



WORKING PAPER
ITS-WP-03-11

Quality Management in
Logistics: A Comparison of
Practices between
Manufacturing and Retail
Companies and Logistics
Firms.

By

Shams Rahman

June, 2003

ISSN 1440-3501

**INSTITUTE OF
TRANSPORT STUDIES**

The Australian Key Centre
in Transport Management

The University of Sydney
and Monash University

Established under the Australian Research Council's Key Centre Program.

NUMBER: Working Paper ITS-WP-03-11

TITLE: Quality Management in Logistics: A Comparison of Practices Between Manufacturing and Retail Companies and Logistics Firms.

ABSTRACT: In February 2002, the Institute of Transport Studies (ITS), The University of Sydney, initiated a study to investigate world class logistics (WCL) practices in Australia. This research is part of the wider WCL study investigating the state of quality practices in logistics in Australian companies. The study examines the extent to which quality management practices are adopted, impediments to implementation of quality improvement processes, quality management tools (simple) employed, methods used to measure customer expectations, and the extent of satisfaction with quality programs. In addition, the study compares the extent of quality practices between manufacturing and retail organizations, and logistics firms. The results show that manufacturing/service organizations are ahead of logistics firms in the application of quality management practices in the logistics functions.

KEYWORDS: Australia, logistics, logistics firms, manufacturing companies, quality management

AUTHORS: Shams Rahman

CONTACT: Institute of Transport Studies (Sydney & Monash)
The Australian Key Centre in Transport Management, C37
The University of Sydney NSW 2006, Australia

Telephone: +61 9351 0071
Facsimile: +61 9351 0088
Email: itsinfo@its.usyd.edu.au
Internet: <http://www.its.usyd.edu.au>

DATE: June 2003

1. Introduction

Today's global business environment is characterized by expanding foreign markets, more comprehensive information networks, improved transport and distribution systems, increased competition and customer expectations, combined with and greater levels of uncertainty. In such an environment, it is widely acknowledged that effective and efficient management of logistics and supply chain activities can provide a means of gaining competitive advantage. In recent years, logistics and supply chain management has received increasing attention, from both academics and managers alike (Holmes, 1995, Cross, et al., 1997, Power et al., 2001, Magretta, 1998, Shin, et al., 2000, Rahman, 2002).

In spite of evidence from around the world suggesting that effective quality management practices can lead to improved organizational performance (Stundza, 1990; AQF, 1991; Main, 1992; Kumar and Gupta, 1993; Sohal, 1995), the importance of quality management throughout logistics systems has not been fully realised. Quality is acknowledged as being critical to the value-adding process of product creation and delivery; orders requiring rework have been estimated to cost in excess of eight times the cost of properly produced and delivered customer requirement (Bowersox et al., 1985). Quality management involves being proactive in performing the right activity the right way the first time, and continuing to perform tasks to the required level. In logistics, that could translate into strategies aiming to make order cycle times shorter and more predictable, as well as maintaining certain levels of in-stock availability and certain fill rates on customer orders.

It has only recently been recognized that high quality logistics services at every stage of supply networks are an essential ingredient of successful supply chain management (Coyle et al., 1996, Choi and Rungtusanatham, 1999). Despite this, most recent studies on quality and logistics focused on a single company or on its immediate suppliers and customers (Tan et al., 1998, Ebrahimpour and Johnson, 1992). It is important to note that the quality level delivered to a final customer is the result of the quality management practices of each partner of supply chains, and hence each partner plays an important role in the production and distribution process. There is evidence to suggest that improving the quality of all logistics operations and supply chain stages results in reduced costs, improved resource utilization, and improved system efficiency (Beamon and Ware, 1998). Beamon and Ware (1998) developed a conceptual model for the assessment, improvement, and control of overall quality of supply chain systems. There are only few empirical studies which have investigated the effect of quality practices on logistics performance, from a supply chain management perspective. For instance, through an investigation of the supply chains of the US electronics components industry, Forker et al., (1997) demonstrated that quality management practices are related to organizational performance and suggested that companies should continue promoting quality management practices throughout their supply chains. Anderson and Jerman (1998) developed a causal model based on the criteria of Malcolm Baldrige Award to investigate the influence of quality practices on logistics performance. Their results showed that a significant relationship exists between level of quality practices and logistics outcomes, especially in logistics operational performance and customer service. Choi and Rungtusanatham (1999) reached a similar

conclusion when they compared quality management practices across various supply chains and industries. In a recent study of the textile apparel industry, Romano and Vinelli (2001) found that quality management practices and continuous monitoring of quality parameters in logistics activities can improve a company's ability to meet its customers' expectations.

2. Previous Surveys

The first comprehensive survey of the state of quality practices in logistics was conducted by Read and Miller (1991). This study investigated the application of quality practices in the logistics activities of North American and European companies, with the aim of gaining insight into the extent to which quality initiatives were practiced, how such programs were structured, and their main results. The study found that lack of pressure to initiate and lack of management support were the major obstacles to implement a logistics quality program. One of their critical findings was that logistics quality programs are not driven by overall business success factors.

Using a similar survey instrument, Millen and Maggard (1997) conducted a follow-up study to the Read and Miller (1991) study and provided a comparison of quality management practices between the two samples. The results showed much dissimilarity between the two studies. For example, the major obstacles for the implementation of quality programs found by Millen and Maggard (1997) was a lack of human and financial resources, as opposed to lack of pressure to initiate and managerial support, as found by Read and Miller (1991). Also, the Millen and Maggard (1997) study found a greater degree of quality practices implementation and quality tools usage across different areas of logistics operations compared with the Read and Miller (1991) study. A number of similarities between the two studies were evident, however. For example, managers in both studies agreed that quality will not return to a traditional role and these quality programs will be supported by management in the future. More recently, Sohal et al. (1999) investigated the adoption of quality practices in the logistics activities of Australian firms. There are many similarities between the main findings of the Sohal et al. (1999) and Millen and Maggard (1997) studies. This may be due to the fact that these two studies were conducted closer to time. This research examines the status of quality management practices in logistics in Australian companies. It also provides a comparison of quality practices between manufacturing and retail companies, and logistics firms.

3. Research Methodology

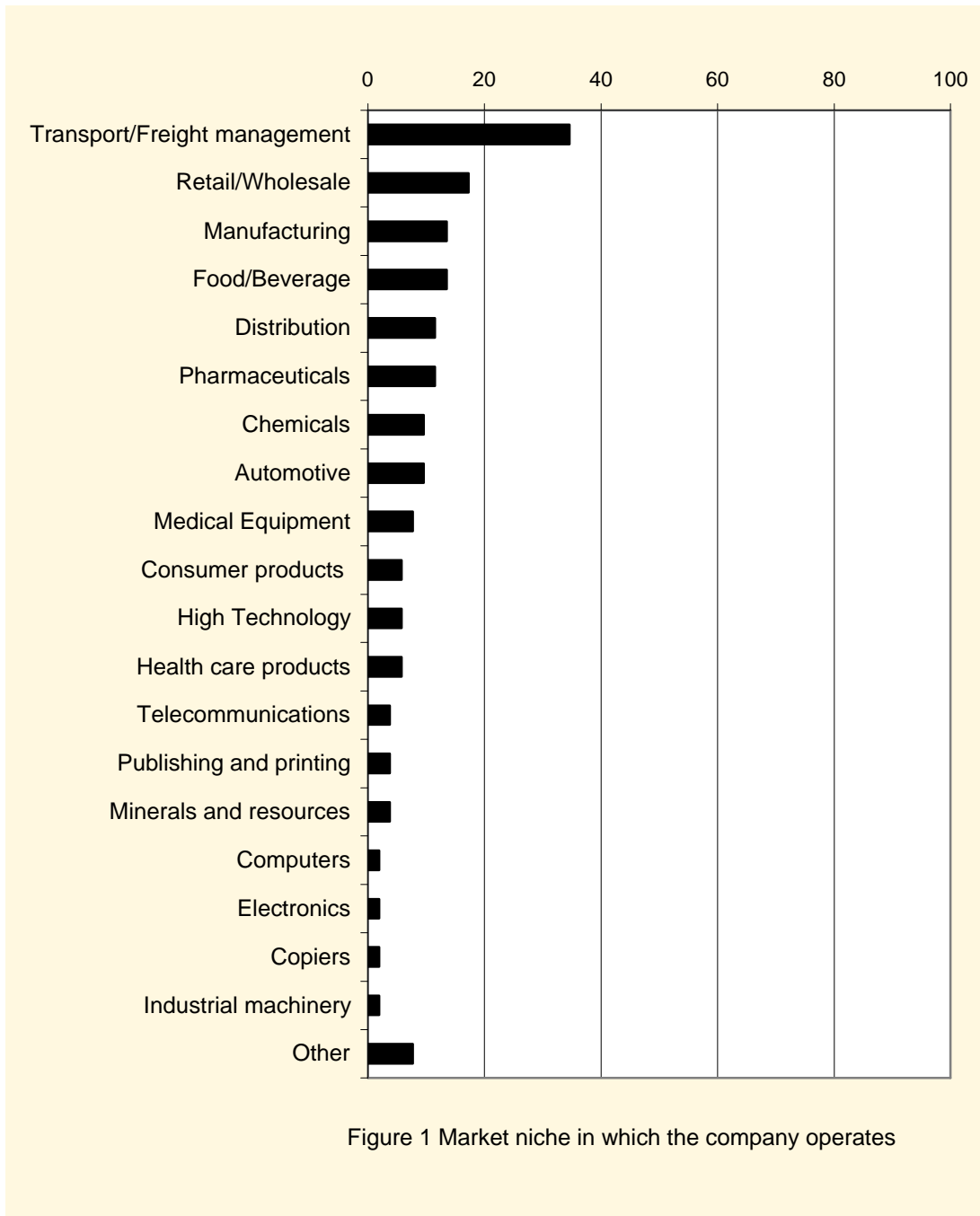
In February 2002, the Institute of Transport Studies (ITS), The University of Sydney, initiated a study to investigate world class logistics (WCL) practices in Australia. The research is part of the wider WCL study investigating the state of quality practices in logistics in Australian companies. The other objectives of the WCL study include examination of relationships between world class logistics practices and environmentally responsible logistics, and assessment of the logistics outsourcing market, the results of

which are under preparation. In this study, the survey instrument developed by Millen and Maggard (1997) was used with only minor modifications. The sample was drawn from companies listed in two published databases: Australia's Top 500 companies (Hardwick, 2001) and firms enlisted as members of Logistics Association Australia (LAA). Banks and other financial firms, insurance companies, and real estate companies were excluded from the list of Australia's Top 500 companies.

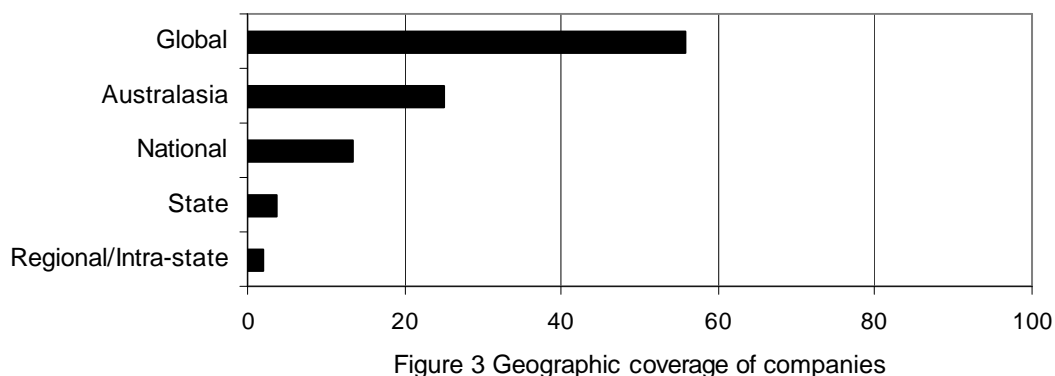
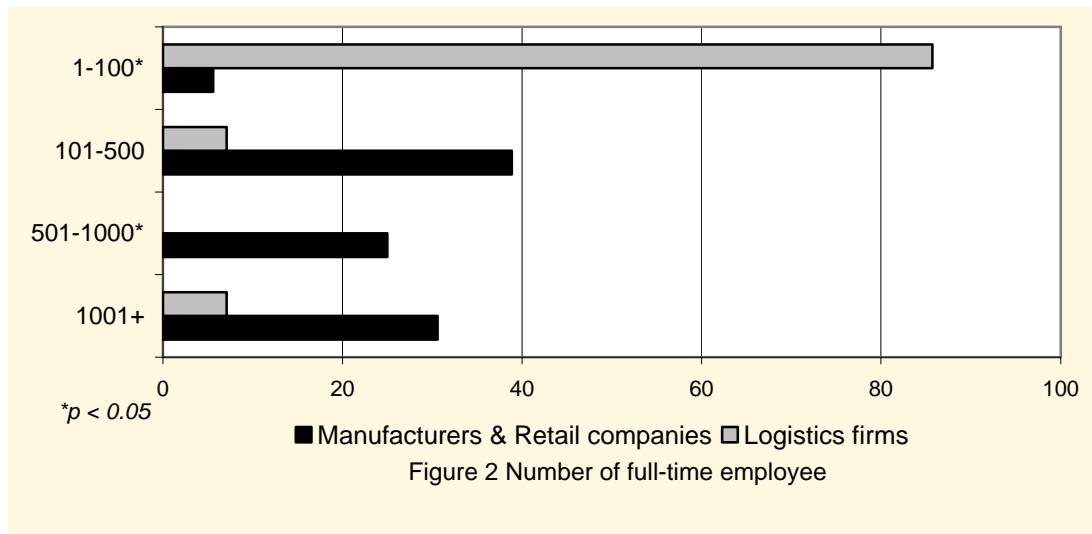
A total of 350 firms were selected for the study, consisting of 120 logistics, 103 manufacturing, and 127 retail/service companies. Logistics/Operations managers were identified and sent copies of survey questionnaires, together with a cover letter and a pre-paid reply envelope. In order to maximize the response rate and to avoid non-response bias affecting the generalisability of the findings, the following procedure was used. First, companies listed in the database of participants were contacted by phone. The names of the relevant managers and their current contact details were obtained. An attempt was made where possible to speak to the relevant manager about the aim and the content of the survey. Then a reminder call was made to the relevant managers approximately two to three weeks after the mail out. Those who had not responded were encouraged to do so, and those who had not received the package were sent a second copy. The survey resulted in 54 responses, a response rate of 17%. This response rate was expected in view of the length and complexity of the survey and was considered acceptable.

3.1 Profile of the respondent

The respondents were asked in which market niche their companies operated. The responses are summarized in Figure 1. About 35% of the companies indicated that transport/freight management is their niche market followed by retail/whole (17.3%) and manufacturing (13.5%). However, a vast majority of logistics firms selected transport/freight management (75%) as their market niche, followed by distribution (37.5%).



Majority of the logistics firms (85.7%) had between 1 and 100 full-time employees and a large proportion of manufacturing and retail companies (38.9%) had between 101 and 500 (Figure 2) employees. About 7% of the logistics firms had employees over 1000 employees and about one-third (30.6%) of the manufacturing and retail companies had employees over 1000 employees. More than half of all firms (55.8%) operated globally (Figure 3).



4. Quality practices in logistics

This section of the study examines the extent of quality management practices in logistics functions. Unlike previous studies (Read and Miller, 1991; Millen and Maggard, 1997; Sohal et al, 1999), this study also compares the extent of these practices between manufacturing/service organizations and logistics firms. To ascertain any significant differences between the two categories of firms, t-test was employed either at 0.05 or 0.01 level of significance.

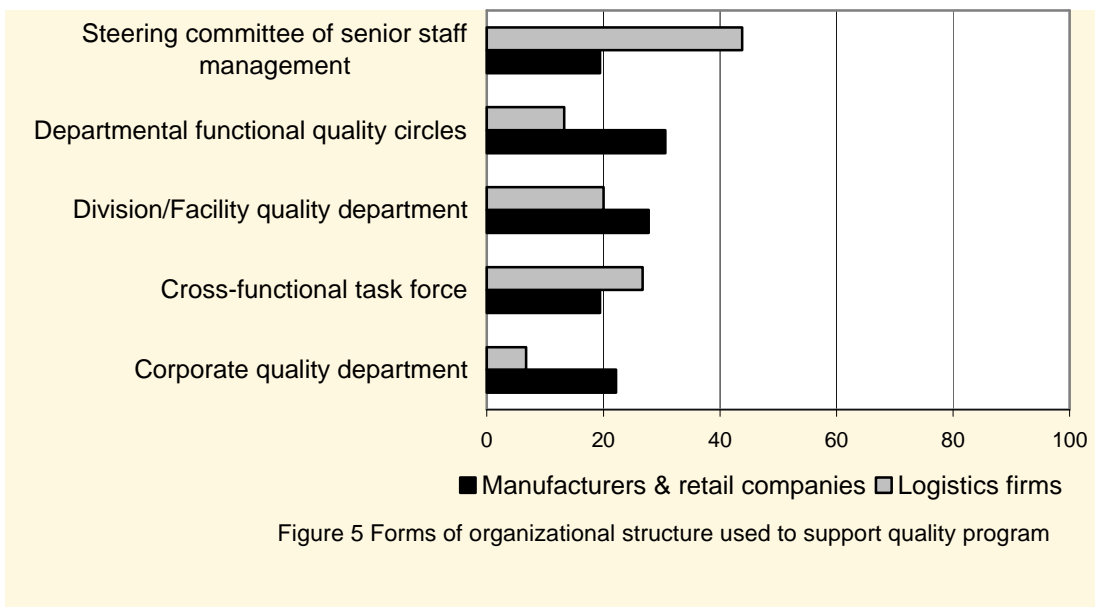
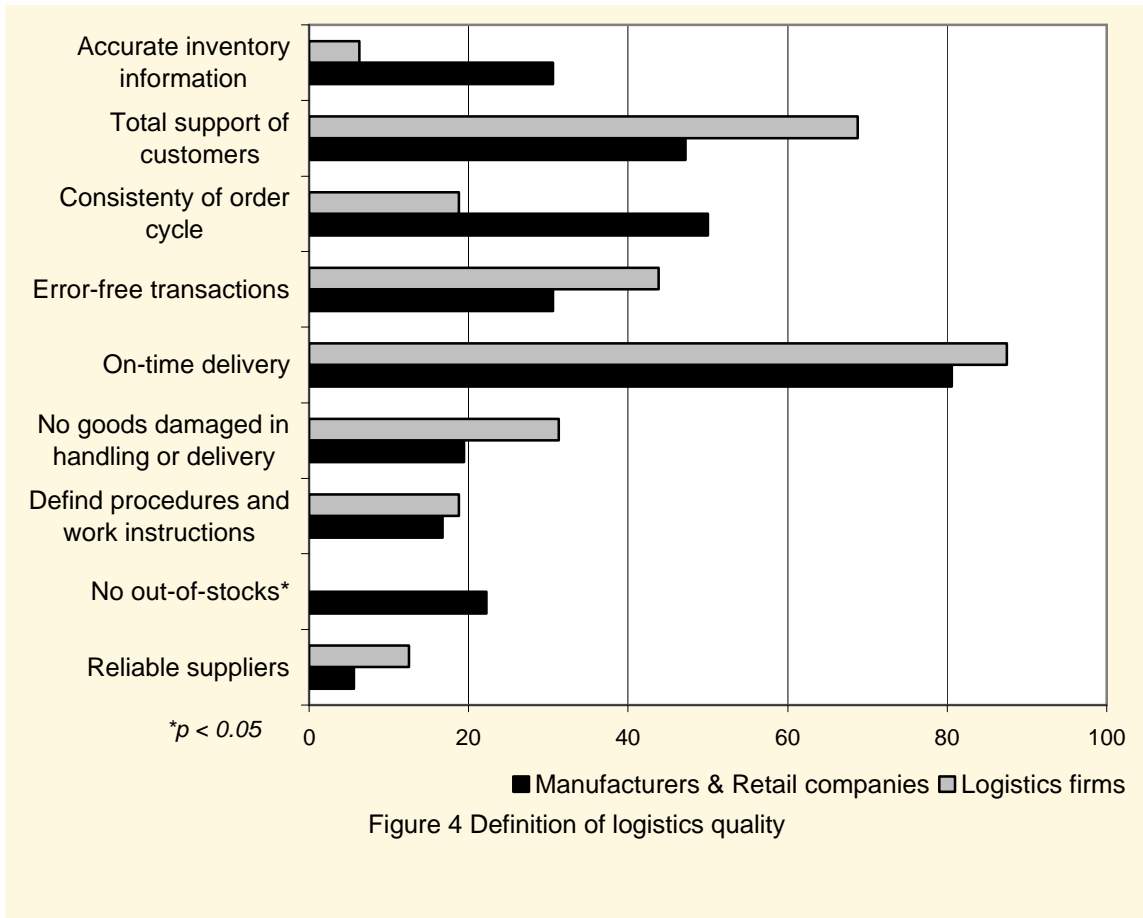
4.1 Definition of logistics quality

Managers were asked how they define logistics quality by identifying its three most important components that define quality in logistics, from a total of nine different components (Figure 4). Respondents ranked 'on-time delivery' (82.7%), 'total support of customer needs' (53.8%), and 'consistency of order cycle' (40.4%) as the most important.

The top two components that identify quality for logistics firms were 'on-time delivery' (87.5%) and 'total support of customer needs' (68.8%), whereas, the top two components for manufacturing and retail companies were 'on-time delivery' (80.6%) and 'consistency of order cycle' (50.0%). This is consistent with the findings of other studies (Millen and Maggard, 1997; McMullan, 1996). 'On-time delivery', and 'order cycle' are frequently cited in literature as critical measures of logistics performance (Gunasekaran et al., 2001, Beamon, 1999). These non-cost measures are used in practices along with cost measures within the scorecard and supply chain operations reference (SCOR) performance models. No manager of the logistics firms believed out-of-stocks to be an important component of logistics quality. Compared to the logistics firms, a high proportion of manufacturing and retail companies (30.6%) viewed 'accurate inventory information' as an important logistics quality indicator. This finding suggests that accurate information on inventory is becoming increasingly important, probably because of the increased uptake of vendor-managed inventory (VMI) and efficient customer response (ECR) management practices.

4.2 Organisation and involvement

To understand the organizational aspects of quality programs, managers were asked to indicate the forms of organizational structure used and people involved in them. Figure 5 shows the results of forms of organizational structure used to manage the quality management and improvement processes. Top-ranking was the use of a steering committee of senior management (26.1%), closely followed by 'quality circles' (25.1%) and 'quality department' (25.1%). This indicates that companies use several forms of organizational structure to support quality program. When two categories of firms were compared, it was found that steering committees were used frequently (43.8%) by logistics firms whereas, while quality circles were commonly used by manufacturing and retail companies (30.6%).



Respondents were provided with four approaches which could be used to administer a logistics quality program, and asked to choose those alternatives that applied to their organisations. The results are shown in Figure 6. The two most frequently used approaches were ‘specific employees dedicated to quality projects’ (44.2%) and ‘all employees having some quality project responsibilities’ (41.9%). Although the intensity of usage of different approaches in this study differs from the findings of Millen and Maggard (1997), the overall ranking of the approaches were the same. Very few programs (11.6%) were managed through an external department and no programs of logistics firms were managed through an external department.

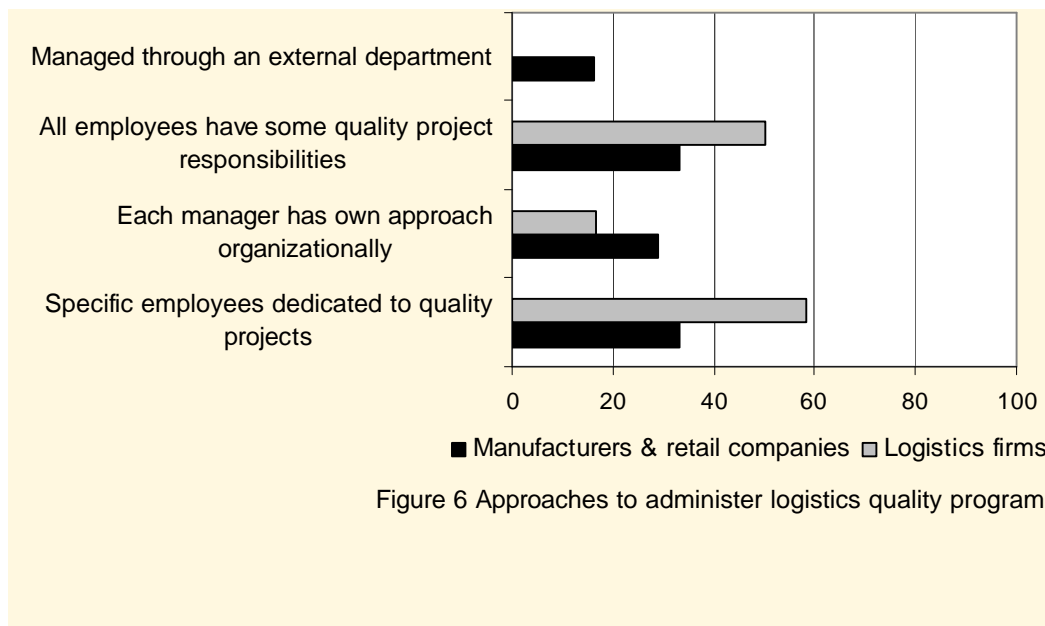
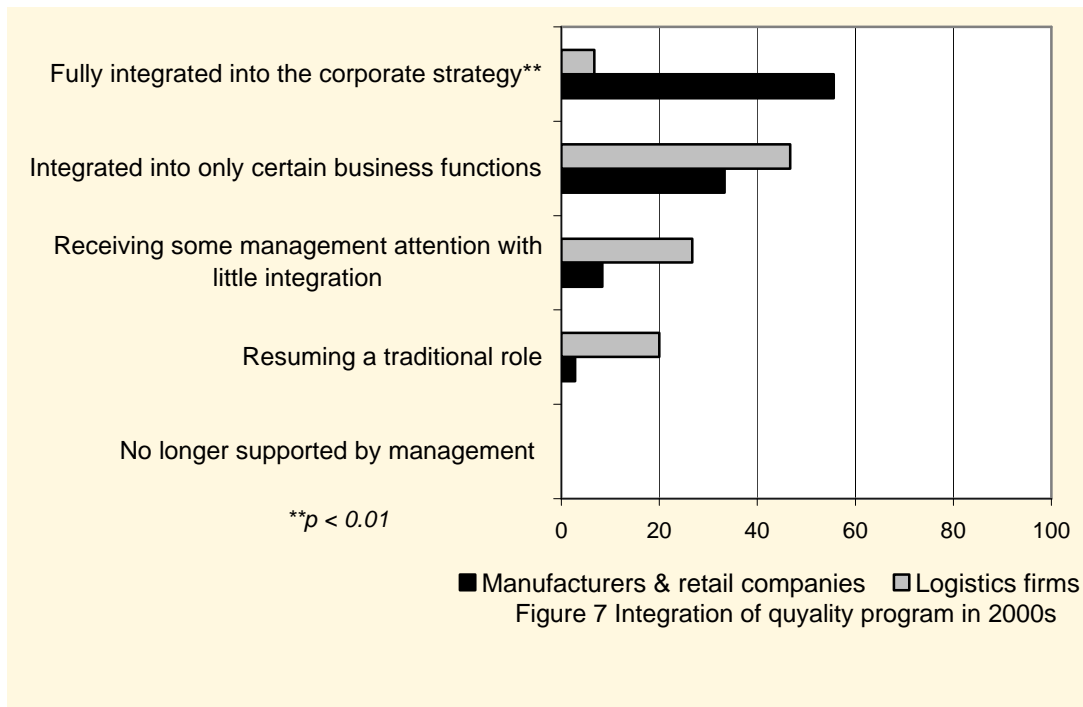
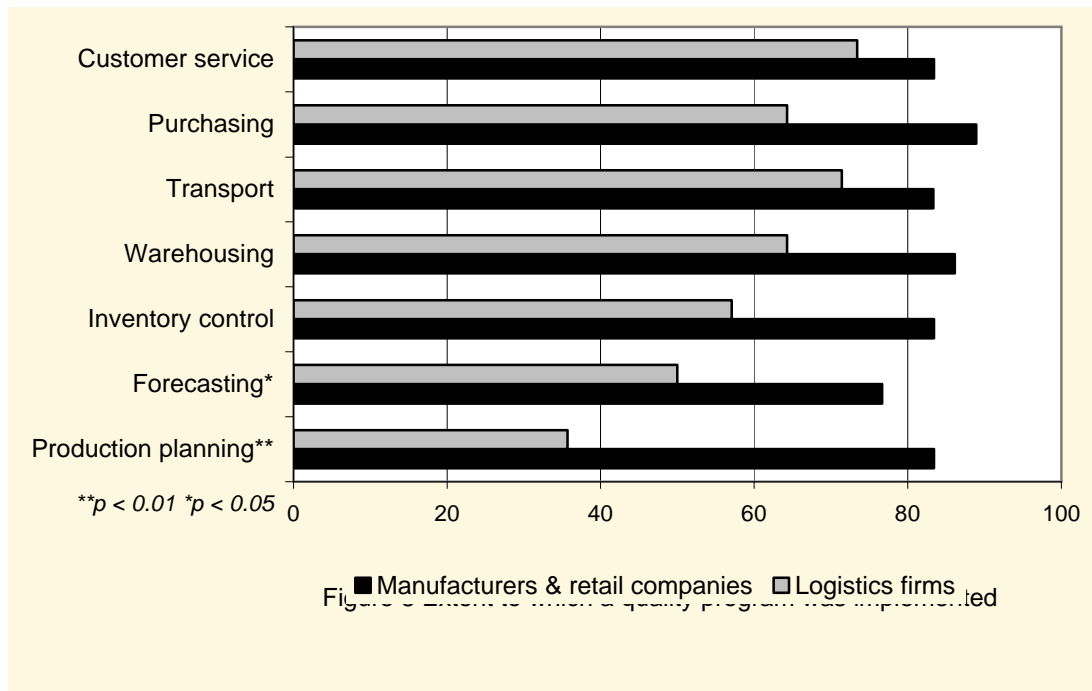


Figure 6 Approaches to administer logistics quality program

Managers were asked the extent to which quality programs are, or would be, integrated into the company as a whole (Figure 7). No respondent in either type of companies believed that their quality programs would not be supported by management in the future, however, the two groups disagreed as to how integrated the quality programs would be. The managers of manufacturing and retail companies were significantly more confident that the quality programs would be fully integrated into the corporate strategy (55.6%) than the managers of the logistics firms (6.7%). One possible explanation for this is that many logistics firms may not yet see that pursuit of quality should be an integral part of the overall business process. Interestingly, 20% of the logistics firms believed that quality would resume a traditional role in the future compared to only 2.8% in the manufacturing and retail companies.



Seven different functions within logistics were listed in the questionnaire, and managers were asked to indicate the extent to which a logistics quality management program was implemented in these functional areas. The functional areas were ranked from most implemented to least implemented. Figure 8 presents these results. Overall, purchasing (82%) and customer service (80.4%) functions were identified as the areas in which a quality program had been implemented extensively. Production planning was found as the area in which quality programs were least implemented (70%). These findings are similar to the findings of Sohal et al. (1999) and Millen and Maggard (1997). The managers of manufacturing and retail companies indicated a greater degree of implementation across all areas of logistics management compared to the managers of the logistics firms. However, the difference is significant only in the areas of forecasting and production planning. This may be related to the fact that production activities such as components and final assembly, packaging are not frequently used third-party logistics services in Australia (Dapiran et al., 1996).



4.3 Quality measurement and improvement

Three questions were asked to assess the effectiveness of quality programs, performance benchmarks, and tools used to measure improvement. Organisations use a variety of procedures to learn about the effectiveness of their quality efforts and to set targets (Figure 9). The most frequently cited method by managers was ‘quality audit by internal resources’ (70.6%). This finding is consistent with the findings of the previous studies (Sohal et al., 1999, Millen & Maggard, 1997; Read & Miller, 1991). Compared to logistics firms (46.7%), a significantly high proportion of manufacturing and retail companies used ‘quality audits by internal resources’ (80%). While the use of third-party audits (i.e., external quality audits) was common among the manufacturing and retail companies (47.2%), none of the logistics firm used this procedure. The managers of manufacturing and retail companies indicated a greater usage of all procedures except ‘competitive benchmarking’.

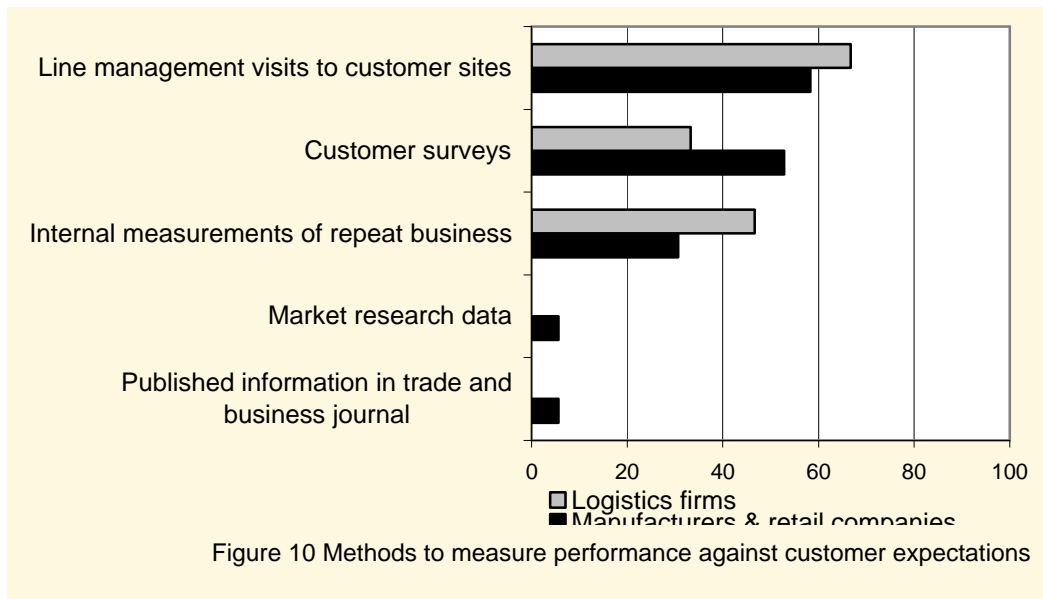
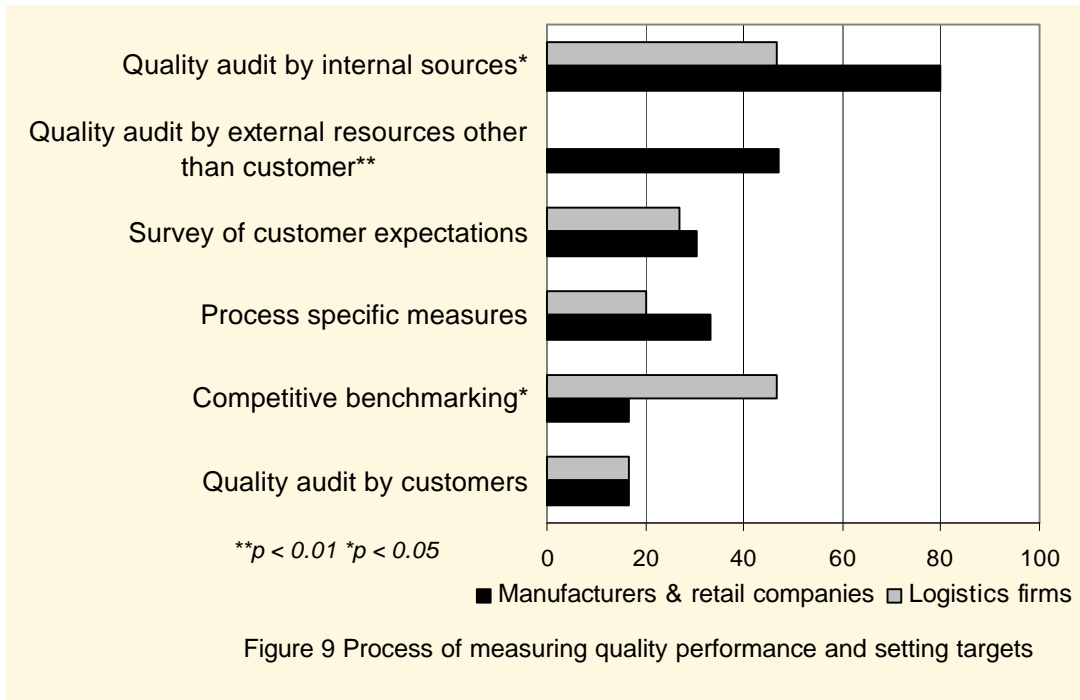
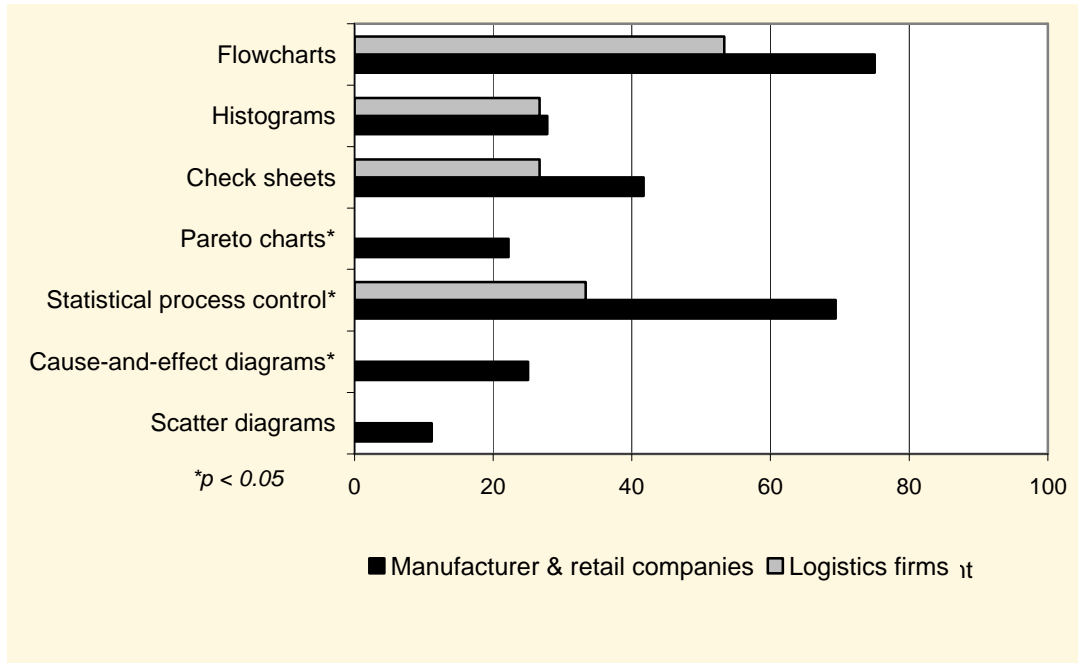


Table 10 shows the extent to which various methods are used by companies to benchmark performance against customer expectations. Three most frequently applied techniques were ‘line management visits to customer sites’ (60.8%), ‘customer surveys’ (47.1%), and ‘internal measurements of repeat business’ (35.3%). These results suggest that the participating organizations are customer-focused and utilizing a variety of methods to assess customer needs and expectations. Compared to the logistics firms, more manufacturing companies employ ‘customer survey’ techniques to ascertain customers’ expectations. In general, logistics firms did not use ‘market research data’ and ‘published

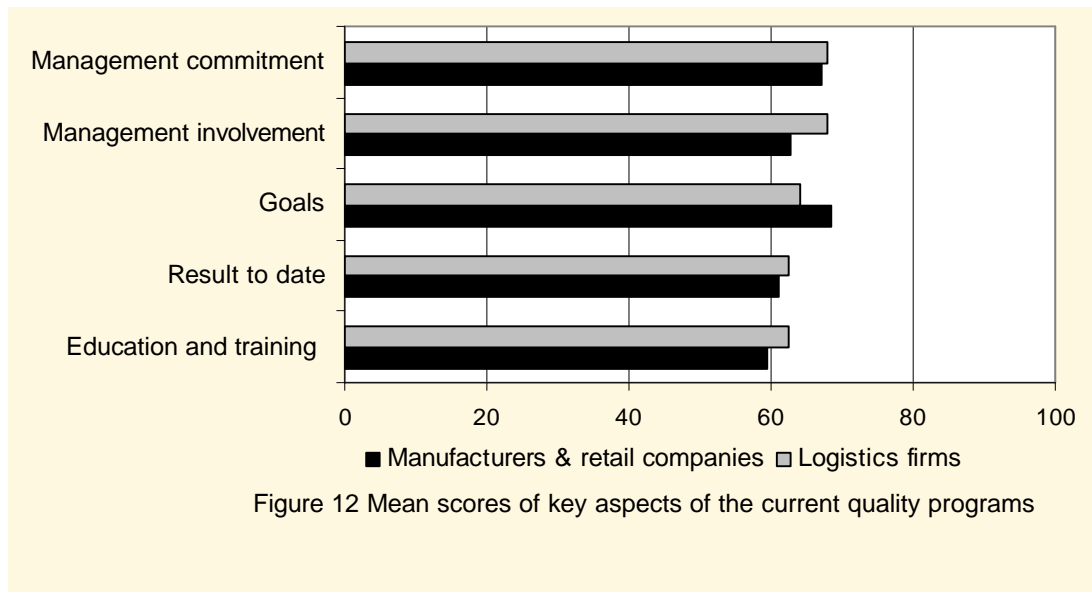
information in trade and business journals’, whereas a small number of manufacturing companies used such techniques (5.6%).



Managers were asked to indicate the tools they used to identify and track improvements in processes (Figure 11). More commonly used tools are ‘flow charts’ (68.6%), ‘statistical process control’ (58.8%), ‘check sheets’ (37.3%) and ‘histograms’ (27.5%). The results are similar to the findings of Millen and Maggard (1997). However, the managers of manufacturing and retail companies indicated a greater degree of application of these tools across all areas of logistics management compared to the managers of the logistics firms. The results also showed that the logistics firms do not use tools such as ‘cause-and-effect diagrams, pareto charts, and scatter diagrams. Compared to logistics firms, significantly more manufacturing companies use statistical process control (69.4% compared to 33.3%) and flowcharts (75% compared to 53.3%). Since traditionally control chart is used in the production area, this result does not come as a surprise.

4.4 Satisfaction with the existing quality program

The respondents were asked to show the extent of their satisfaction with each of the key quality processes using a scale of 1 (very dissatisfied) to 5 (very satisfied) (Figure 12). The mean scores for each aspect were calculated, and these were used to rank order the various aspects of quality program. Obtaining ‘management commitment’ and achieving the set ‘goals’ were identified as the two aspects of logistics quality program that gave managers the most satisfaction. Obtaining ‘management commitment’ and ‘management involvement’ gave managers of logistics firms most satisfaction, while achieving ‘goals’ gave managers of manufacturing companies most satisfaction. However, it is important to recognize that the extent of satisfaction is relatively moderate (between 59 and 68%). Managers were least satisfied with the education and training aspect of quality program.



4.5 Quality program implementation problem

The factors that impeded the implementation of the quality management program in logistics were also investigated and the results are shown in Figure 13. ‘Establishing employee ownership of the quality process’ and ‘changing the corporate culture’ were the two most significant impediments. Significantly greater number of manufacturing & retail companies rated this factor as being the impediment (66.7%) than the logistics firms (26.7%). The managers of logistics firms saw ‘changing corporate culture’ (40%) and ‘training and education of employees’ (40%) as the two most significant factors obstructing the institution of quality improvement process in their organizations. In addition, the result showed that ‘executive commitment’ was the least likely impediment to quality improvement process for both groups.

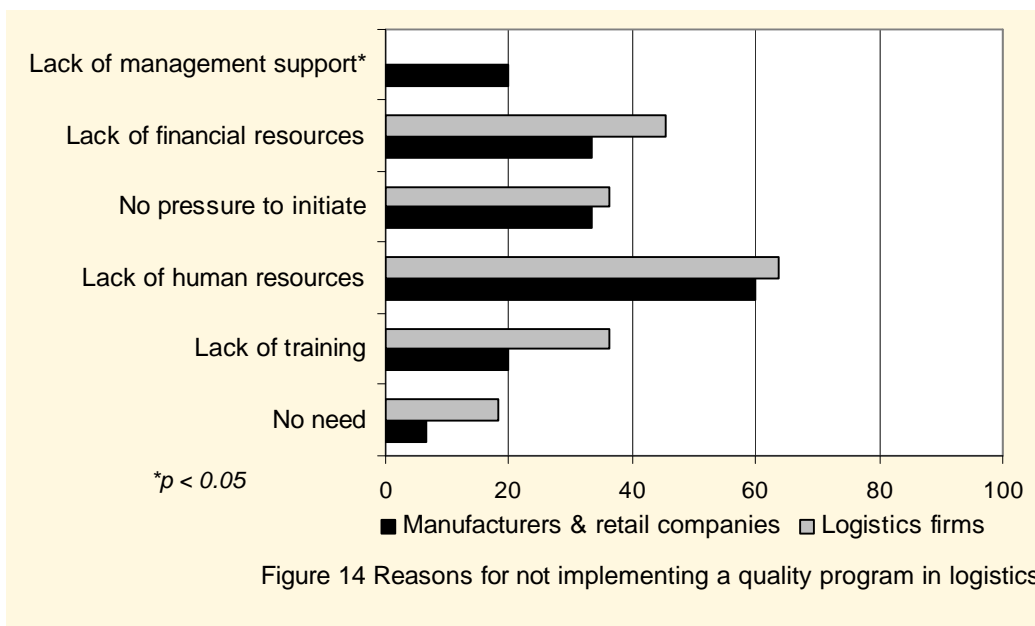
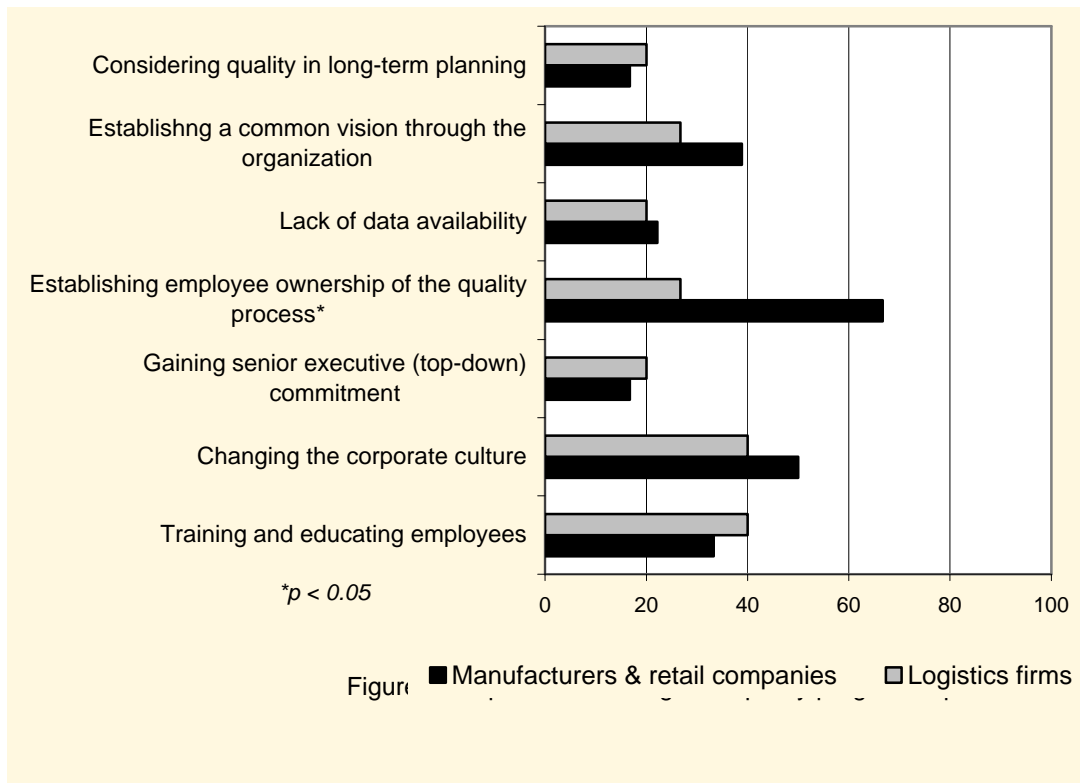


Figure 14 shows the reasons given by managers for not implementing a quality management program in logistics functions. 'Lack of human resources' (61.5%) and 'lack of financial resources' (38.5%) were identified as the major reasons for not implementing a quality program. Millen and Maggard (1997) came to similar conclusions in their research in the context of American companies. When comparisons were made between manufacturing and logistics firms, the results indicated that the reasons such as 'lack of

human resources', 'lack of financial resources', and 'lack of training' were more severe in the case of logistics firms. 'Lack of management support' is not considered by the managers of logistics firms as a reason for not implementing a quality program, whereas, 20% of the manufacturing companies believed that it is a concern.

5. Conclusion

This research examined the status of quality management practices in logistics in Australian companies. Overall, the results indicated that many firms have successfully implemented quality programs in logistics functions. Over fifty percent of the firms were satisfied with their current quality programs. The top two components that identified quality in logistics were 'on-time delivery' and 'total support of customer needs'. The participating companies used several forms of organizational structure to support quality program which include 'steering committee of senior management', 'quality circles', and 'quality department'. The primary obstacles for not implementing quality programs in logistics functions were 'lack of human resources', and 'lack of financial resources'. Most commonly used tools to identify and track improvements in processes were 'flowcharts', 'statistical process control', and 'check sheets'. While the use of third-party audits was common among the manufacturing and retail companies, none of the logistics firm used this procedure. While obtaining 'management commitment' and 'management involvement' gave managers of logistics firms most satisfaction, achieving 'goals' gave managers of manufacturing companies most satisfaction.

6. Managerial Implications

It is evident from this study that high quality logistics service is critical to customer service. This requires logistics managers identify necessary quality managements, and to apply them effectively in all areas of logistics functions. The results of this study indicate that participating companies assigned relatively less importance to the 'reliable suppliers' (7.7%). Supplying right product at right time in right quantity at right place is critical to running effective logistics systems. The results of this survey suggest that logistics managers of both manufacturing and logistics firms need to improve their perception on this aspect of logistics quality.

This study provided a comparison of quality practices between manufacturing and retail companies and logistics firms. Overall, manufacturing companies are ahead of logistics firms in the application of quality management practices in the logistics functions. No respondent in either type of companies believed that their quality programs would not be supported by management in the future, however, the two groups disagreed as to how integrated the quality programs would be. The managers of the manufacturing and retail companies were significantly more confident that the quality programs would be fully integrated into the corporate strategy (55.6%) than the managers of the logistics firms (6.7%). To achieve satisfactory results through quality practices, managers of logistics

firms must understand that the quality programs should be integrated into the corporate strategy. This view has been frequently expressed in the quality management literature.

The results of this study show that the managers of the logistics firms rated quality indicators such as 'consistency of order cycle' (18.8%) and 'accurate inventory information' (6.3%) poorly. The results suggest that managers of logistics firms should realize that 'consistency of order cycle' and 'accurate inventory information' are two critical aspects of service quality and must give appropriate attention to these quality indicators.

The managers of manufacturing and retail companies indicated a greater degree of implementation of quality programs across all areas of logistics management compared to the managers of logistics firms. Manufacturing and service firms are ahead even in areas which are traditionally considered to be the core business areas of logistics firms such as transport, warehousing, inventory management. Managers of logistics firms must learn skills and effectively apply them in various areas of logistics management.

References

- Anderson R D, Jerman R E & Crum M R (1998) "Quality management influences on logistics performance", *Transportation Research Part E*, 34, 2, 137-148.
- AQF American Quality Foundation (1991), *International Quality Study: Top Line Findings*, Report No 1, USA
- Beamon, B M (1999), "Measuring supply chain performance", *International Journal of Operations and Production Management*, 19, 3, 275-292.
- Beamon B M & Ware T M (1998) "A process quality model for the analysis, improvement and control of supply chain systems", *Logistics Information Management*, 11, 2, 105-113.
- Choi TY & Rungtisanatham M (1999) "Comparisons of quality management practices: across the supply chain and industries", *The Journal of Supply Chain management*, 35, 1, 20-27.
- Coyle JJ, Bardi CJ & Langley CJ (1996) *The Management of Business Logistics*, West Publishing Company, St. Paul. MN.
- Cross DJ, Goldsby T, & Clinton SR (1997) "Information technology influences on world class logistics capability", *International Journal of Physical Distribution and Logistics Management*, 27,1, 4-17.
- Dapiran, P, Lieb, R, Millen, R, and Sohal, A (1996), "Third party logistics services usage by large Australian firms", *International Journal of Physical Distribution and Logistics Management*, 26, 10, 36-45.

Ebrahimpour, M and Johnson, J L (1992), "Quality, vendor evaluation and organizational performance: a comparison of US and Japanese firms", *Journal of Business research*, 25, 2, 129-142.

Forker LB, Mendez D, & Herhauser JC (1997) "Total quality management in the supply chain: what is its impact on performance", *International Journal of Production Research*, 35, 6, 1681-1701.

Gunasekaran, A, Patel, C and Tirtiroglu, E (2001), "Performance measures and metrics in supply chain environment", *International Journal of Operations and Production Management*, 21, 1/2, 71-87.

Hardwick S (2001) *Australia's Top 500 Companies 2000-2001/ By The Business Who's Who of Australia Dun & Bradstreet Australia*, Sydney.

Holmes G (1995) *Supply chain management: Europe's new competitive battleground*, EIU Research Report.

Kumar, S. and Gupta, Y. P(1993) "Statistical control at Motorola's Austin Assembly Plant", *Interfaces*, 23,2, 84-92.

Magretta J (1998) "Fast, global, and entrepreneurial: supply chain management, Hong Kong style: An interview with Victor Fung", *Harvard Business Review*, 103-114, September-October.

Main, J., 1992, *How to Steal the Best Ideas Around Fortune*; 126,8, 102

McMullan, A (1996), "Supply chain management practices in Asia Pacific today", *International Journal of Physical Distribution and Logistics Management*, 26, 10, 79-95.

Millen R & Maggard M (1997) "The change in quality practices in logistics: 1995 versus 1991", *Total Quality management*, 8, 4, 173-179.

Power D, Sohal AS & Rahman S (2001) "Critical success factors in agile supply chain management: an empirical study", *International Journal of Physical Distribution and Logistics management*, 31, 4, 247-265.

Rahman S (2002) "The theory of constraints' thinking process approach to developing strategies in supply chains", *International Journal of Physical Distribution & Logistics Management*, 31, 10, 809-828.

Read WF & Miller M (1991) "The state of quality in logistics", *International Journal of Physical Distribution & Logistics Management*, 21, 6, 32-47.

Romano P & Vinelli A (2001) "Quality management in a supply chain perspective: strategic and operative choices in a textile-apparel network", *International Journal of Physical Distribution & Logistics Management*, 31, 4, 446-460.

Shin H, Collier DA, & Wilson DD (2000) "Supply management orientation and supply/buyer performance", *Journal of Operations Management*, 18, 317-333.

Sohal, A S (1995), *Quality Practices in Australian Firms*, Monash University/Ernst & Young Report, Department of Management, Monash University, Melbourne.

Sohal AS, Millen R, Maggard M, & Moss, S (1999) "Quality in logistics: a comparison of practices between Australian and North American/European firms", *International Journal of Physical Distribution & Logistics Management*, 29, 4, 267-280.

Stundza, T (1990), "Good quality systems are those that work", *Purchasing*, January 18, pp. 160A21, 160A25, 160A27, 160A31.

Tan K C, Kannan, V R and Handfield R B (1998), "Supply chain management; supplier performance and firm performance", *International Journal of Purchasing and Materials Management*, Summer, 2-9.