1992)	✓	✓	✓		✓	✓	✓
Kim and Lee (1993)*					✓	✓	✓
Orr (1995)	✓	✓	✓	✓	✓	✓	✓
Minor et al (1994)*		✓	✓				
Mills et al (1995)	✓	✓	✓	✓		✓	
Draaijer and Boer (1995)				✓	✓		

* Review of other manufacturing strategy research.

² Decision Areas are the decisions which the organisation makes about the manufacturing process which will, in some way, contribute to the Competitive Priorities which the organisation wishes to achieve.

Quality management is clearly a fundamental component of strategic manufacturing decision making. This is a fact that few researchers and practitioners would deny based on intuition or experience. However, little research has been conducted to specifically identify the relative position and role of quality in the broader context of manufacturing decision making. The research presented in this paper explored this issue.

METHODOLOGY

The Australian wine industry was used as the research target for the identification of the role of quality in strategic manufacturing decision making. The industry was selected because it constituted about 800 registered producers at the time so that the entire industry could be included in a structured data collection process, removing the difficulties associated with sample stratification. More importantly, however, the literature clearly identified quality to be a paramount issue for this industry, both in terms of competitive priorities and decision areas (Dwyer, 1992; Brownless, 1993; d Hauteville, 1994; Forbes and Spawton, 1995). It was concluded that the clearly defined importance of quality in this industry would help with the process of identifying the role of quality in manufacturing decision making.

The term quality means different things to different industries so it is appropriate to define what quality means to the wine industry. The simplest definition of quality in the literature is "fitness of purpose" (Juran, 1979). Other definitions include "conformance to requirements", Crosby (1979), and "the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs" (ISO 8402, 1986). In many cases product and service quality also incorporate the concept of "value for money". Quality clearly only has meaning when it is related to the function of the product (Samson, 1990). In the wine industry this meaning is represented by the characteristics of the wine as a (premium) beverage.

Garvin (1987) defines product quality as "performance, features, reliability, conformance, durability (shelf life), serviceability, aesthetics and perceived quality". In addition Samson (1990) believes that quality arising from a production process should include "what does the customer want and what can we deliver?". Thus it would appear that the term "product quality" in the context of wine production is a mixture of delivery, value for money and customer perception factors. This definition of quality is a moving target for the wine industry. It is up to the wine producer to monitor customer lead changes and adjust the process to accommodate these changes. This need for constant appraisal and adjustment makes the quality management term "continuous improvement" very important for industries such as the wine industry.

Once a suitable definition of quality had been established, the research methodology and manufacturing strategy literature was used to identify the necessary features of the research methodology for this project. The literature had a number of important points to make about the techniques for research in this area. For example, Zikmund (1994) contended that descriptive research seeks answers to questions such as who, what, when, where and how to describe characteristics of a population or phenomenon, while Denzin (1989, p. 26) suggested that since different research methods such as observation and interviews "reveals different aspects of empirical reality". For this reason, multiple methods of data collection were used for this research. The need to contribute to applied knowledge in this area of research (Hill, 1987) meant that a generative research approach was used in which informal techniques were included so that the target population itself identified some of the important research issues (Simon, 1994). Some formalisation was also used so that "the objectives of the study determined during the early stages

of research are included in the design to ensure that the information collected is appropriate for solving the problem" (Zikmund, 1994, p. 43).

The literature also suggested that the assessment of competitive priorities and decision areas was potentially problematic. Manager-reported findings were likely to be the most common forms of data collection and in many cases the research had to rely on responses from a single manager from each company. According to Swink and Way (1995), disagreement among different functional managers' perceptions places the task of determining the acceptable degree of variation squarely on the researcher. A combination of interviews and questionnaire surveys were therefore used to reduce the potential for observer bias.

As a result of these requirements, the methodology finally used was exploratory and standardised. It utilised a combination of a questionnaire to produce quantitative data and in-depth interviews and a workshop to produce rich qualitative data which complemented one another. It comprised the following basic stages:

1. An environmental scan was conducted using in-depth interviews with a selection of senior decision makers in the largest industry organisations, leading mid-sized organisations and representatives of small manufacturers in the industry. This scan was augmented with a review of the industry literature.
2. The results of the environmental scan were then compared with a review of the quality and manufacturing strategy literature to identify the competitive priorities and decision areas which applied to the industry.
3. A workshop or focus group was then used to examine the findings of stage 2. The objective was to refine the findings of the previous stage for inclusion in a questionnaire survey of the industry.
4. The survey was distributed to 826 wine producers and the responses analysed to determine the relationship between the competitive priorities and decision areas identified for the industry. The response rate was at least 37% of the population on the basis of employment numbers, production volume and wholesale sales.
5. The findings from stage 4 were then discussed with the manufacturing managers of a selection of key organisations in the wine industry. This information was analysed and added to the statistical findings from the previous stage.
6. The information from the stages above was then used to create a model of manufacturing decision making which clearly indicates the role and position of quality management in this process. This model is shown in Figure 1.

FINDINGS

Table 3 lists all the decision areas identified during the project which were found to apply to the industry. The decision areas and competitive priorities are ranked in order of importance, which was determined using the questionnaire survey data. The table shows that quality control and assurance was ranked as the second most important decision area. The interview data indicated that plant and equipment was the most important decision area because of its high level of contribution to the competitive priorities of product quality and cost. The wine making process is complex and

technology helps to reduce the costs associated with production problem and skilled labour as well as assuring higher product quality. Plant and equipment and quality are therefore closely related decision areas for this industry. Quality was ranked as the most important competitive priority by the questionnaire survey analysis, followed by product cost. The interview data indicated that, for this industry, buying behaviour is strongly influenced by quality and cost which are the basis for competition in both the domestic and international markets for this industry.

Table 3. Ranked Decision Areas and Competitive Priorities Identified for the Australian Wine Industry

Decision Area		Competitive Priority
1. Plant and Equipment	13. Work Organisation	1. Product Quality
2. Quality Control / Assurance	14. Supplier Reliability	2. Product Cost
3. Capacity	15. Process Flexibility	3. Product Price
4. Production Planning and Control	16. Level of Integration of Technology	4. Supply Dependability
5. Product Design	17. Corporate Culture	5. Market Scope
6. Top Management Involvement	18. Role of Workforce	6. Role of Work Force
7. Inventory Levels	19. Time Control	7. Rate of Innovation
8. Labour and Staffing	20. Process Integration	8. product range
9. Integration with Business Strategy	21. Organisational Design	9. Supply Flexibility
10. Material Flow	22. Facility Management	10. Speed of Production
11. Communication	23. Structural Decentralisation	
12. Worker Involvement		

An ANOVA was used to identify whether there were any significant differences in the importance of quality for different organisational characteristics. It determined that there was no significant difference in the importance of quality ($P < 0.05$) for the organisational characteristics of: type of ownership, age of company, representative age of important wine manufacturing equipment, number of employees, total grape crush, total wine production, total wholesale sales, wholesale inventory level and total material costs. These characteristics were determined to be relevant in stages 2 and 3 of the research. This means that quality is a high level issue for all companies in the wine industry, regardless of size, ownership or operational set-up. Most of the other competitive priorities varied significantly with these organisational characteristics, except product cost.

The model in Figure 1 shows the results of a factor analysis which relates the identified decision areas and competitive priorities. This analysis shows that quality control and assurance are related to production planning and control and that they fall into the manufacturing decision making process, unlike the decision areas which relate to strategy, management or people, which were found to be both business and manufacturing strategy issues.

Figure 1. Structure of Decision Areas and Competitive Priorities for the Australian Wine Industry

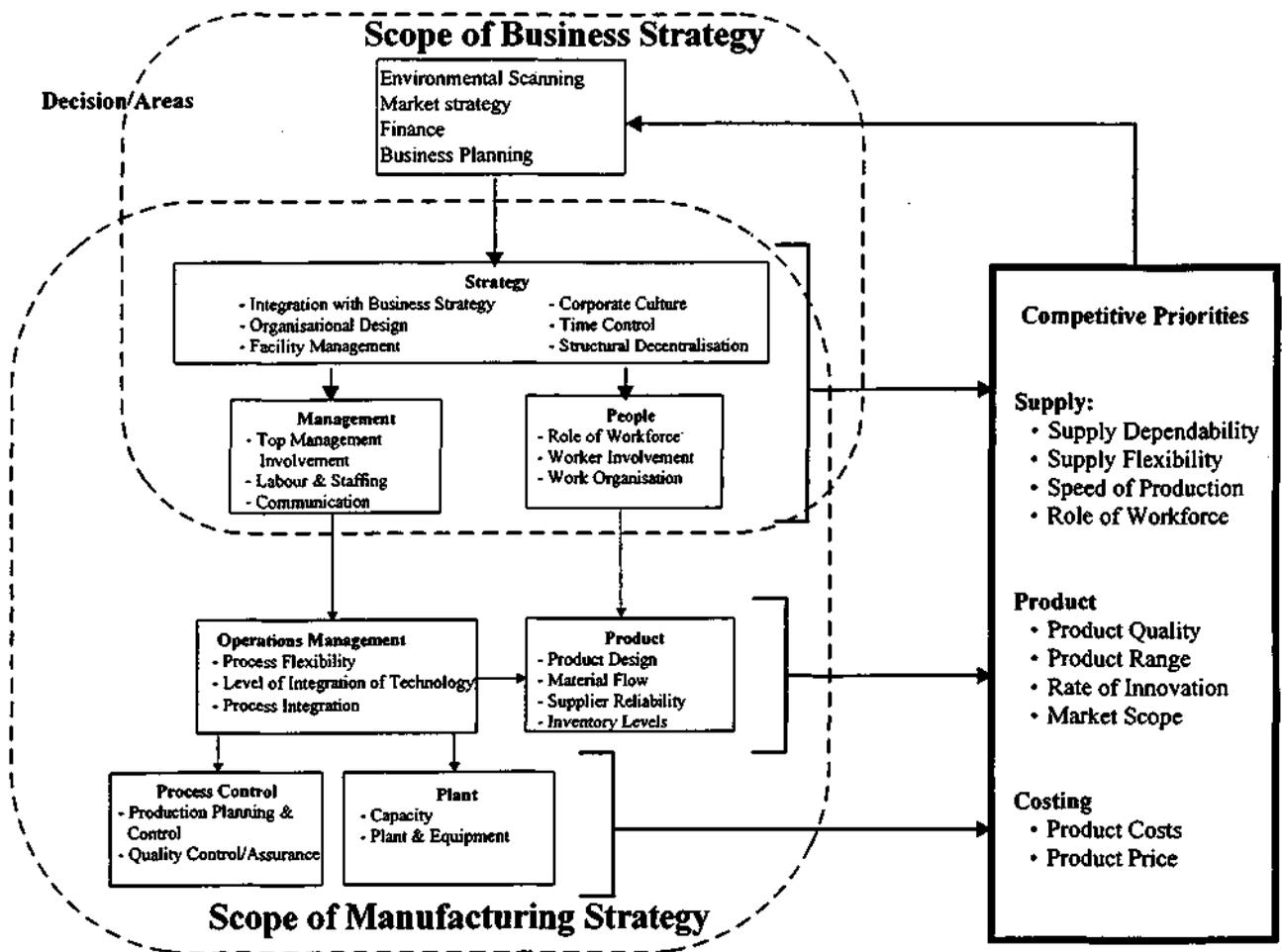


Figure 1 also shows that quality fitted into the grouping of product focussed competitive priorities, along with product range, rate of innovation and market scope. All these competitive priorities are external to the organisation and contribute to the market performance of the product and ultimately to the business performance of the organisation, as the diagram indicates.

CONCLUSION

The role of quality in strategic manufacturing decision making has been shown to be very significant and second only to plant and equipment for the industry examined in this research. Quality was also ranked as the most important competitive priority for the industry. It is therefore likely that quality has a similar role to play in manufacturing decision making in other industries. It is interesting to note that, unlike most of the other competitive priorities identified in the research, the importance of quality was not significantly differently rated for a large range of different organisational characteristics ($P < 0.05$). This means that quality is an industry wide issue and that it is likely that the findings of this research are applicable to other industries.

The relationship of quality to production planning and control is a logical finding, although it is interesting that quality was not identified to be a part of the business strategy of the organisations surveyed. This does not fit well with the high importance rating given to quality as a basis for competition since it directly impacts upon sales and therefore business performance. It could be

concluded that the industry surveyed identified the technical and marketing importance of quality, but not the impact on business performance. The industry therefore did not identify the need to view quality as a strategic business issue as well as a strategic manufacturing decision making issue. It is likely that this observation applies to other manufacturing industries as well, which suggests that manufacturers should examine the strategic business value and role of quality management. Further research should be conducted in this area to evaluate the role of quality management in other industries and in the business strategy domain.

References

Brownless, C., 1993. "The Winemakers", *Work and People*, Vol. 14 (3), pp. 26-33.

Buffa, E.S. 1984. "Meeting the competitive challenge", Homewood, I.L: DOW, Jones-Irwin.

Corbett, C. & Wassenhove, L.V. 1993. "Trade-offs? What trade-offs? Competence and Competitiveness in Manufacturing Strategy", *California Management Review*, Vol. 35 (4), pp.107-122.

Corbett, L.M. 1992. "Summary report of the 1992 New Zealand Manufacturing Futures Survey", Graduate School of Business and Government Management, Victoria University of Wellington, New Zealand.

Crosby, P. B., 1979. "Quality is Free", McGraw-Hill, New York.

d Hauteville, F., 1994. "Consumer Acceptance of Low Alcohol Wines", *International Journal of Wine Marketing*, Vol. 6 (1), pp. 35-48.

De Myer, A. and Ferdows, K. 1991. "Quality Up, Technology Down: Manufacturing Improvement Programs in Europe", *International Journal of Technology Management; Special Publication on the Role of Technology in Corporate Policy*, pp.136 - 153.

Denzin, N.K. 1989. "The research act: A Theoretical Introduction to Sociological Methods", (3rd ed.). Englewood Cliffs: Prentice-Hall, Inc.

Draaijer, D. & Boer, H. 1995. "Designing Market-Oriented Production Systems: Theory and Practice", *Integrated Manufacturing Systems*, Vol. 6 (4), pp.4-15.

Dwyer, W., 1992. "An Analysis of the Australian Wine Exporter", University of Western Sydney Discussion Paper, Series No. E9208.

Forbes, J.D. and Spawton, A.L., 1995. "Risk Management in the Australian Wine Industry", Office of Research, University of South Australia.

Garvin, D. A. 1987. "Competing of the Eight Dimensions of Quality", *Harvard Business Review*, Vol. 65(7), pp. 101-109.

Garvin, D.A. 1993. "Manufacturing Strategic Planning", *California Management Review*, Vol. 35 (4), pp. 85-106.

Haas, E.A. 1987. "Breakthrough Manufacturing", *Harvard Business Review*, March-April, pp.75-81.

- Hill, T.J., 1987. "Teaching and Research Directions in Production/Operations Management: The Manufacturing Sector", *International Journal of Operations and Production Management*, Vol. 7 (4), pp. 5-12.
- ISO 8402, 1986. "Quality Vocabulary", International Standards Office.
- Juran, J. M., 1979. "Quality Control Handbook", McGraw-Hill, New York.
- Kim, J.S. & Arnold, P. 1992. "Manufacturing Competence and Business Performance: A Framework and Empirical Analysis", *International Journal of Operations and Production Management*, Vol. 13 (10), pp.4-25.
- Kim, Y. & Lee, J., 1993. "Manufacturing Strategy and Production Systems: An Integrated Framework", *Journal of Operations Management*, Vol. 11, pp.3-15.
- Mills, J., Platts, K. & Gregory, M. 1995. "A Framework for the Design of Manufacturing Strategy Processes", *International Journal of Operations and Production Management*, Vol. 15 (4), pp. 17-49.
- Minor, E.D., Hensley, R. L., Rhonda, L., & Wood, R. D., 1994. "A Review of Empirical Manufacturing Strategy Studies", *International Journal of Operations and Production Management*, Vol. 14 (1), pp.5 - 25.
- Orr, S.C., 1995. "Production Practices in the Australian Wine Industry", *Journal of Wine Research*, Vol. 5 (2), pp.17-25.
- Roth, A. & Miller, J., 1990. "Manufacturing Strategy", Kluwer, USA.
- Samson, D. A., Sohal, A. 1990. "The Strategic Status of Quality: an Australian Perspective", *International Journal of Technology Management*, Vol. 5 (3), pp. 29-42.
- Samson, D. and Sohal, A.S. 1993. "Management, Myopia and Strategy in the Manufacturing Function: A Problem Driven Research Agenda", *International Journal of Technology Management*, Special issue on manufacturing technology: diffusion, implementation and management, Vol. 8 (3/4/5), pp.216-299.
- Simon, A., 1994. "A Generative Research Strategy for Investigating Management Practices in the Australian Business Service Industry and for QM Customer Surveys", *Proceedings of the First National Research Conference on Quality Management*, Mt Eliza, pp.65-77.
- Skinner, W., 1969. "Manufacturing: Missing Link in Corporate Strategy", *Harvard Business Review*, Vol. 47 (3), pp.136-145.
- Sweeney, M., 1993. "Strategic Manufacturing Management: Restructuring Wasteful Production to World Class", *Journal of General Management*, Vol. 18 (3), pp.57-76.
- Swink, M. & Way, M. H., 1995. "Manufacturing Strategy: Propositions, Current Research, Renewed Directions", *International Journal of Operations and Production Management*, Vol. 15 (7), pp.4-26.

- Tunälv, C., 1992. "Manufacturing Strategy - Plans and Business Performance", *International Journal of Operations and Production Management*, Vol. 12 (3), pp.4-24.
- Voss, C A., 1995. "Alternative Paradigms for Manufacturing Strategy", *International Journal of Operations and Production Management*, Vol. 15 (4), pp.5-16,
- Wheelwright, S.C. 1981. "Japan - Where Operations Really are Strategic", *Harvard Business Review*, Vol. 59 (4), pp. 67-74.
- Zikmund, W.G. 1994, "Exploring Marketing Research", (4th ed.). Orlando, Florida: Dryden Press.