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OPERATIONS STRATEGY DEVELOPMENT AND IMPLEMENTATION :-
A SELF ASSESSMENT MATRIX.

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ABSTRACT

In both the increasingly competitive and the continuously changing business environment existing today, increasing pressure is placed on companies to maintain and improve their profitability. Management teams are becoming increasingly interested in assessing the performance of their organisations for comparison on the global frontier. On the basis of this assessment, companies are placed in order of performance excellence and can therefore identify a rise or fall in performance based on practices of their peers. The challenge to survive in this mutable business environment requires the use of a strategic process which integrates the business objectives of an Organisation. Consequently, there is a need for an integrated *strategic development process* for both small and large companies. University College Galway has produced a strategic development process (SDP) to address this need. The S.D.P was developed with the assistance of the 1996 M.B.A. students and makes use of Hayes and Wheelwright's scale of excellence. The relevance of SDP arises from a recognition that without SDP the operations/manufacturing function will find itself uncompetitive in the marketplace. SDP will assess if there is a lack of best business practice integration between departments. The risk of departmental short term goals not mirroring the long term objectives of the company will be investigated. In general, there is an increasing awareness that management must conduct accurate strategy performance reviews to ensure that the company is operating competitively and profitably. There is a need for the majority of companies to follow and anticipate strategic demands made by parent plants and customers. It is also necessary that these companies be conscious that good strategic management is a requirement for survival in today's competitive environment. The improvement in profitability which can be obtained by adopting a self assessment performance program is particularly relevant to companies striving to become world class businesses. It was recognised that there was a need to design this self assessment methodology. A "Delphi" style survey, was conducted in 1996 involving representatives from Irish companies to determine the key strategic issues to be addressed in manufacturing strategy development. Subsequently, a self-assessment matrix was designed and used to set a strategy performance benchmark. A second survey evaluated the company's performance in relation to the SDP and the established benchmark. The structure and contents of the self assessment matrix used in the SDP is explained in this paper, together with the results of the surveys. Ongoing investigation into the acquisition of a national prize for the best performer resulting from the implementation of SDP is underway by U.C.G.

1. INTRODUCTION

In the 1960's Skinner [1] wrote 'that what appears to be routine manufacturing decisions frequently come to limit the corporation's strategic options, binding it with facilities, equipment, personnel and

basic controls and policies to a non-competitive posture which may take years to turn around'. In general, competitiveness is a driving force within modern businesses which ensures survival in a rapidly mutable manufacturing environment. It is clear that technology developments lead to shorter time-to-market and also that customers demand newer, more advanced products which consequently increases the demand on a manufacturing facility's infrastructure and design.

Consequently, senior management are reviewing their corporate business strategies and adjusting the strategies accordingly to reflect the increased market demands. However, in this dynamic environment the operations function can get left behind. Hill [2] explores the scenario where the production function is regarded as being "too short-term gains driven" and suggests a way to link manufacturing with corporate decisions. Hill's five steps are:-

1. Define Corporate objectives,
2. Determine marketing strategies to meet these objectives,
3. Assess how different products win orders against competitors,
4. Establish the most appropriate mode to manufacture these sets of products
- process choice,
5. Provide the manufacturing infrastructure required to support production.

Of course the manufacturing/operations function is more than just a series of production processes. To be successful in operations the business process must support the operations strategy which in turn must support the corporate strategy. The operations manager must also play a major role in the development stage of this process and effectively assess their business from a strategic perspective, combined with the day to day routine roles in which they are involved. In the first three stages of Hayes and Wheelwright scale of excellence the role of the manufacturing function is represented as a "pawn". In essence, this representation of the manufacturing function identifies that the manufacturing function adds no real competitive advantage and also is not considered as being the driving force behind the corporation's competitiveness. Porter [4] in his competitive forces model discusses the integrated role of suppliers, customers, buyers, and competition internally in industry combined with how new entrants shape a new strategy. Frequently, operations management are forced to re-evaluate strategy to order to avoid strategic drift. Companies who find themselves no longer supporting corporate goals can have difficulty in rapidly responding to essential market requirements. In some cases the time and resources to develop a new manufacturing process and company infrastructure can take years to complete. Time to respond is something that few companies can afford in this competitive age of manufacturing whilst still maintaining their market position. A company must therefore reassess its position on a regular basis. It is true to say that some companies analyse their strengths, weaknesses, opportunities and threats (SWOT) and consequently develop a new strategy. However, without a solid benchmark this type of assessment can be misleading, due to the fact that it may not be an honest objective assessment in comparison with the best-in-class from the appropriate industry sector. This suggests a strong need for an assessment tool which can provide companies with the means of developing a meaningful strategy. The assessment matrix discussed in this paper is a first step in resolving the problem of misleading information which arises from incestuous assessments.

2. OPERATIONS STRATEGY DEVELOPMENT

Operations strategy is formulated at several levels within the Organisation as depicted below in Figure 1. Firstly, an analysis of the companies competitive situation and the company situation are conducted. Corporate strategy represents the starting point for operations strategy and for the business plans of the operating units. The corporate strategy is reviewed and revised constantly and therefore, is highly responsive to changes in both the internal and external environments. The

responsibility for formulating the operations strategy rests with the operations group, a fundamental goal in the formulation of the operations strategy is to identify and relate all strategic elements formed at the operations level to the other plans and strategies developed at higher levels.

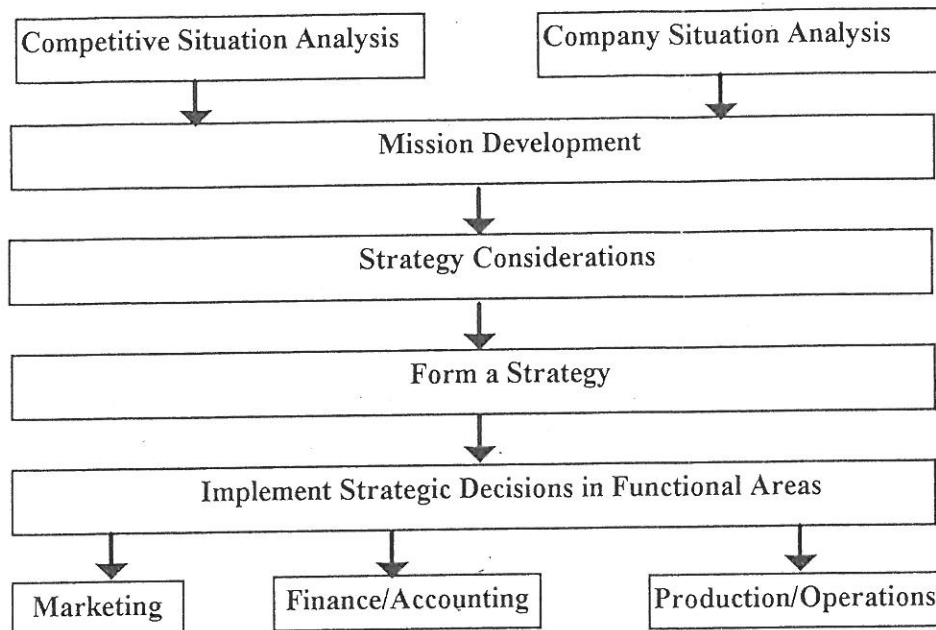


Figure 1. Strategy Development Process

3. EXPERIENCES WITH STRATEGY IMPLEMENTATION

According to Alexander [5], companies are facing strategic changes and the experiences of these companies which drove the implementation of new strategic decisions were (from a sample of 93):

- Introducing a new product or service 29
- Expanding operations to enter a new market 15
- Discontinuing a product or service 11
- Acquiring or merging with another firm 10
- Changing the strategy in functional departments 6
- Others 5

Other situations can be added to this list e.g. significant increase in capacity, withdrawing from a market, production methods change, product image change, organisational structure change. All of these areas provide frequent changes in ways of doing business and as such it requires the operations function to constantly review its current and strategic direction.

4. SELF ASSESSMENT

Self assessment is widely used for quality, business performance measurement, product development and other areas of business. Some well known assessment tools reviewed prior to developing our matrix were, the Malcolm Baldrige National Quality Award in the United States. The major elements and relative weightings, in brackets, are: Leadership (6%), Information and analysis (7.5%), Strategic Quality Planning (6%), Human Resources, Development and Management (15%),

Management of Process Quality (14%), Quality and Operational results (18%), Customer Focus and Satisfaction (30%). The British Quality Foundation [8] have produced a package called ASSESS which is a business excellence self assessment model based on the European Foundation for Quality Management's TQM model which focuses on: Leadership (10%), People Management (9%), Policy and Strategy (9%), Processes (14%), People Satisfaction (9%), Customer satisfaction (20%), Impact on society (6%), Business results (15%). A general business excellence model was reviewed from Management Today and Unysis [6] as reported in Management Today December 1995. This is a more general self assessment which selects the 'Most Admired' company. A World Class Performance (WCP) assessment model from Director [9] presented eight key areas for WCP. Relative weights were not available. The criteria were: Structured management, World-class principles and beliefs, Customer partnerships (internal and external), Business process management, Competitive products and services, World class manufacturing, Supplier partnerships and Employee Involvement.

Our main area of interest is excellence in Operations Strategy as a competitive weapon. The models above cover some of the key areas but failed to meet our needs w.r.t. Operations. The model presented in the next section overcomes the problem of misleading information and uses an integrated strategic functional approach suitable for companies who are willing to assess themselves honestly using these or other models. The participating companies will achieve a significant competitive advantage as the assessment will help to identify current weaknesses and also areas within which resources should be deployed in order to improve performance - as identified by the benchmark data. The greater the number of companies who participate in completing benchmark surveys the stronger the resulting benchmark becomes. The self assessment process[8] is shown in Figure 2.

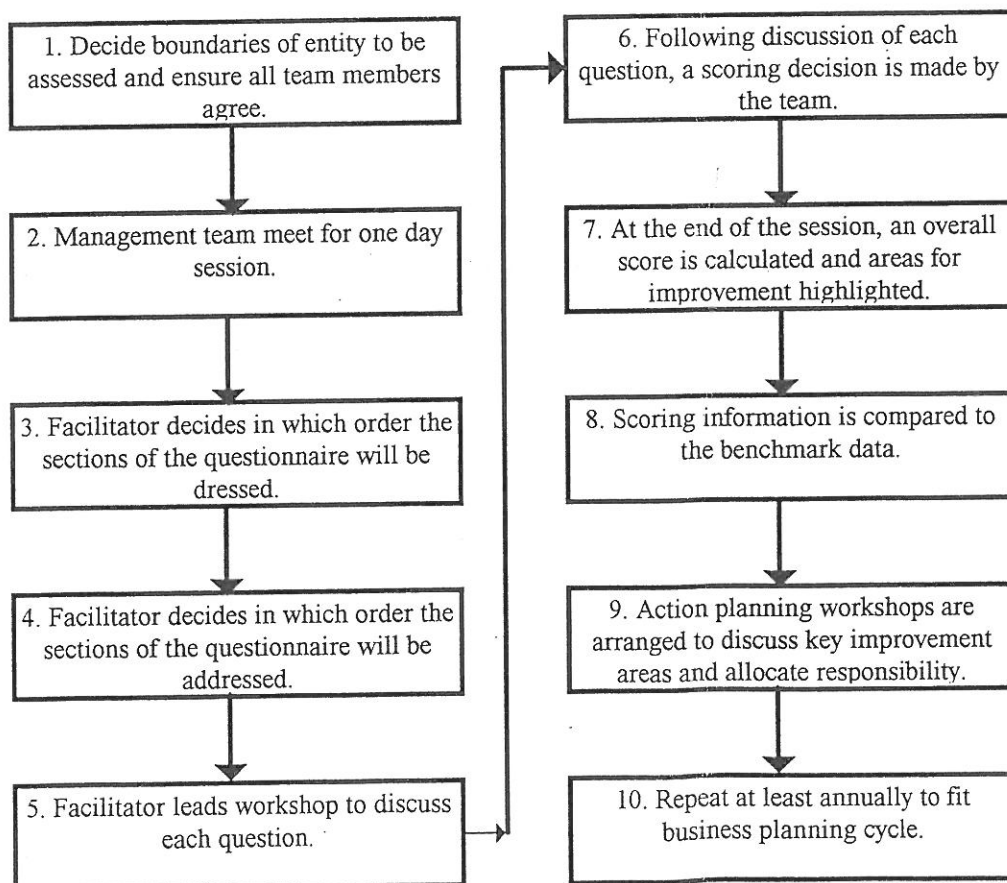


Figure 2. The Self-Assessment Process.

5. THE DEVELOPMENT OF THE SELF ASSESSMENT MATRIX

The paper was a combined effort between the authors and the 1996 MBA class in U.C.G.. It was part of the Operations Strategy course. The work consisted of a number of interactive class discussions combined with lectures on operations strategy development and implementation. The class feedback on this project was very positive as a teaching method. A summary of the process followed is:

1. Brainstorm activities to develop the idea and a project outline 27/1/96
2. Explored possible matrix structures [7], Weightings, researched self- assessment methodologies
3. Break into discussion groups (6 groups) 24/02/96
 - Reviewed Management Today/Unisys questionnaire, Baldrige award, Company innovation profile [3]
 - Groups assigned the task to produce a generic list of assessment criteria
 - Identification of Delphi process to be used to produce the final criteria
(The authors selected the panel of experts and did the Delphi survey.)
4. Presentation of lists of criteria and established one generic list by 9/3.
5. Students carried out PILOT assessment with target manufacturing organisations.
6. Finalised assessment criteria based on inputs form manufacturing companies approached by the MBA class.
7. Conducted a survey of ten companies, analysed and documented the results.

One of the objectives of this study was to develop an integrated non-functional strategic development process. This was achieved by developing a generic list of assessment criteria and consequently categorising these criteria into functional banners under which the integration is completed.

6. SETTING THE PERFORMANCE BENCHMARK

6.1 Matrix Design

Senior management representatives from seven companies were asked to complete the benchmark matrix utilising the following criteria for each business element in the matrix. Scores were allocated as shown in brackets from : [-1 to 4]. Together with completing the matrix the managers were also asked to critique the matrix and add or delete questions as they deemed necessary. In general the feedback received was very useful and incorporated into the final matrix. The benchmark scales used in the matrix are summarised below:

Critical (4): This is a Critical area on which the company must focus in order to be a 'best in class' business sector leader. It ensures that all aspects of strategy are considered and resources applied accordingly in order to make the company a recognised leader in their business.

Key (3): This represents the operational aspects necessary for the company to keep ahead of the competition. It assists in supporting the company in its overall strategic direction and also supports competitiveness.

Influential (2): This scale represents areas which are regarded as necessary in order to keep up with the competition. Activities are not a high priority, in this category are seen to be useful in offering a competitive edge.

Desirable (1): Will be done if time and resources permit. Not regarded as a priority to meet company business goals.

Disagree (-1): Not necessary in developing or implementing manufacturing strategy.

N/A (0): Not regarded as useful in any way in running the business. **OR :-** Does not apply to our business

The scoring system used the average score for each question in the matrix and this average was then used as the benchmark. The second phase of the study involved the completion of the assessment matrix by nine manufacturing companies. This was done with the help of the MBA class members and it was generally felt by the participants that advisory help was needed to clarify the terminology and assist in answering the questions. For future reference an explanatory/help guide will be produced. The assessment criteria were as follows with the points in brackets.

Business Norm (4): In this case specific plans are complete with goals and objectives and exist in all functions within the business whereby the activity is practised by all functions according to the plan together with documented results available. Plans are under constant review and upgraded in order to maintain the company as a leader in the marketplace

Widely Practised (3): Strategic business plans exist for all KEY areas of the business, e.g. Finance, Marketing, and the plans are actioned and results documented. Plans cover the minimum areas that are regarded as critical for business success by the company.

Occasionally Done (2): Basic plans exist for key activities of the business but they need to be upgraded and reviewed to cover all business activities, also functional plans are required. No regular reviews done.

Reviewing Needs (1) : No specific plans exist but the importance for strategic planning has been recognised and each function is preparing plans to address their strategic direction.

Not Done (0) : The strategic element of these activities have not been considered and the main focus is on day to day tactical and firefighting activities.

The results were calculated for each company and summarised in an overall report. The scoring method is explained in section seven in this paper.

6.2 Setting criteria weights.

A Delphi style process was used to set relative weights for the sixteen categories. Eight experts drawn from senior company management level and academics responded to a summary questionnaire where they were asked to allocate marks out of 100 across the sixteen criteria. The score in the graph below represents an average from these responses. The main focus is on General management, Marketing/Sales, Quality, Technology Development and Human Resources, Engineering and organisational Development. The full results are shown below in Figure 3.

The results of our survey were multiplied by these weightings in order to achieve an overall company performance. There are four general groupings:

- over 8.5 - Production Department.
- between 7.0. and 8.0 - general management, marketing/sales, quality, technology development and human resources.
- between 5.2 and 6.5 - Engineering, Organisation development, financial management, production management systems, business measurement process, information technology, logistics, supplier management,
- less than 5.0 were : external environmental sensing and contingency planning.

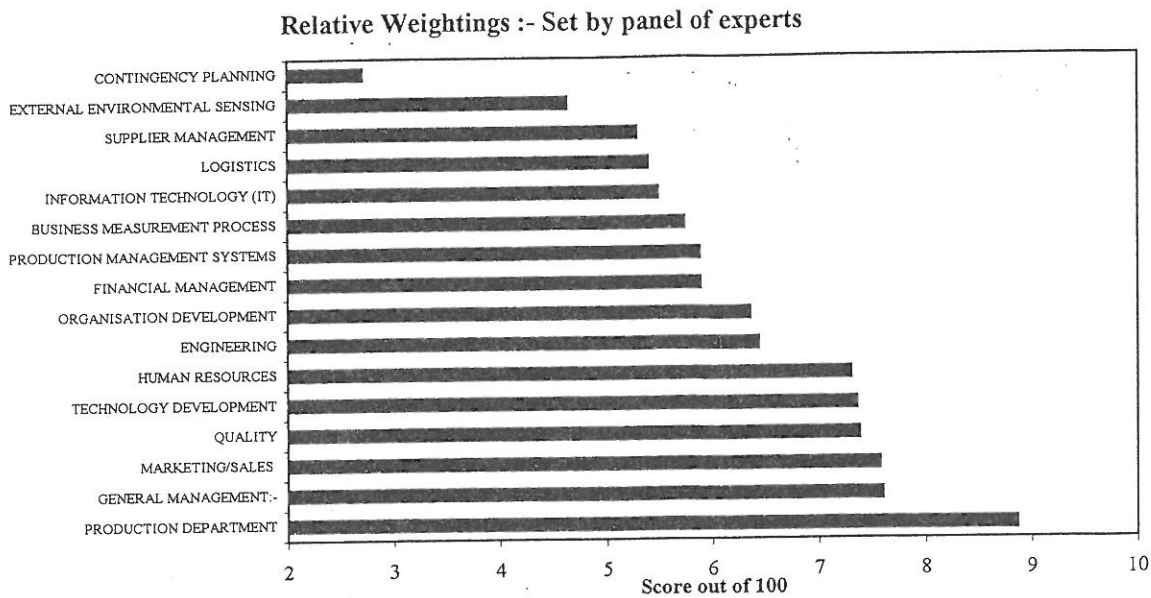


Figure 3.

7. RESULTS OF THE SURVEY OF PARTICIPATING COMPANIES

A total of nine manufacturing companies completed the assessment matrix. The main results are shown in the graphs below. The 'Benchmark' column represents the companies performance when compared directly to the established benchmark. Where companies have indicated that the criteria is not applicable, this item was ignored in the scoring process. One difficulty with this scoring system is the fact that a company can score a high mark for doing the wrong things very well, while failing to perform in the areas which have a high benchmark rating. The 'Performance' column introduces a derating scale which works on a scoring principle whereby marks are allocated as shown below. The maximum score for a company is four points, for an activity which is a company norm. The maximum benchmark is also four. This gives a maximum points score of sixteen i.e. (Benchmark multiplied by maximum performance). For a benchmark of three the max. score will be twelve, etc.. Performance points operate slightly differently in that we do not want to reward companies for exceeding the benchmark in minor criteria while failing in the more critical criteria, resulting in a high score. We thus award performance points as follows:-

[Score = S, Benchmark = B]

- IF $S/B = 1$ or < 1.25 then max. score in allocated,
- IF $1.25 < S/B < 1.5$ then Perf = $S*B*1.2$
- IF $1.5 < S/B < 2.0$ then Perf = $S*B*1.35$
- IF $2.0 < S/B < 2.5$ then Perf = $S*B*1.45$
- IF $2.5 < S/B < 3.0$ then Perf = $S*B*1.60$
- IF $3.0 < S/B < 4.0$ then Perf = $S*B*1.75$

In general there is no significant difference between the resulting figures in the summary graph, shown in figure 4, with a difference in the order of ten percent in the areas of Environmental Sensing, Human resources and Contingency planning. Figure 5 shows the revised figures which take the weightings into account as set by our panel of experts in the Delphi process.

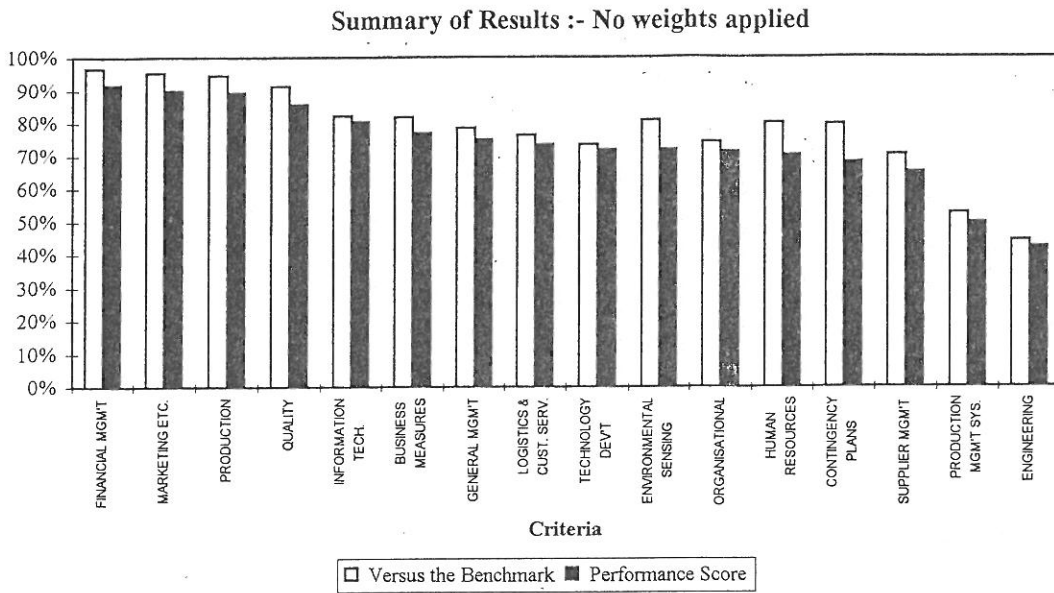


Figure 4.

This graph shows how the companies performed against the benchmark as well as an overall score performance. The score is based on the system described above which is designed not to reward companies for doing the wrong things well while ignoring the important issues, as defined by the benchmark.

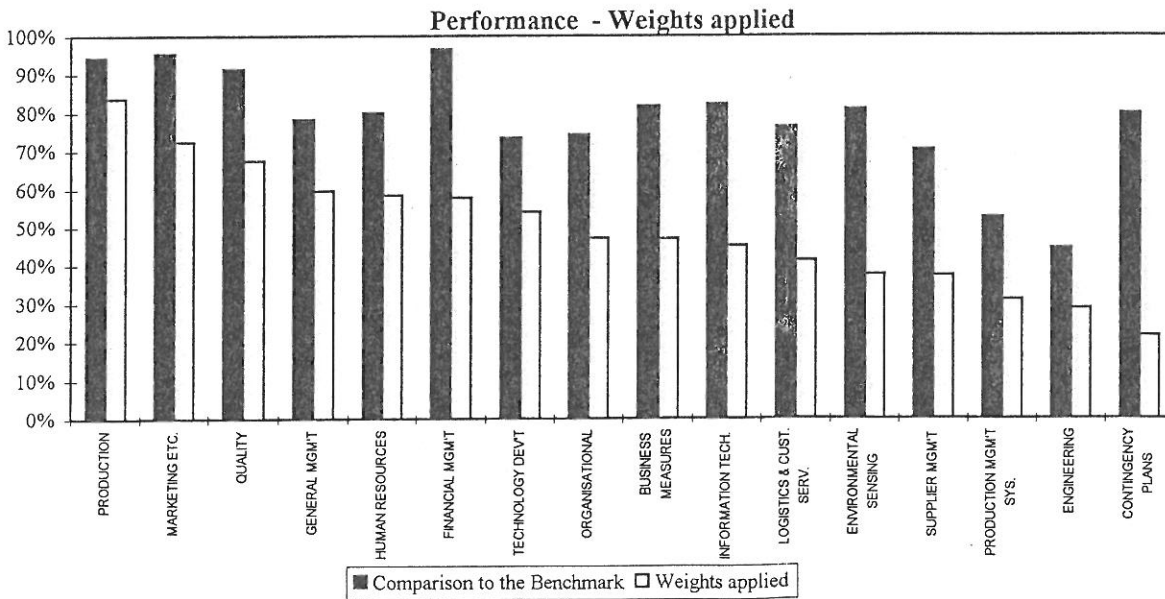


Figure 5.

In this graph the Delphi weights are applied to the original results. Looking at the Performance column we see that the highest performers are in the areas of Production, Marketing, Quality, General Management, Human Resources, Financial Management, Technology Development and

Organisational issues. This is different from the unweighted results where Financial Management was the highest performer with Production being in third place. Other significant movers are Human resources up from 12th to 5th, General Management up from 7th to 4th, Information Technology down from 5th to 10th.

The performance of the ten companies surveyed is contained in Table 1.

Company No.	No Weights	Delphi Weights	Ops. Mgr. Weights	Academic Weights	Mang. Dir. Weights
10	106	64	44	57	44
2	103	66	53	60	45
7	97	59	41	52	39
3	96	57	40	52	39
6	90	54	37	49	37
1	75	44	29	41	28
9	70	42	29	38	30
8	56	34	24	30	23
4	55	33	23	30	22
5	52	31	21	29	20

Table 1

Graphically this is represented in Figure 5.

The effect of different weights on company performance

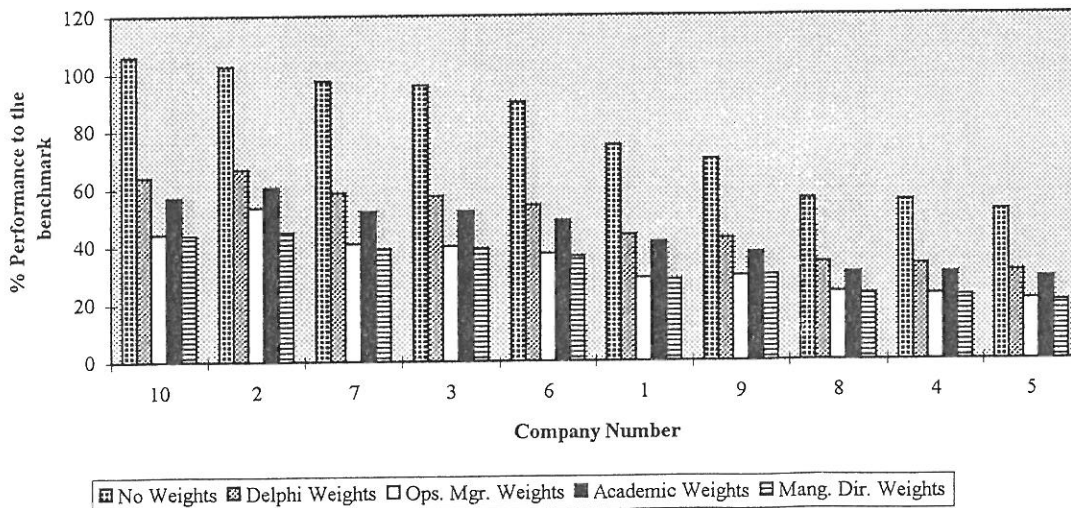


Figure 6.

There is good correlation between the various weights with a change between first and second placing when the weights are applied.

9. CONCLUSIONS AND RECOMMENDATIONS

From further analysis of the results we compared the companies performance in the areas selected by the panel of experts (Descending order of weights). Weights are not applied to results, this is displayed in Table 2.

Business area	% Exceeded Benchmark	% between 70%-100%	Total over 70%
Production Department	50	20	70
General Management	40	20	60
Marketing/Sales	40	40	80
Quality	50	30	80
Technology Development	20	20	40
Human Resources	30	20	50
Engineering	20	10	30
Organisational Development	30	20	50
Financial Management	60	10	70
Production Management Systems	30	0	30
Business Measurement Systems	40	30	70
Information Technology	50	10	60
Logistics	20	30	50
Supplier Management	30	20	50
External Environmental Sensing	40	10	50
Contingency Planning	40	20	60

Table 2

Companies scored an average of 70% or more in three of the top four criteria. Poor scores were recorded in areas of Technology Development, Engineering, with good performances in lower priority criteria such as Financial, Business Measurement and contingency planning. This suggests a need for a focus on operations basics with improvements in Engineering, Technology Development, Human Resources, and Organisational Development. Some areas which were rated as 2.0 or less in the benchmark matrix, i.e. Influential, are worth highlighting. These are, written mission statements, knowledge of new entrants, a five year recruitment plan, university links and the use of consultants, legislation awareness, shared supplier technologies, ship to stock programmes, production control, job design, use of MRP 11, environmental business management, product liability programmes. Other areas rated between 2.0 and 2.6 were also interesting, i.e. more influential than key. These were continuous improvement concepts (2.4), Safety Health & Welfare of employees (2.5), cross functional management teams (2.1), Performance indicators by function (2.4), long range planning (2.1), concurrent engineering concepts (2.2) and information technology development (2.6). The full list of criteria, over a benchmark of 2.0, is shown in the appendix.

MAIN RECOMMENDATIONS

The following areas should be addressed by companies expecting to gain competitive advantage from their operations function.

1. The provision of general management support to operations in the form of clear written mission statements which will enable operations to develop its own operations strategy,
2. The development and maintenance of state of the art business and process technologies is key to remaining competitive,
3. The Human Resources function needs to take a more hands on approach in recruitment planning, the promotion of continuous improvement concepts and cross functional teams in the Organisation as well as a focus on employee Health, Safety & Welfare.
4. Engineering are surprisingly non strategy orientated with work required in business process re-engineering and concurrent engineering activities.
5. Business measurements are key in any successful enterprise as goals need to be set and progress reported in a timely manner. Of course the goals must reflect the company's strategic direction.
6. General improvement within the Organisation as a whole with emphasis on change management practice and cross functional management teams
7. Other general areas for improvement are in the development of information technology, a focus on logistics, more co-operative work and sharing with suppliers, environmental business management and long range resource and capacity planning.

APPENDIX - KEY ELEMENTS OF THE MATRIX

Criteria with a benchmark equal to or less than 2.0 have been omitted.

	Benchmark
GENERAL MANAGEMENT :-	3.22
Written corporate objectives	3.71
Corporate Business strategy	3.43
Manufacturing Strategy	3.43
Order winning criteria	3.43
Written Policies & Procedures	3.33
Internal communication process	3.33
Support for innovation	3.50
Marketing/sales	3.12
Marketing plan: Global/local etc	3.43
Sales Plan by region/country etc	3.57
Product list	3.14
Future market planning	3.00
Knowledge of existing Competitors	3.00
Market Research	3.14
Forecasting	3.29
Product life cycle profile known	3.50
New product development plans	3.00
Technology development	3.67
Manufacturing technology	4.00
Business technology by function	3.00
Research and development	4.00
Human resources	2.82
Appraisal Process	3.00
Technical training	3.14
Personal development training	3.00
Correct skills : Key resources	3.29
Welfare and Health & Safety policy	2.57
Remuneration systems	2.43
Industrial relations policy	2.67
Continuous improvement concepts	2.43
Supplier management	2.92
Supplier management plan	3.20
Shared goals	3.00
Supplier communications (EDI)	2.25
Supplier rating system : Quality, delivery	2.33
Appraisal process	2.67
Control of supplier base: Number etc]	3.00
JIT processes	4.00
Quality	3.15
Process based Quality plans	2.86
Product based Quality plans	3.14
Standards. e.g. ISO9000, IE310, UL etc	4.00
Total Quality Management plan	3.17
Employee Involvement	3.57
Quality circles or Cross-functional teams	2.17
Business Measurement Process	2.81
Performance indicators by function	2.40
Establishment of common goals	3.14
Reporting systems	3.00
Continuous improvement plans	2.71

	Benchmark
Logistics and customer service	3.01
Survey of customer requirements	3.57
Customer communication process	3.43
Support and field service	3.14
Materials management planning	2.86
Transportation Management	2.29
Order processing development	2.29
Export management	3.50
Production Department	3.26
Capacity Plans :- People, Equipment	3.14
* Short and medium term	3.29
* Long range plan	2.14
Competitiveness plans	4.00
Productivity Improvement	4.00
Worker motivation & Development	3.00
Production Management Systems	3.15
Materials Resource Planning : MRP 11	2.00
Just in time applications	3.00
Control of resources : Materials, people	4.00
Cross functional linkages	4.00
Production Mgmt Systems Development	2.75
External environmental sensing	2.65
Economic Growth	2.86
Legislation	2.57
Public relations and Company image	2.43
Benchmarking	2.71
Government/EU programs	2.67
Engineering	3.03
New Product Introduction process	3.33
Concurrent Engineering: QFM, DFM	2.20
Business Process development	2.50
World Class Management program	3.00
Capital equipment planning	3.17
Value Engineering programme	3.00
Competitiveness programme	4.00
Computer Integrated Manuf. CIM	3.00
Financial Management	2.98
Formal Budgeting Process	3.75
Investment planning and approval process	3.00
Cost reduction programs	3.14
Capital investment plan for 3-5 yr.	3.00
Information Technology (IT)	2.62
IT plan by function	2.57
IT for business competitiveness	2.67
Contingency Planning	2.71
Loss of market share	3.29
World politics	2.25
Internal politics	2.60
Organisation	3.32
Flexibility to change	3.71
Change management practice	2.86
Business Process Re-engineering	2.50
Cross functional Management teams	4.00
Communications/Employee Involvement	4.00
Decision making process	3.29

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