
The Importance-Performance Matrix as a Determinant of Improvement Priority

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The Importance-
Performance
Matrix

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A crucial stage in the formulation of operations strategy is the derivation of a ranked (or rated) list of competitive factors such as quality, flexibility, cost, etc. This list is used either to infer an appropriate set of strategic operations decisions or alternatively it is used in conjunction with an independently derived list of the organization's performance to prioritize each of the competitive factors. Martilla and James[1] take the latter approach to derive an importance-performance matrix. The investigations reported in this article examine how the matrix can be modified to reflect managers' perceived relationships between "importance", "performance" and "priority for improvement". Two investigations are reported; one deals with operations improvement at the level of the whole operations function, the other at the level of the department or micro-operation. A different zoning of the importance-performance matrix to that used by Martilla and James is proposed.

Using the modified matrix allowed the managers who participated in the investigation to explore improvement priorities in their operations in an effective manner. One of the more significant activities in the operations strategy formulation process is the derivation of a list of competitive factors (also called critical success factors, performance objectives or competitive variables) which is prioritized in terms of the relative importance of each competitive factor. Typically such a list ranks or rates those factors which the operations function contributes to the competitiveness of the organization. So, for example, quality may be regarded as more important than product or service range but less so than price, and so on. All the significant methods of operations strategy formulation include some prioritization, for example Hayes and Wheelwright[2], Hill[3], Fine and Hax[4] and Platts and Gregory[5]. Many of these methods are discussed in Voss[6].

After this list has been formulated it can be used in two ways:

- (1) As a translation device between the market aspirations of the organization and the various areas of operations strategy (often divided into structural and infrastructural decisions as in Hayes and Wheelwright[2]). For example, Hill's[3] well-known method of manufacturing strategy formulation uses these competitive factors in this way.

- (2) The list of ranked or scaled competitive factors can be used to help determine improvement priorities among the competitive factors. This approach typically involves comparing the importance rating of each competitive factor with some concept of its required performance. For example, Platts and Gregory[5] develop an approach to formulating manufacturing strategy (although there seems no reason why it cannot also be used more generally to include service operations) which makes use of such a comparison to determine strategic improvement priorities.

The Platts and Gregory[5] method involves four significant stages, although there are more than this if one includes various data-gathering exercises. The first stage involves managers listing the competitive criteria for the product, or family of products, under consideration, and assigning “relative importance” scores to each. The second asks managers to judge the operation’s performance for each competitive criteria against their general view of competitor’s performance. The third step audits the current practice of the operation in various areas of activity and asks managers to estimate the degree of influence each activity area has over the achievement of required performance for each competitive criterion. Finally, all these analyses are considered together in order to identify any mismatches between the relative importance of each competitive criterion and the achieved performance for each. Action plans are developed based on these mismatches.

Although Platts and Gregory’s[5] method contains little which had not been used in previous strategy process research, it does bring together a number of significant elements. These include:

- the use of managers’ perceptions of the relative importance of explicitly defined competitive criteria (Platts and Gregory[5] use a suggested checklist of criteria to help managers develop their own);
- the use of competitors’ performance as the explicit benchmark used to judge the operation’s performance;
- the use of numerical scales to record both relative importance (by allocating points out of a total of 100) and performance (on a +2 to -2 scale, where +2 is a performance significantly better than competitors and -2 a performance which is significantly worse);
- the use of a “gap-based” approach which compares importance with performance in implicitly setting improvement priorities.

Judging by the frequency with which they occur in the published methods, all these elements seem to be generally regarded as useful in operations strategy formulation, although the last point is, arguably, particularly powerful.

The Importance-Performance Gap

In the service operations/marketing area perhaps the best-known importance-performance gap-based method is that proposed by Martilla and James[1]. They held that each attribute of a service could be judged by its “customer importance” and “company performance”. Importance was rated on a four-point scale (extremely important, important, slightly important and not important). Performance was also rated on a four-point scale (excellent, good, fair and poor). The results were displayed on the matrix shown in Figure 1, which is divided into four quadrants to indicate the priority to be given to each attribute. Chase and Hayes[7] also (briefly) refer to the use of a similar matrix, though they do not specify exactly how it can be used.

The importance-performance matrix has been modified by other authors. For example, Easingwood and Arnott[8] used a similar idea to present their survey-based study of generic priorities in services marketing. They used the dimensions “current effect on performance” (which is close to the idea of importance) and “scope for improvement” (which again is close to, but slightly removed from, the idea of performance). They also suggested an additional matrix of “ease of change” and “sensitivity to change”, to reflect the practicalities and constraints to improvement. Other previous work has suggested modifications to the importance-performance matrix both for manufacturing[9] and service[10].

The utility of the Martilla and James[1] matrix lies in its ability to bring together both customer (importance) and competitor (performance) perspectives to judging the relative improvement priorities which need to be applied to competitive criteria. The aspect of the model which does not appear to be consistent with managerial behaviour is the use of the ubiquitous 2 × 2

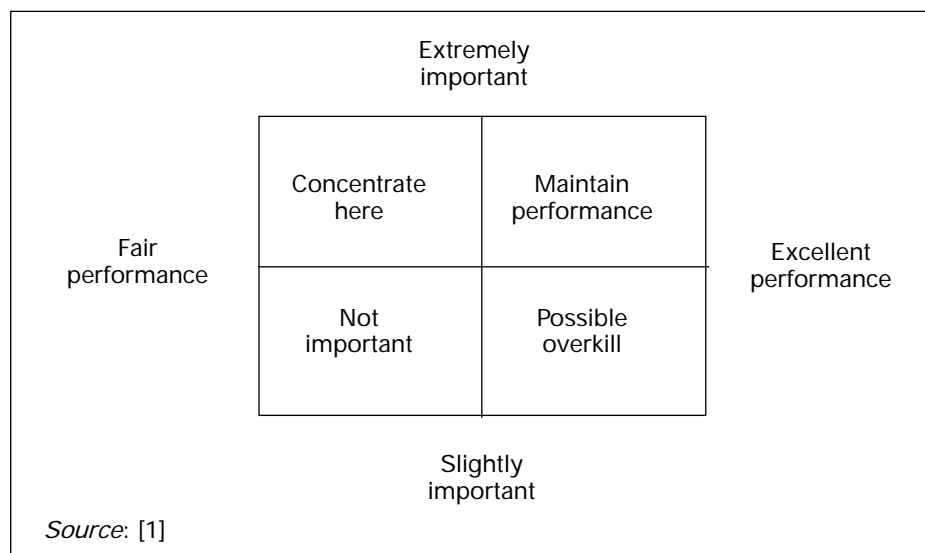


Figure 1. Importance-Performance Matrix

format. While this has the merit of simplicity, it implies, in effect, that managers' views of what constitutes acceptable performance are not influenced by customers' views of importance. A more intuitively attractive hypothesis is that the borderline between what is regarded as acceptable and unacceptable performance, and therefore the priority which managers give to improving a particular competitive criteria, will depend on its importance. So, for example, it could be hypothesized that managers would be prepared to accept a somewhat lower performance for competitive criteria which customers do not regard as particularly important than they would do for those which customers did find important.

The research described here is intended to explore this relationship between managers' perceived ratings of the importance of competitive criteria, their perceived ratings of the operation's performance, and their perceived priority for the improvement of the competitive criteria. The assumed form of the relationship is that "importance" and "performance" act together to determine "priority for improvement". Two investigations are described. The first examines this relationship at the macro operations level, i.e. it is used to determine improvement priorities for the operations function as a whole. The second describes an investigation which applies a similar approach at the micro operations level. This was used to help determine internal customer-supplier improvement priorities.

Methodology

The purpose of methods, models and procedures in the process activities of operations strategy is to aid managers in the practical task of formulating their own operations development strategies. Therefore any research methodology which attempts to devise or refine such models is likely to benefit from the involvement of managers in a setting which either simulates, or in reality is, actual strategy formulation. The implication of this is that an appropriate methodology should be based on groups of managers, from a single organization, who have the experience to understand the company's products and services and the seniority to have influence over the formulation of operations strategy in their company.

These conditions apply to the investigations described in this article. The only exception, it might be argued, concerns the seniority of the participants. The second investigation, which describes how the importance-performance matrix has been adapted for use in internal customer-supplier relationships, was based on the use of improvement groups which were associated with their own micro operations within the larger organization and because of this were slightly less senior in their organization.

Investigation 1

Methodology

Four groups of between four and seven managers participated in this initial investigation. Groups A and B were from separate industrial service companies

in the same international European-based conglomerate. Group A was drawn from a builders' supplies company, Group B from a contract maintenance company. Group C was drawn from the Australian division of a multinational computer services company. Group D was the after-sales division of a European-based engineering company. The investigation was carried out in nine stages. All groups included managers from both the operations and marketing/sales functions as well as other parts of their organization. There was however a preponderance of managers from operations.

Stage 1. The group was "subjected" to a tutor-led session on operations strategy which explained the basic principles of a strategic approach to the management of the operations function. This session included discussion of the strategic role of the operation's function, competitive criteria, the distinction between "order-winning" and "qualifying" criteria and marketing-operations interface problems.

Stage 2. The group was asked to identify a product or service (or product or service family) which was well-known to all members of the group and which was, or was likely to be, significant in the company's operations.

Stage 3. The group identified the set of competitive factors which, to at least some extent, influenced the competitiveness of the product or service in its market. To do this the managers began from an initial list of competitive factors which included: specification, quality (conformance), delivery speed (or customer waiting time), delivery dependability, flexibility (of product/service design, mix, volume or delivery – see Slack[11]), and price. From this initial list the group devised its own set of competitive factors which it deemed appropriate for that particular product or service.

Stage 4. The individual managers in the group were asked to rate the priority for improvement which they personally would give to each competitive factor. Priority was rated on a four-point scale – "urgent action required", "some improvement required", "no improvement required at the moment", and "excess performance already". No discussion between group members was allowed, and the scores were collected immediately.

Stage 5. The group was asked to consider customers' views of each factor and rate the relative importance of each competitive factor using Martilla and James's[1] original four-point scale – extremely important, important, slightly important, not important.

Stage 6. The group was asked to consider the operation's performance, relative to its competitors, for each of the competitive factors. Performance was again rated using Martilla and James's[1] scale – excellent, good, fair and poor.

Stage 7. The group was asked to chart each competitive factor on the importance-performance matrix (without any internal priority divisions), discuss what it felt the position of each factor indicated about the priority to be given to each factor, and then to decide collectively on each factor's priority rating.

Stage 8. The group was then asked to repeat the previous seven steps for a second product or service. This time it was also asked to consider any changes it wished to make to the method.

Stage 9. A group meeting with the tutor formalized the changes which the group wished to make to the method in order to make it an appropriate tool for determining priorities in its own particular organization.

Results

Figure 2 shows the aggregation of all eight matrices produced by the four groups, where:

n = the number of competitive factors which were rated in that particular position;

P^1 = the mean priority rating given by the individuals for the factor when rating independently (where "urgent action" = 4, down to "excess" = 1);

P^2 = the consensus priority rating formed by the group following discussion and the use of the matrix to position the factors (using the same scale).

Although the sample used was relatively small, and notwithstanding the differences between the environmental contexts of the four groups, the results do give some interesting indications of the links between importance, performance and perceived improvement priority. The most obvious conclusion which can be drawn from the results is that Martilla and James's[1] intuitively derived relationships seem broadly to hold. That is, for a given importance, the priority for improvement increases as performance decreases. Similarly, for a given performance level, the priority for improvement increases as importance increases. However, as hypothesized earlier, the rate of change of the priority for improvement allocated by the managers in the groups does not seem to be uniform for either the importance or performance dimension. In other words, the matrix may reflect priorities at the extremes of the importance and performance scales, but the 2×2 zoning used by Martilla and James does not seem to hold for intermediate points.

The discussions within the groups, and between the groups and tutor, also questioned the use of a four-point scale to rate importance and performance. There was broad agreement to extend the number of rating points available to the managers so as to reflect the sometimes subtle differences between the competitive criteria. In extending the number of points, three of the four groups independently used Hill's[3] "order-winning" and "qualifying" distinction. This idea had been discussed in stage 1 of the process prior to the use of the matrix. The three groups interpreted "qualifiers" as generally having less importance to customers than order winners irrespective of the achieved performance of the operation. This is not necessarily always the case as will be discussed later.

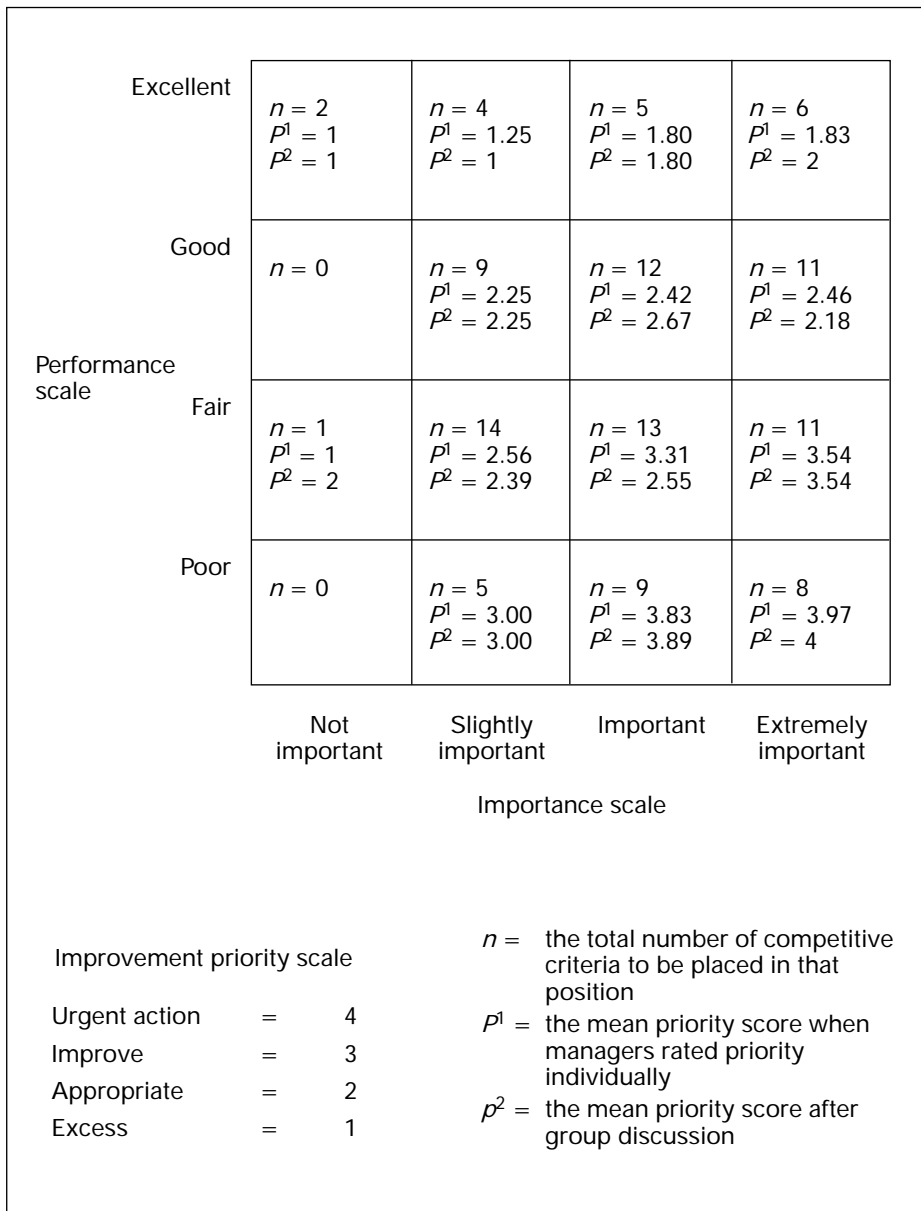


Figure 2. Aggregation of Eight Matrices Produced by Four Groups

Based on these discussions and further work carried out with an expanded group of managers from company D (which included the original group), nine-point scales were developed to rate both importance and performance. Both scales were based on a 3×3 structure; three basic categories, each divided into three subcategories. These scales are shown below.

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A Nine-point Importance Scale

For this product or service does each performance objective meet the following?:

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- order-winning objectives:
 - (1) provide a crucial advantage with customers – they are the main thrust of competitiveness;
 - (2) provide an important advantage with most customers – they are always considered by customers;
 - (3) provide a useful advantage with most customers – they are usually considered by customers;
- qualifying objectives:
 - (4) need to be at least up to good industry standard;
 - (5) need to be around the median industry standard;
 - (6) need to be within close range of the rest of the industry;
- less important objectives:
 - (7) do not usually come into customers' consideration, but could become more important in the future;
 - (8) very rarely come into customers' considerations;
 - (9) never come into consideration by customers and are never likely to do so.

A Nine-point Performance Scale

In this market sector, or for this product group, is our achieved performance in each of the performance objectives:

- better than competitors:
 - (1) consistently considerably better than our nearest competitor;
 - (2) consistently clearly better than our nearest competitor;
 - (3) marginally better than our nearest competitor;
- the same as competitors:
 - (4) often marginally better than most competitors;
 - (5) about the same as most competitors;
 - (6) often within striking distance of the main competitors;
- worse than competitors:
 - (7) usually marginally worse than most competitors;
 - (8) usually worse than most competitors;
 - (9) consistently worse than most competitors?

Importance-Performance Matrix Zoning

An alternative zoning of the area covered by the matrix is shown in Figure 3. It departs from the 2×2 format to reflect the results of managers' individual and group priorities and their later discussions on the use of the matrix. The boundaries between zones are quite different from the original 2×2 format but do follow what was regarded as an intuitively acceptable rationale. There is a "lower bound of acceptability" shown as line AB in Figure 3. The manager's views were that the boundary between acceptable and unacceptable performance when importance was rated as relatively unimportant (8 or 9 on the importance scale) would in practice be low. They were prepared to tolerate performance levels which were "in the same ball-park" as their competitors (even at the bottom end of the rating). They became concerned only when performance levels were clearly below those of their competitors. Conversely, when judging competitive criteria which were rated highly (1 or 2 on the importance scale) they were markedly less sanguine at poor or mediocre levels of performance. Minimum levels of acceptability for these competitive factors were usually at the lower end of the "better than competitors" class. Below this minimum bound of acceptability (AB) there was clearly a need for improvement; above this line there was no immediate urgency for any improvement. However, not all competitive factors falling below the minimum line were seen as having the same degree of improvement priority. A boundary approximately represented by line CD represents a distinction between an urgent priority zone and a less urgent improvement zone. Similarly, above the line AB, not all competitive factors were regarded as having the same

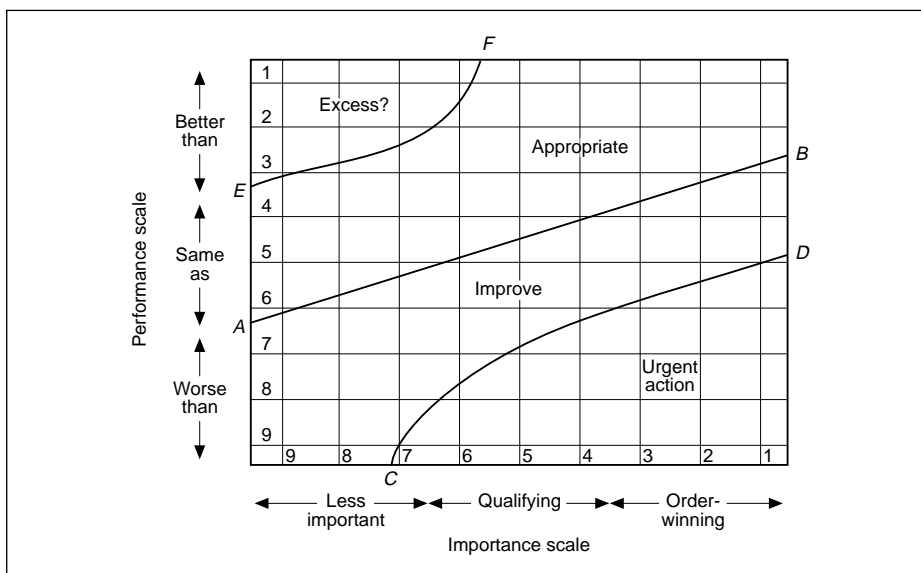


Figure 3.
Importance-Performance Matrix: Alternative Zoning

characteristics. The line EF was seen as the approximate boundary between performance levels which were regarded as “good” or “appropriate” on the one hand and those regarded as “too good” or “excess” on the other. Segregating the matrix in this way results in four zones which imply very different treatments.

The “Appropriate” Zone

This zone is bounded on its lower edge by the “minimum performance boundary”, that is the level of performance which the company, in the medium term, would not wish the operation to fall below. Moving performance up to, or above, this boundary is likely to be the first-stage objective for any improvement programme. Competitive factors which fall in this area should be considered satisfactory, at least in the short-to-medium term. In the long term, however, most companies will wish to edge performance towards the upper boundary of the zone.

The “Improve” Zone

Any competitive factor which lies below the lower bound of the “appropriate” zone will be a candidate for improvement. Those lying either just below the bound or in the bottom left-hand corner of the matrix (where performance is poor but it matters less) are likely to be viewed as non-urgent cases. Certainly they need improving, but probably not as a first priority.

The “Urgent Action” Zone

More critical will be any competitive factor which lies in the “urgent action” zone. These are aspects of operations performance where achievement is so far below what it ought to be, given its importance to the customer, that business is probably being lost directly as a result. The short-term objective must therefore be to raise the performance of any competitive factors lying in this zone at least up to the “improve” zone. In the medium term they would need to be improved to beyond the lower bound of the “appropriate” zone.

The “Excess?” Zone

The question mark is important. If any competitive factors lie in this area their achieved performance is far better than would seem to be warranted. This does not necessarily mean that too many resources are being used to achieve such a level, but it may do. It is only sensible therefore to check if any resources which have been used to achieve such a performance could be diverted to a more needy factor – anything which falls in the “urgent action” area, for example.

Example of the Use of the Modified Matrix

Figure 4 illustrates one of the services selected during the subsequent session by the extended group from company D. The service analysed was a “resident engineer” service package which included both contract-specified engineer

The Importance-Performance Matrix

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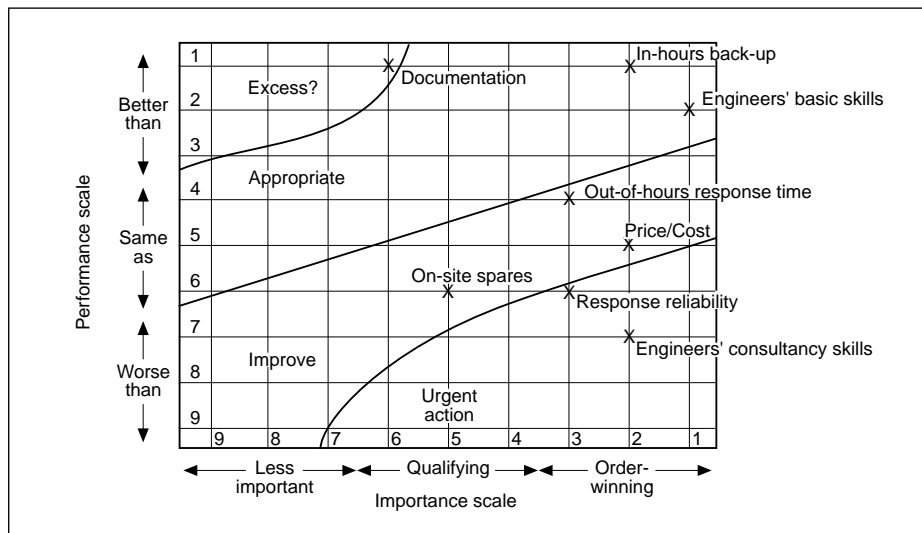


Figure 4.
Importance-Performance Matrix
Modified for "Resident Engineer" Service

attendance hours and back-up support on a 24-hour basis. In this case the significant competitive factors were chosen by the group as follows:

- in-hours back-up: the ease with which resident engineers could call on advice and assistance from the regional depot;
- engineers' basic skills: the ability of the resident engineers to perform the range of basic preventive and emergency breakdown repairs;
- documentation: the manuals and training given to customers' technical staff;
- on-site spares: the range of spare parts held on the customer's site;
- out-of-hours response: the contracted maximum response time for out-of-hours service;
- response reliability: the proportion of occasions on which out-of-hours service time exceeded the contracted minimum time;
- engineers' consultancy skills: the ability of resident engineers to advise customers on their equipment care and replacement procedures (in order to sell more services and products to the customer).

The group's analysis shown in Figure 4 revealed that "response reliability" and "engineers' consultancy skills" should be given urgent action priority for improvement. "On-site" spares, "out-of-hours" response time and "price/cost" were in need of improvement, but not so urgently as the previous competitive criteria. It also indicated that the company's documentation could be regarded as too good.

As with many subsequent uses of this approach to prioritizing improvement, the matrix did not reveal any total surprises as such. The competitive factors, “response reliability” and “engineers’ consultancy skills” were known to be in need of improvement. However, the exercise was regarded as very useful for two reasons:

- (1) It did help to discriminate between many factors which were in need of improvement. Prior to the exercise, the factors “on-site spares” and “price/cost” were also regarded as equally in need of improvement.
- (2) The exercise gave a purpose and structure to a rather ill-defined debate on improvement priorities which had been ongoing for some time. It was the process of performing the exercise as much as the results which was regarded by the managers as being particularly useful.

The “Order-losing” Distortion

As noted previously, the managers generally preferred to regard the “qualifying” category for competitive criteria as being of less importance than the “order winning” category. However, on three occasions during the original investigation and also subsequently in the extended D group, competitive factors which were rated as being only of middle-ranking importance were awarded the highest priority for improvement. The given reason in all cases was that the achieved performance in the factor was so poor that it was acting not just as a lack of positive contribution to competitiveness, but rather as a significant restraint on competitiveness. The current achieved performance of the factor had negative utility for the company. This idea is what Hill[3] calls the “order-losing” type of qualifier. In such cases (and at the risk of devaluing the currency of improvement) there is an argument for an “even more urgent action” zone at the left-hand end of the urgent action zone.

Investigation 2

Methodology

The purpose of the second investigation described in this article was to attempt to modify the importance-performance matrix shown in Figure 3 so as to reflect the needs of internal service provision. Specifically, its objectives were to:

- determine whether managers who were leading an improvement initiative in their own company could modify the importance-performance matrix so as to provide improvement priorities which were seen as credible within the company;
- determine how the matrix should be modified; and
- identify the perceived benefits and problems of using this approach to determine improvement priorities.

A single financial services company was used in the study. It provided a range of mainly loan-based financial services in the personal banking, retail credit, insurance and mortgage areas. A single back-office operation serviced the requirements of a network of branch (field) operations. The study was performed as part of a larger operations improvement initiative. This initiative involved a series of improvement workshops which relied heavily on the internal customer concept of identifying improvement strategies for each part of the company.

Step 1. The back office operation was formed into nine groups, each comprising managers from similar types of process (mortgage processing, debt collection, etc.). The branch operations were represented by regionally based groups of branch managers (three groups). All groups were composed of departmental managers who were familiar with and had used the version of the importance-performance matrix as developed in the first investigation to develop strategic performance improvement priorities for some of the company's external services.

Step 2. Each group was asked to identify relatively well-focused services it provided for (usually single) internal customers. For this exercise the groups were asked to choose as unambiguous a service-customer combination as possible.

Step 3. For each service-customer combination the groups were asked to identify the performance factors (as were termed the internal equivalent to competitive factors) which they believed the internal customers would use to judge the service. As a checklist the groups were asked to identify factors under the generic headings of technical performance, error-freeness, responsiveness, dependability of delivery, flexibility, advice/assistance, and cost/budget allocation. These factors were chosen partly because they already had currency and credibility within the organization.

Step 4. Groups were asked to interview the manager(s) of the customers for the selected internal service to determine the "relative importance of the selected factors of performance to your ability to do your job effectively". The groups were left free to devise their own rating scale to record the importance of each performance factor.

Step 5. Groups were asked to discuss with the customer(s) their perception of the internal supplier's performance at delivering the service. They were asked "What is your opinion of how well (the supplier) delivers (this aspect) of their service to you?" Again the groups were left free to devise their own rating scale to record the supplier's perceived performance.

Step 6. Groups were asked to determine improvement priorities by comparing the importance and perceived performance ratings on an importance-performance matrix.

Step 7. The groups were asked to discuss their suggested improvement priorities with the internal customers to check the degree of correspondence with customers' views on improvement priorities.

Results

During the series of improvement workshops a total of 25 service/customer combinations were examined. Twenty-two of these resulted in completed importance-performance matrices. Of the four which were abandoned, two services were rendered redundant by changes in the company's external services and two involved internal customer groups which effectively disappeared as part of the wider changes involved in the performance improvement initiative.

The following is a summary of the main results to emerge from the 22 completed exercises:

- Asking the groups to examine the less complex or ambiguous internal service/customer combinations did tend to skew the study away from what were regarded as some of the more critical internal services. Indeed some of the internal services which were regarded as particularly important were regarded so primarily because they *were* complex, difficult to define or servicing an ill-defined customer group.
- Groups varied considerably in their ability to define a comprehensive set of performance factors. Some groups always showed a tendency to stick to the suggested "prompt" or checklist categories. Others at first attempted to impose their own categories on customers. Most groups, however, quickly developed the skill of adapting the broad categories to the customer group's own categorization of performance factors.
- Most groups retained some way of distinguishing between "order-winning" and qualifying (or hygiene) ratings in their scales. For example, Figure 5 shows the scale eventually adopted by most of the groups. Points 1, 2 and 3 on the scale represent different strengths or "order-winning", while point 4 is, in effect, a "qualifier" point.
- All groups moved away from "competitor-based" methods of judging performance, although for the services which could have been purchased from external suppliers the competitor-based scale was regarded as "useful but contentious".
- The groups also reduced the number of points on the performance scale, again on the grounds of "over-complexity", and again a five-point scale was usually favoured.
- One of the most useful performance scales (as judged by the customer groups) used the concept of customer expectations to distinguish between the better grades of performance. Figure 6 shows this scale.

- Generally the groups experienced few problems in using their modified matrices to determine improvement priorities. Some groups, however, either could not reach unanimity as to where a factor should be positioned on the matrix, or felt that its position could “depend on circumstances”. In those cases groups resorted to representing the position of some factors by “areas” on the matrix rather than by single points.
- Priority categories correspond very closely with those suggested in the first investigation reported in this article using external services. Figure 7 shows the matrix which uses the scales shown in Figures 5 and 6.

Conclusion

The importance-performance matrix proved to be an extremely valuable tool to help in setting priorities both for the improvement of external and internal services. However, there are differences in the scales used. Whereas nine-point scales were favoured for external services, both importance and performance ratings seem to work best when kept to, at the most, a five-point scale for internal services. However, the priority categories proposed for external services were found to be also appropriate for internal services.

Of particular importance was the managers’ reaction to the process. In the first (investigation to determine improvement priorities for external services),

How important is this factor to you?

- (1) It is crucial to our satisfaction
- (2) It is very important to our satisfaction
- (3) It is useful but not vital to us
- (4) Only an issue if it falls below a minimum standard
- (5) Not usually important

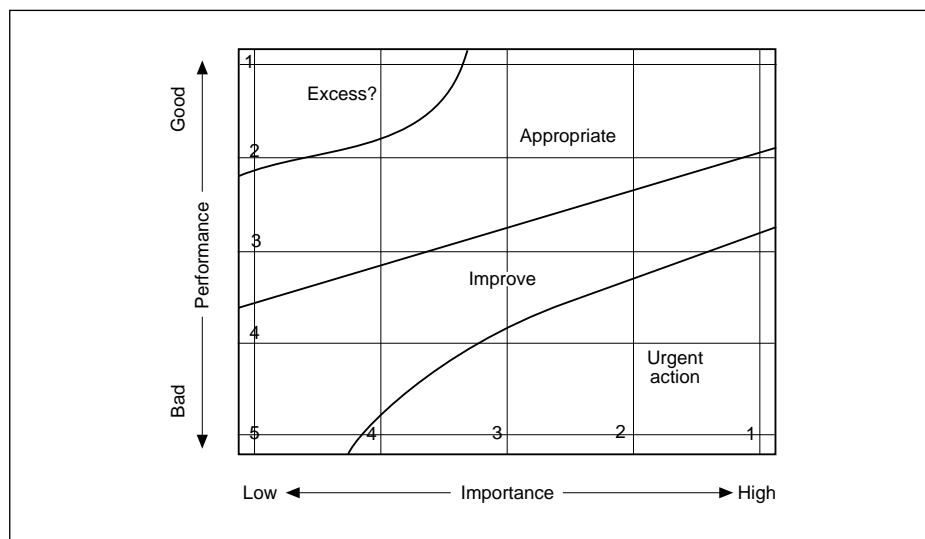
Figure 5.
Scale of Performance
Factors Adopted by
Most Groups

What is your supplier’s performance at delivering this factor to you?

- (1) They exceed your best expectations
- (2) They meet your best expectations
- (3) They just meet your expectations
- (4) They meet the minimum standard which you could tolerate
- (5) They fall below your minimum standard

Figure 6.
Performance Scale
Using Customer
Expectations

Figure 7.
Importance-
Performance Matrix
Using Performance
Scales Shown in
Figures 5 and 6



managers valued the extra discrimination they achieved and the opportunity for a structured discussion of important operations issues across functional boundaries. In the second investigation (addressing internal services), the groups performing this analysis (representing supplier interests) and the internal customers themselves both found the exercise of priority setting using this methodology particularly developmental. In particular, the groups expressed the belief that it caused them to question their current assumptions regarding internal services as well as causing them to explore the internal customer-supplier relationship in a richer manner than they had done before. Perhaps of longer-term significance was the group's intention to issue the methodology as an ongoing communication tool which would be used to refine their existing "service-level agreement"-based relationships.

One reaction of the managers participating in this exercise was almost universal both for internal and external priority setting. This was that, up to that point, they had been "ignorant of their own ignorance". "I didn't know how little we knew about our customers, and especially our competitors" was a typical reaction. If for no other reason, methodologies such as this are a valuable subject for academic study.

References

1. Martilla, J.A. and James, J.C., "Importance-Performance Analysis", *Journal of Marketing*, January 1977.
2. Hayes, R.H. and Wheelwright, S.C., *Restoring Our Competitive Edge*, Wiley, 1984.
3. Hill, C.H., *Manufacturing Strategy*, 2nd ed., Macmillan, 1993.

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4. Fine, C.H. and Hax, A.C., "Manufacturing Strategy: A Methodology and an Illustration", *Interfaces*, Vol. 15 No. 6, 1985, pp. 28-46.
 5. Platts, K.W. and Gregory, M.J., "A Manufacturing Audit Approach to Strategy Formulation", in Voss, C.A. (Ed.), *Manufacturing Strategy*, Chapman & Hall, 1992.
 6. Voss, C.A., *Manufacturing Strategy*, Chapman & Hall, 1992.
 7. Chase, R. and Hayes, R.H., "Beefing up Operations in Service Firms", *Sloan Management Review*, Autumn 1991.
 8. Easingwood, C.J. and Arnott, D.C., "Priorities in Services Marketing", *International Journal of Service Industry Management*, Vol. 2 No. 2, 1991.
 9. Slack, N., "A Focus on Flexibility", *Proceedings of the 5th Annual Conference of the Operations Management Association*, University of Warwick, UK, 1990.
 10. Verdermerwe, S. and Gilbert, D.J., "Internal Services: Gaps in Needs/Performance and Prescriptions for Effectiveness", *International Journal of Service Industry Management*, Vol. 2 No. 1, 1991, pp. 50-60.
 11. Slack, N., *The Manufacturing Advantage*, Mercury Books, London, 1991.