Production Management Practice in New Zealand: A Survey

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Abstract

This paper presents a preliminary report on a postal survey of production managers in New Zealand. The respondents were asked questions about the tasks and responsibilities of production managers, and their perception of the practical relevance of production management topics commonly taught in tertiary institutions. The results presented here mainly address this issue of relevance. The motivation of the study comes from the many studies done overseas which have questioned the practical relevance of the production management curriculum. A preliminary conclusion is that although some variations exist, the situation in New Zealand is not very different from other countries.

1 Introduction

Recent government policy changes have exposed New Zealand manufacturers increasingly to global competition. Firms are customer-oriented in the global arena, and they compete on the basis of cost, quality, customer tailoring, and market response time. This pressure to perform is further aggravated by the decreasing product life cycle caused by rapid innovation. Recent developments in manufacturing philosophy such as just-in-time, flexibility, lead time reduction, and total quality control; and recent developments in manufacturing technology such as robotics, flexible manufacturing systems, and computer aided manufacturing have placed further demands on the production management (PM) function [20].

How well is the profession of production management in New Zealand standing up to these challenges? Recent evidence [1, 8] shows that while the performance is generally poor, some companies are doing particularly well. However, these studies do not go into the tasks and responsibilities faced by production managers. Some research have been done abroad to study PM practice, and there exists a somewhat dated study of the New Zealand production executive done in 1981 [18], but little is known about current production management practice in New Zealand, particularly in the face of competitive pressures mentioned above. This issue of production management practice is of particular importance in the design of education and training programmes for production managers. According to evidence collected overseas, the relevance of PM education to the tasks involved in PM is scant [10].

This paper presents a preliminary report on a postal survey of production managers in New Zealand. The results presented here address mainly the practical relevance of current tertiary PM education. Section 2 presents a review of the literature; a summary of some responses of the survey is given in Section 3. Finally, some concluding remarks are offered.

2 Literature Study

Green, Newsom, and Jones [7] surveyed American Fortune 500 companies to gather information on their use of quantitative production and operations management (POM) techniques, and the barriers to their use. Of the 19 techniques surveyed, only 7 were of frequent use or extensive use - network analysis, inventory models, linear programming, time series analysis, regression and correlation analysis, analysis of variance, statistical sampling. The main barriers to the use of quantitative techniques were: benefits of using the techniques not being clearly understood by managers, managers' lack of knowledge of the techniques, and managers not having been exposed to quantitative techniques early in their training. All of these indicate that lack of knowledge is the prime reason for not using the techniques.

Berry *et al*. [3] asked POM practitioners about the frequency of use of 22 POM topics. Practitioners also indicated appropriate educational coverage for the topics. Academics also provided information on current educational coverage of these topics in introductory POM courses and on what the ideal coverage would be. The practitioners' desired coverage matched their frequency of use of the topics quite closely. Similarly, the academics were currently covering the topics pretty close to their ideal level. But there was a wide divergence between the views of the practitioners and the academics. Practitioners would allow two-thirds of the total time to concepts - oriented topics (and one-third to technique - oriented topics). But the academics would allow about equal time to these different orientations. Seven of the eight topics favoured by academics could be considered analytical techniques, while nine of the eleven topics favoured by practitioners could be considered production concepts. Possible explanations of this discrepancy offered by the authors were: practitioners' lack of familiarity with some of the analytical techniques, practitioners' lack of understanding on how some of the concepts such as human / monetary aspects are taught in courses without the POM banner, ease of teaching / testing analytical techniques, students' better response to analytical techniques, or unavailability of concepts related teaching materials. Later, Berry and Lancaster [2] used a revised list of 22 production management topics to solicit views of practitioners only. The new data again reinforced the importance of concept related topics to the practitioners.

Two significant studies of qualifications, careers, and jobs of British production managers have been reported [9, 14]. They [9] found that production managers spent most of their time (30%) in directly facilitating production. Improvements to processes and products and labour/staff relations claimed the second (20.6%) and third (17.9%) slice of their time. Lockyer and Oakland [9] also demonstrated the lack of use of POM techniques. Economic order quantity (57%), critical path analysis (52%), and classification and coding (50%) were the three most frequently used techniques. This study reinforces the dissonance between the practice and teaching of production management - POM techniques were not used in practice to a great extent. The latter, Oakland and Sohal [14] report found that essentially the same condition prevailed ten

years later, although some improvements could be noticed, particularly in the education of production managers. This latter report also pointed out the need for training production managers in information technology, computer aided manufacturing, and finance and management accounting.

For certain decision areas, the extent of responsibility of the production managers, the extent of complexity and difficulty, and the proportion of time spent were surveyed by Wild [19]. The highest extent of responsibility were in the areas of work design, quality assurance, factory layout, capacity planning, and productivity. Production managers found decision making in the areas of productivity, capacity planning, and process design the most complex. They spent the most of their time in the areas of productivity, capacity planning, and production control. They reported that they needed to interface most with the departments dealing with human resource, marketing, and design. They pressed the highest emphasis on skills in managing people ahead of problem solving skills and technical skills. They thought skills in analytical/quantitative techniques, which are emphasised by POM curriculum, were lower in importance. In the future, they saw computers, manufacturing automation, and productivity improvement as affecting their job the most. Wild's study, although a little dated, showed the curriculum areas on which production management instructors should stress most - people skills, productivity measurement and improvement, work design, quality, layout, capacity planning, and production control, and inter-functional issues with marketing and design. Studies done in India [11] and Singapore [17] essentially reinforced Wild's findings [19] in United Kingdom, although there were few differences in emphasis.

In a survey of British manufacturing industry, Oakland and Sohal [12, 13] examined the usage of POM techniques and barriers to the acceptance of these techniques. The top five traditional techniques were: budgetary control, payback period, return on investment, standard costing and reorder level stock control; and the top five OR/statistical techniques were: stock control based on reorder level/cycle, forecasting, economic order quantity, statistical sampling and experimental design. The top three barriers to use of both kinds of techniques were: No knowledge, not applicable, and successful without using the technique. Significantly, more than half the respondents did not use more than half of the techniques surveyed, and as for most of the people who did not use the techniques much, they either did not know the techniques or if they knew, did not think the technique was applicable. This certainly brings into sharp focus the question of relevance of POM techniques. However, rather than questioning the relevance of POM techniques per se, the authors suggest teaching the techniques in a way that would illustrate their applicability and benefits. This study also sought to establish the relationship between previous POM training and technique usage. It concluded that POM training was a significant factor in the usage of techniques.

Malhotra [10] points out that the current focus of modelling methodology in the POM discipline has narrowed the relevance of POM teaching and research. He has suggested five approaches to make POM teaching and research more relevant. He stresses the need for empirical research with an emphasis on strategic decision making in POM, along the lines of other social science research. Traditional modelling research should be rooted in practice; the POM research and curricula need to be more internationalised in the face of growing globalisation; POM teaching should move away from the narrow functional outlook to a more cross-functional perspective;

journal editors and reward systems should encourage more relevant POM research. The increasing importance of international pedagogy was pointed out also by Schmenner [16].

2.1 Production Management in New Zealand

Very few published studies of production management practices in New Zealand are available. Turner and Radford [18] essentially replicated the study of the production manager done in the UK [9]. In comparison to the British production manager, the New Zealander was found to control fewer subordinates, but to be responsible for a wider variety of functions. The New Zealand production executive was more happy with their job than their British counterpart. While the British study lamented the educational levels of the British production manager, the educational level of the New Zealander was found to be even lower. Thus Turner and Radford [18] make a plea to provide further training to production executives.

Dallenbach [[6] in his survey of the penetration of operations research in New Zealand found that the top application areas were: inventory control, sales forecasting, production planning and scheduling, and critical path scheduling; all of which are applicable to production management.

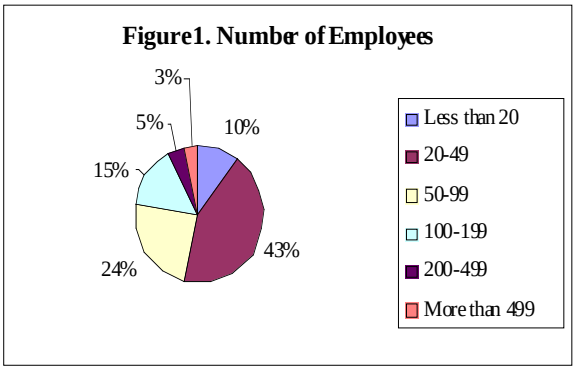
Corbett [4], as part of the global manufacturing futures survey, assessed the competitive priorities and perceived strengths of New Zealand manufacturers. The results of NZ survey were compared with other international surveys. He found that, in general, NZ manufacturers have similar competitive priorities to the other countries that were surveyed. The NZ respondents perceived their price and performance as weak areas. Corbett and Bayly [5] surveyed just-in-time (JIT) implementers in New Zealand to determine the perceived benefits, success factors, and problems related to JIT implementation. The respondents reported the implementation as beneficial to them in many respects, but it needed hard work and commitment. They did not find it suitable for all manufacturing operations, specially where overseas suppliers were involved. This survey targeted known JIT implementers. Hyde *et al*. [8] concluded from their survey of New Zealand manufacturers that the prevalence of world class manufacturing practice was low, although some exceptions existed. The low educational levels of the work force and their supervisors, and the isolation of New Zealand were seen as formidable barriers to the diffusion of world class practices in manufacturing.

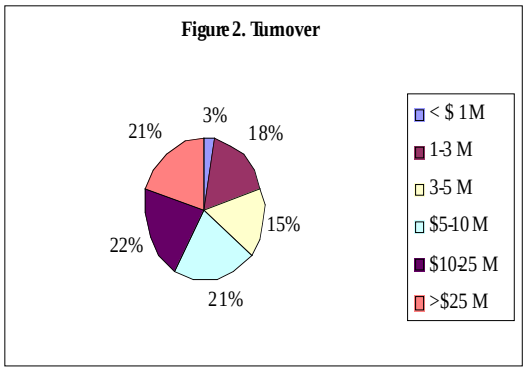
In a survey of tertiary operations management programmes in New Zealand, Robb and Heyl [15] lament that few papers were dedicated to areas such as time-based competition, flexibility, new product / service development, process improvement, project management, and international operations management. However, they believe that the university faculty were responsive to the demands for skills in modelling, problem solving / critical thinking, strategic thinking, and group work.

3 The Respondents

The larger manufacturing organisations in New Zealand were the focus of this study. The reason for this is that many of the sophisticated production management techniques are geared towards the larger organisations, and if these do not find the techniques practically relevant, the smaller organisations are not likely to find them useful either. Since a list such as the “Fortune 500” does not exist in New Zealand, we used a

commercial data base called KOMPASS, which is fairly comprehensive. A list of 500 companies that were listed as manufacturing companies, and which had the largest number of employees was drawn from this database. The survey questionnaire was directed to the person in charge of production in these companies. The number of usable responses received at the time of writing stands at 129, with a response rate of 26%, which is deemed satisfactory for this kind of survey. Figures 1 and 2 show the number of employees and the turnover of the business units of the respondents. These figures reflect the fact that the sample consisted of the larger organisations in New





Zealand.

3.1 The Objectives and Tasks in Production Management

The respondents were asked the importance of various objectives in their jobs. The objectives in order of the average importance ratings are (the ratings are on a scale of 0-4) given in Table 1. The table confirms earlier studies [20] showing the high importance placed by production managers on people skills. Some respondents identified other quality related and safety related objectives.

Table 1. Importance Rating of Production Management Objectives

Objective	Average Rating
Managing people / staff / colleagues	3.42
Meeting production targets	3.42
Ensuring quality	3.39
Using resources efficiently	3.26
Minimising costs	3.22

The respondents also rated the importance of 22 production related tasks. The seven tasks with the highest average importance ratings are shown in Table 2. Health and safety, which is not emphasised heavily in most PM courses, occurs at the top of the table. People issues are emphasised again. Both long-term and short-term tasks in quality and in production are stressed by the production managers. Many overseas authors [10, 16] have stressed the importance of international management issues in today's production management education, but our respondents found this task of the lowest importance. Similarly, vendor selection and development, the subject of the current hot topic "supply chain management" was rated the second lowest in importance.

Table 2. Importance Rating of Top Production Management Tasks

Task	Average Rating
Ensuring health and safety	3.07
Utilising available capacity	2.91
Acquiring, developing and maintaining desired work force	2.91
Creating quality objectives, programmes, and values	2.90
Quality assurance of day to day operations	2.88
Setting up production planning and control	2.88
Solving daily production problems	2.86

In regard to the way of dealing with these tasks, the respondents had the following importance ratings, given in Table 3. This is similar to the finding in Wild [19]. The use of analytical / quantitative techniques, which is heavily emphasised in most PM courses, is even lower in the estimation of New Zealand production managers than that of their British counterparts [19].

Table 3. Rating of problem solving approaches

Problem solving approach	Average Rating
Using subjective judgement and assessments	2.79
Using specialist staff	2.62
Using computers	2.60
Using analytical / quantitative formulas and techniques	2.20

3.2 The Practical Relevance of Production Management Topics

In order to judge the practical relevance of 67 production management topics commonly covered in undergraduate tertiary curriculum, the respondents were asked to provide a rating on the scale of 0 - 4. These topics were under the heading of 9 broad subject areas. The top 20 topics are presented in Table 4. Confirming to similar studies done abroad [2], practitioners show clear preference to concept-oriented topics as against technique-oriented topics.

Table 4. Rating of Practical Relevance of top 20 PM Topics

PM Topic	Average Rating
Manufacturing flexibility (product/volume changes)	3.19
Quality concepts / procedures	3.14
Material requirements planning	3.04
Total quality management	3.03
Budgetary control	2.94
Lead time reduction	2.93
Master production scheduling	2.85
Capacity requirements planning	2.82
Quality circles / Employee involvement	2.82
Competitive issues in manufacturing	2.80

Standard costing	2.80
Issues in production planning	2.73
Manpower scheduling techniques	2.70
Long range capacity planning	2.68
Issues in Production - Marketing interface	2.64
Just in time concepts	2.61
Priority scheduling rules	2.61
Issues in Manufacturing - Design interface	2.60
Vendor evaluation and selection	2.55
Issues in manufacturing process selection	2.54

The bottom 10 topics considered by the production managers to be the least relevant are listed in Table 5. Highly quantitative / analytical techniques are at the lowest end of these topics judged most irrelevant by the practitioners. The only concept-oriented technique in this list is the topic of international operations, reinforcing the list of tasks presented earlier.

Table 5. The Ten Least Relevant PM Topics

PM Topics	Average Rating
Taguchi methods	1.70
International operations	1.70
Facilities location models	1.57
Exponential smoothing models	1.50
CPM/PERT analysis	1.43
Reliability theory	1.41
Simulation	1.39
Queuing theory / models	1.32
Linear programming	1.27
Robotics	1.25

The nine subject areas themselves, under which these topics were grouped, are listed below in Table 6 in order of the overall average rating of the topics in the subject areas.

Table 6. Listing of PM Subject Areas

PM Subject Areas	Overall average rating of topics	Maximum of average rating of topics
Production planning	2.61	3.04
Monetary issues	2.51	2.95
Quality Management	2.46	3.14
Manufacturing strategy	2.43	3.19
Logistics / Inventory management	2.24	2.61
Work study and improvement	2.15	2.46
Production scheduling	2.14	2.61
Computers and Information Technology	2.04	2.52
Operations research / Statistical	1.44	1.84

techniques

Not surprisingly, production planning is at the top of the above list. The high position of monetary issues in this list is consistent with earlier studies [3]. Highly mathematical topics found the least favour among the respondents.

The five top reasons for assigning low practical relevance to some topics were given as shown in the following Table 7. This list is in remarkable agreement with the list of Oakland and Sohal [12, 13]. While the respondents appear to be diffident about their knowledge of the topics, the low relevance of PM topics was mostly ascribed to teaching non-existent issues.

Table 7. Reasons for Low Practical Relevance of PM Topics

Reason for Low Relevance	Frequency Rating
The issue dealt by the topic does not occur in practice	2.43
Benefits of using the concept are not clearly understood	2.32
Management is successful without using the skills	2.28
Staff's lack of knowledge of the topic	2.18
Unrealistic assumptions in the model	2.15

When asked to rate the importance of the following skills in the practice of production management, the respondents rated them as follows (Table 8). Technical skills and even intellectual ability is not valued very highly. As in most studies in this area, people skills are stressed very highly.

Table 8. Average Rating of Skills

Skills	Average Rating
Skills in managing / working with people	3.52
Problem solving skills	3.26
Attitudes (such as honesty and self-confidence)	3.23
Self-management (priorities, time, etc.)	3.19
Communication skills (Report writing / speech)	3.10
Technical skills and knowledge	2.98
Intellectual ability and understanding	2.89

In assessing the influence of current trends in the future of production management practice, the respondents came up with the following level of significance of the trends (Table 9). In spite of the low position assigned to the subject area of information technology (IT) related topics earlier, the use of computers is seen as the most significant trend. As before, international operations is relegated to the bottom. Besides these items, some respondents identified environmental regulations, global economic changes, health and safety issues, and manufacturing flexibility as significant future issues for production management.

Table 9. Significance of Current Trends

Trends	Average Significance Rating
Increasing use of computers	3.05
Greater stress on profits	2.90
Changes in product designs	2.52
Changes in labour relations	2.50
International operations	2.29

4 Conclusion

As in earlier studies, this survey reinforces the importance placed by production management practitioners on concept-related topics. Among these, the subject areas of production planning, quality management, and manufacturing strategy are considered the most practically relevant for New Zealand. Analytical techniques are given very low importance. This polarisation (concept vs. technique) is perhaps even more marked in this study than in overseas studies. People skills and monetary issues are given high preference, even though these topics are usually taught outside the discipline of production management in most institutions.

Ensuring health and safety is seen as one of the top tasks of production managers, but this topic is given scant attention in PM teaching. International operations management, and supply chain management, which are two "hot" topics in overseas PM circles are perceived to be of low value to New Zealand production managers. Even though information technology (IT) was given low rating currently, it was seen as having the highest impact on future PM practice. This justifies the current trend in stressing IT in PM teaching.

One comes away with an overall impression that production management teaching needs to move away from being a sub-discipline of management science / operational research and needs to emphasise "softer" topics such as human resources, health and safety, environmental issues, and strategic concerns in order to accord with product management practice.

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