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Wysowl Pty Ltd
Newsletter Number 22
July 2007

SUPPLIER QUALITY, RELIABILITY AND COST

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OVERVIEW

For any business, the quality, cost and reliability of incoming parts, components, goods or services from suppliers is a vital business consideration. Despite this, examples where companies choose suppliers in such a way that quality, scheduling and total costs are negatively impacted remain common. This paper examines some elements of supplier selection and relationships.

LOWEST TOTAL COST – NOT PRICE TAG

This is an interesting point because most managers will argue that their company does not award business on the basis of price tag alone, even when it does. *A common problem is that the measures of quality used are inadequate and thus business slowly (perhaps imperceptibly) drifts to the lowest bidder.* Lowest price tag is not the same as lowest total cost, and total cost is the figure that is important

Regardless of whether we discuss capital equipment, tools and minor equipment, raw material, parts, components, sub-assemblies or even paper; the same principles endure. Lowest price is not necessarily the best deal. Some examples are:

1. A mine buys a "boy-sized" crusher to do a "man-sized" job. Constant downtime and a low output dogs the company for years. An assessment of total cost over a 10-year period (the life of the mine) would have provided a better answer.
2. A purchasing officer, under pressure to reduce costs, deserts a long established supplier to buy tool steel from a cheaper outlet. The subsequent defects, waste and frustration cost much more than he saved by changing suppliers. However, his

department's figures look better, and he received a bonus for reducing the cost of incoming goods.

3. A food processor changes to a cheaper supplier of thermal plastic bags used in packaging. The percentage of reworked bags rises from around 2% to about 5%. The waste is obvious.
4. An electronics company deserts an established supplier to purchase a component from a cheaper supplier. Test failures for finished product doubles, as does the level of rework. Cycle time for a product run increases and customer service levels fall. The cost of incoming components did fall, but total costs rose.

In all the above cases, the cheaper product met specifications, and yet performed poorly in the hands of the purchaser. Meeting specifications is not enough. Some reasons for this are:

1. No specification can be totally complete. The supplier must understand to what purpose its material or components will be put before it can adequately satisfy its customer. In many cases, this will demand a close working relationship.
2. An item made of many components may be difficult to assemble or fail to perform predictably even though all components meet specifications. This is particularly true of continuous and electronics processes where the interplay of components or raw materials is complex and interactive.

THE HIGH COST OF MULTIPLE SUPPLIERS

Historically, businesses have sought a degree of protection by having multiple suppliers for any given item. In this way, they argue, if one supplier fails to

satisfy their needs, another can step in to fill the gap. We can no longer afford the often unseen costs of such a policy. Some of the reasons to avoid multiple suppliers follow.

Multiple suppliers increase variation. If a plant has three suppliers of parts or raw material, it has at least three separate sources of incoming variation. Even if all three products or sources of raw material meet specifications, they will be different in some way and perform differently in your processes. Try as they might to produce product that is identical, they will not; they cannot. If you have two suppliers you have at least two sources of variation. Only the company working with a single supplier will be successful in reducing to a minimum variation and thus defects, waste and error in its own processes and products. Moreover, many internal processes are simplified greatly by working with a single supplier. The purchasing department can do a better job; receipt of goods inward and warehousing may be simplified; the multiplicity of paperwork may be simplified; keeping track of supplier performance is much easier. Usually, it will be possible to hold lower inventory when working with a single supplier and this aspect alone will hold considerable economic advantages for most companies.

Multiplicity of suppliers raises costs more often than it reduces them. The manager of the packaging operation in a manufacturing plant decided to reduce the number of suppliers of a special type of plastic bag used in a vacuum packaging process, where the bag is heat sealed. He conducted in process tests on the bags coming from both existing suppliers and found one to be superior on several counts. He started ordering from this superior supplier only, having satisfied himself that criteria such as delivery schedules and continuity of supply could be met. As a consequence, defective packages fell and productivity rose. Not only did he have fewer problems with aspects such as pin holes in bags, but also his operators were able to more finely tune the machinery once they had a known input of bag type. Before the change was made, no one realised that the problems operators were having with some aspects, such as temperature setting for the heat sealing bar, were as much a function of variation in the bags from different suppliers as anything else. As a bonus, he was able to use increased volume through a single supplier to reduce the price paid for bags.

This manager then examined other aspects of his operation and found good reasons to reduce the number of suppliers of other packaging products such as cartons. One benefit that followed such actions was that several of his single source suppliers started to visit his plant to see how their product was performing, before he had asked them to do so. One of their combined

studies led them to the discovery that the type of ink on certain packaging material affected the performance of that product in the packaging process. Some changes were made and productivity was given another boost. The cost was nil, except for the time they spent collecting and analysing data, which should be a normal part of their job.

A policy of multiple suppliers can stifle improvement. Imagine these two situations. On one hand you are one of several suppliers selling raw material or parts to a customer. Sometimes the customer buys from you, and sometimes it does not. The other situation is one where the customer has selected you as its long term single source of supply. Under which set of circumstances would you be most willing to conduct research and development to make your material work better in your customers' hands for mutual benefit?

SINGLE SOURCE SUPPLY REDUCES COSTS

Anyone can buy a product or service cheaper than the price they currently pay. There is no trick to it; no secret. The real job at hand is to reduce total cost, now and forever by working long term with a single source of supply for each item or type of material purchased.

Where no medium to long term contracts exist, it is difficult for a supplier to innovate and further develop product to better serve customers when the business plan is necessarily short term. Thus customers who purchase on the basis of price based competitive tendering can reduce their own long term competitive position. A short term purchasing policy can actually discourage the supplier from conducting research and/or investing in better machinery and materials; in improved training and continual process improvement.

Two short paragraphs from "Out of the Crisis" provide more reasons for working with a single supplier.

"Lot-to-lot variation from any one supplier is usually enough to give fits to manufacturing. It is reasonable to expect that variation between lots from two suppliers will give even more trouble.

Heard on the factory floor. "With every new lot of S-T material that comes in (from the same vendor), our troubles with point-defects shoot upward, with a whole new set of problems to conquer. Material from two suppliers would drive us out of our wits."⁽¹⁾

One of the key aspects of Dr Deming's philosophy and of Six Sigma is the process approach, or as Deming stated it, production viewed as a system. The system includes suppliers. A company that chops and changes its suppliers is breaking one of the links in that system.

HELPING SUPPLIERS HELP YOU

If your supplier's product is poor or mediocre, it is likely that so too is yours. It soon becomes clear that benefits exist in adopting an attitude of not only helping suppliers to improve but also allowing them to help you.

Examples exist where customers are providing training and assistance to suppliers in (for example) statistical techniques. Also, the sight of suppliers working in the customer's plant to better understand how their product is used is becoming more common.

This attitude of mutual support and assistance can hardly be fostered in a situation where multiple suppliers and/or price based competitive tendering is the norm. For critical or complex items people from both organisations need long term commitment and plans to realise the full potential of their combined efforts. The development of a new product may take years of collaboration between chemists, purchasing officers, production managers, design, process and maintenance engineers from several companies. Such collaboration is not as common in the West as it is in Japan. In the West, expensive engineering changes linked to incoming parts or components forced upon them after production has started are far too common. In Japan they are rare. We cannot afford not to take this process approach to our work any longer, and the process includes suppliers.

The same concept can be applied to internal customers and suppliers. A client spent a fortune designing and installing a nationwide computerised system for ordering, receiving and dispatching stock as well as entering sales and producing invoices and statements. Unfortunately, sales staff, keyboard operators and dispatch/warehouse staff were not included in the design phase. Two years after the system was installed changes to that system were being made that might have been designed out at the specification stage of the project. Meanwhile, staff struggle with an inadequate system, inaccurate readouts of stock on hand are common, as are credit notes and similar counter productive problems.

SOME EXCEPTIONS TO SINGLE SOURCING

Buying on a one-off basis is different from continuing delivery. A single purchase of office furniture is an example. The mine buying a crusher is another. In such instances the customer may examine the supplier's previous performance, cost, and ability to provide back-up service and combine this with previous experiences with the supplier to make one-off decisions.

There are instances where no single supplier can supply your total demand. Sometimes the government may dictate that business be split between two suppliers, for

example, for defence reasons. It may be that in peacetime a single plant could supply the nation's needs, but a war situation would dramatically increase demand with little or no lead time to build another plant. In these instances the impact of more than one supplier can be mitigated by using stratification. To illustrate, suppose a national organization is forced to buy (for whatever reason) from four suppliers. It may be possible to have supplier 1 providing product for the Queensland operation. Supplier 2 supports the New South Wales operation. Supplier 3's entire product goes into use in Victoria, and the remainder of the country obtains product from supplier 4.

The same concept can be applied on a plant by plant basis. If you have four plants and three suppliers, the best result under these circumstances may be for two of your plants to have a dedicated supplier each, while the third supplier ships to your other two plants.

By following this practice each plant has only one source of supply on a long term basis, but some flexibility is retained for emergency situations such as a strike or a fire in a supplier plant. The exact reverse is true if you purchase from the one supplier company, but where the supplier is forwarding product made in different plants. For example, companies producing plastic extrusions which are buying PVC from a single company would sometimes get product from Plant A, and sometimes from Plant B. The product from both plants met specification, but they performed differently enough in the extruders to bring a new raft of problems with each batch purchased.

SELECTING A SINGLE SOURCE OF SUPPLY

It is not advocated that companies should rush out and quickly eliminate all suppliers bar one for each item. Clearly, such actions are nonsense. What is suggested is that businesses work now and forever towards a single source of supply for each item, commodity or service. This single sourcing should include, for example, printing, couriers, general carriers, advertising, components, raw material and support services such as technical consulting/contracting. Obviously, the selection of a single source of supply will require careful consideration because the purchaser is buying not only goods or services, but also engineering skills and knowledge, industrial relations ability, management talent and a willingness to work closely with you. A single source supplier should be as carefully selected as a business partner; because that is the situation you are entering into, a partnership.

It makes little sense to enter into a single source of supply arrangement unless you are confident that a situation of mutual confidence and trust exists. A mutual agreement to work together to constantly

improve quality is also helpful. Moreover, entering into a single supplier situation without being confident about the supplier's quality, cost, ability to meet delivery schedules and commitment to continual improvement, is obviously inviting trouble. A single source supplier should be able to furnish evidence that it too is moving towards a single source of supply for any given item, service or commodity.

ELECTRONICS CASE STUDY

In this example a communications equipment manufacturer was sourcing components and parts from over 50 vendors who in turn purchased from over 800 component manufacturers. Multiple suppliers were the norm, with up to five manufacturers for a single component. This was brought about by the policy of using multiple suppliers as a method to guarantee supply and by the practice of calling for tenders for components for each new product launched. In this way, a component that was common to many products was purchased from the cheapest tender for each product launch, and the number of suppliers gradually grew.

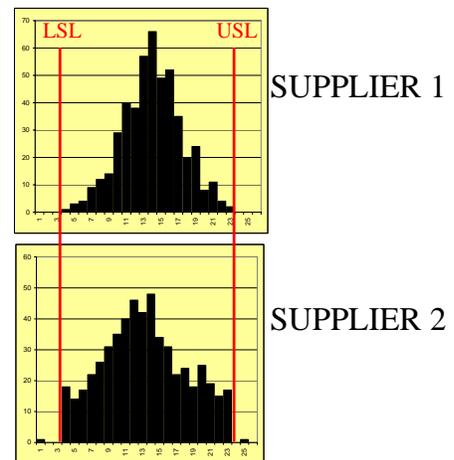
Benchmarking studies indicated that the cost of components was too high. Quality issues, both in manufacturing and in field failures were at unacceptable levels. The technical and customer support centres were being plagued with calls from distributors and customers that would never have occurred had the component quality been better.

Late deliveries beleaguered the schedulers who could not put an urgent product into the schedule because of one or two suppliers were late delivering parts. To illustrate, one system contained about 300 purchased parts. The background local demand was for about 1,500 products per week. Orders from overseas averaged about 1,000 per week, but these orders were erratic. Distribution agents from Eastern Europe and the Middle East tended to order product only three to four times per year because this mitigated against unreliable transport channels and reduced the total transport cost per product to less than the carrying cost of high inventory levels.

The purchasing plan was to have a regular supply of components delivered each week to meet local demand. Components required to fill orders from the Middle East and Eastern Europe were ordered on an as required basis. Given that some 300 components and parts were required, if one percent of these parts were late arriving, about three components would be late for each scheduled run for an overseas order, making scheduling a nightmare unless high inventories of components were carried.

A new approach to purchasing was adopted. The purchasing manager introduced a new supplier qualification process to improve quality. For vital components, suppliers were required to demonstrate that their production processes were stable. The purchasing manager was then in a position to reduce the number of suppliers by channelling more product through a single supplier. He discovered high quality suppliers that were supplying (for example) five components when they had the capability to supply more than double this number of components. This increase in volume enabled him to use volume as a negotiating point to reduce the cost of incoming parts. Figure 1 shows a comparison of the performance of a key variable of sample components submitted by two suppliers before the new purchasing regime was introduced. Supplier two was chosen initially, because it was less expensive and its ability to meet specification seemed almost as good as the other supplier. The new approach to purchasing resulted in supplier two being replaced, because its greater variability was causing interaction issues with other components. Knowing that incoming meets specification, by itself, is insufficient indication of how components and material will perform in a customer plant.

FIGURE 1
Performance from Two Suppliers



In summary, this customer company reduced its supplier base by nearly two thirds, simplifying the purchasing process greatly. The cost of incoming components fell. Quality of incoming components improved, reducing test failures and rework as well as field failures and the attendant calls to technical and customer support centres. On time delivery by suppliers improved, simplifying the scheduler's task and also resulting in a higher level of customer service to their own plant's distributors.

SPECIAL NOTES ON INTERNAL CUSTOMERS

In vertically integrated corporations it is not uncommon to discover that locking internal customer and supplier operations into a supply arrangement drives poor quality and higher costs.

In one vertically integrated company, quarries, concrete batching plants and a variety of concrete product plants (pipes and tiles for example) were vertically integrated. The downstream operations were required to accept stone and sand from internally owned quarries. The quarries were quite profitable; the downstream operations were experiencing quality, cost and service issues. The subsequent investigation by a consulting firm discovered that the quarries also sold product to external customers, some of whom were direct competitors in concrete products.

It discovered also that in many cases quarries were shipping first quality material to competitor plants which had the option to buy elsewhere if quality or service slipped. Sometimes, poorer quality material was being shipped to internal plants which, according with corporate policy, had no option but to accept raw material from the internally owned quarries.

The financial losses this practice created in the downstream operations was far greater than the gains made at the quarries. Given the higher value added in downstream operations, this was to be expected.

Vertically integrated companies have the greatest opportunity to manage the system as a whole and to optimise financial performance of the entire chain. However, often their habit of treating each operating unit as a separate business units despite these units having no power to choose either customers or suppliers, results in distorted management behaviour and reduced financial returns.

EPILOGUE

Improved quality, lower costs, better scheduling and improved customer service levels; we can have it all if we understand and are able to reduce variation, manage systems well and create purchasing policies and practices whose objective is to manage total financial performance.

References:

1. *W. E. Deming, Out of the Crisis, 1988, MIT*