

# COST ANALYSIS FOR WORLD CLASS CHANGE

## Part 2: The Costs Associated with Supplier Development and Quality

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This article examines cost models proposed as means of quantifying benefits derived from supplier development.

### SUPPLIER DEVELOPMENT

Supplier development is the process given to customer company's processes to improve their supply chain performance. Customers assist suppliers to develop their capabilities in design, manufacture and logistics.

### Drivers for Supplier Development

To increase profit, two principle strategies may be employed:

1. Reduce costs - from fixed cost overheads and variable costs (direct and indirect). A reduction in operating capital allows the company to be more responsive to customer needs through a pull manufacturing system and eliminate or reduce to minimum stock levels via Just-In-Time systems
2. Increase revenue - from higher prices or increased volume turnover.

These strategies are applicable within the company managed by directors and managers. They are equally applicable to companies contributing directly or indirectly to the performance of the business serving particular markets. These include suppliers, trading companies, sub-contracting design houses, consulting and IT providers. Each of these contributes goods or services that should add value in some form to the end user.

### COST FACTORS

Steele and Court [8] identify the following as costs contributing to life costs of bought in products:

- the best purchase price commercially available
- the hidden costs of stockholding and purchasing administration
- the costs of poor quality and late delivery
- the loss of interest on early payments
- subsequent operational and maintenance costs
- the cost of operational failure
- the consequences of a negligent or incapable supplier
- the costs of eventual disposal.

Woodcock [10] focuses on work place aesthetics and provides arithmetic models highlighting cost elements associated with informal training:

- Cost of wages of new operators during learning period
- Cost of scrap and rework during learning period
- Cost of supervisory time in training
- Cost of lost production and wages of experienced operators involved in training.

To ensure expenditure on formal training courses is not wasted, Woodcock considers the following elements essential:

- Proper selection of trainees
- The appointment of suitable training staff
- Setting-up a training area
- Devising effective training programmes.

### COST REDUCTION THROUGH SUPPLIER DEVELOPMENT

Two practices are enumerated by OEMs concerning the pricing strategies their suppliers operated. The 'traditional' approach was for suppliers to quote at or below cost, in order to gain the contract. Contracts were considered to be for a shorter term than partnership or single sourcing agreements. Price rises were necessary for any uncontrollable factor, wage rises and inflation. This policy was common across industries and along supply chains, hence for any justifiable reason, cost rises were passed along to the end customer.

Western industry and 'government, civil and military, are being rooked by rules that award business to the lowest bidder' Deming [3]. 'The aim in purchase of tools and other equipment should be to minimise the net cost per hour (or year) of life. But this would require long-term thinking, not just cheapest price tag for purchase today. The necessary figures for initial cost, maintenance, and length of life for each important tool are on hand, albeit scattered, and could be assembled.' Deming goes on to state: 'He that has a rule to give his business to the lowest bidder deserves to get rooked.'

Traditional procurement of production components and materials were based upon economic order quantity (EOQ) models, where the principle variable is the mix of product rather than the rate of product usage that was in question. With the use of electronic data interchange/integration (EDI) technology, order costs have virtually been eliminated because the associated administration has been automated. With the application of Just in Time (JIT) principles and recognition of liability for payment of goods as the product leaves the production line, holding costs have been drastically reduced.

The advent of Japanese market share increases due to price advantages and extra features on the products as standard, caused Western industry to review their pricing policy. American corporations during the 1970s expected their suppliers to reduce unit prices year on year or not to increase them as fast as inflation. This principle was exported to Japan where it was indoctrinated into the Keiretsu by MITI. During the 1980s, Japanese transplants began to be developed in Europe and the USA, using a costing policy based on reducing unit prices through increased quality, automation and flexibility, with reduced or eliminated waste and better logistics operations. Ensured longer-term supply contracts and mutual systems development allowed suppliers to invest more in tooling, capital fund assisted by MITI and the assembler plant for joint tooling ownership. Costs have been removed at supplier and customer plants with the aid of suggestion, review and action schemes. Motivation is maintained for the scheme due to the subtle use of cognitive dissonance, in the form of small

monetary rewards up to about £3.50 per accepted suggestion. Ken Lewis [7] at Dutton Engineering (Wootton) provided £5 and £15 per suggestion. For a total outlay of £750 for suggestions, and £1,670 in labour, material and equipment, Dutton reduced its cost base by £160,000.

There are three dimensions to strategies designed to increase operating income - increasing sales revenue through increased prices, increased sales revenue through increased sales volume, or by reducing internal operating costs. Steele and Court gave PMMS empirical figures for typical revenue breakdowns, see below.

<i>Table 1</i>	
<b>Empirical Revenue Breakdowns</b>	
	% of revenue
Purchases for production	50
Purchases for MRO (maintenance, repair and operating supplies)	10
Manufacturing, sales and over heads	30
Profit	10

To quantify the financial impact of functions upon the bottom line, Hoare [5] states that a 2% of sales reduction in costs equates to the effects an increase of 50% in sales would have for operating income. Hoare's figures are based upon a 60% purchase level. Steele and Court match this level as the summation of production and MRO purchases. See Table 2. However, these spreadsheet figures are expressed as ex-works costing examples, and do not take into account internal efficiencies, practices and product mix. Overhead rates are calculated as a 100% charge on direct labour - using standard man-hours rather than machine hours, while general overheads are charged as a 100% charge on the summed cost of sales labour and overhead figures. Hoare applied 100% to direct labour for direct overheads and 100% to labour and direct overheads to achieve general overheads, which is a total overhead allocation of 300%.

Direct labour is considered proportionally very low for a company operating in a manufacturing environment however, should the company be an assembler then 60% purchases would be a reasonable average between the commonly accepted levels of 50% and 80%.

Some assemblers in the electronics industry have to strategically push away from solely board assembly, because their profitability is being squeezed. PCB assemblers, typified by Celestica, have component purchases approximating 90% to 95% of finished goods price, hence overhead allocations of 300% (as in Hoare's example) are not practicable. This leads to the conclusion that the example in Table 2 depicts a 'top heavy' organisation, where the mean order size is a constant, and technical, sales and general administrative costs are linear to the number of orders.

In 1990, the principal collaborating company for a research project undertaken by one of the authors had 120 employees. With new orders, they grew to over 320, then shrank to approximately 250. These figures equate approximately to the anticipated increase in sales revenue of between 208% and 266%. This is in contrast to Hoare's directly proportional overhead increase, during this time, staff numbers remained constant at 21, hence overhead allocation would not need to be as high and material costs could be lowered due to increased order quantities.

<i>Table 2</i>						
<b>Changing Factors Independently by 5%</b>						
			Reduce Purchasing		Increase Sales	
SALES	£1000		£1000		£1050	
COST OF SALES						
Manuf' inc O/H	£ 300	30%	£ 300	30%	£ 315	31.5%
Purchases	£ 600	60%	£ 570	57%	£ 625	62.5%
	£ 900	10%	£ 870	13%	£ 940	6%
GROSS PROFIT	£ 100	10%	£ 130	13%	£ 110	11%
INCREASE	0	0%	30	30%	10	10%
			Increase Price		Reduce Manuf O/H	
SALES			£1050		£1000	
COST OF SALES						
Manuf' inc O/H			£ 300	30%	£ 285	28.5%
Purchases			£ 600	60%	£ 600	60%
			£ 900	10%	£ 885	11.5%
GROSS PROFIT			£ 150	15%	£115	11.5%
INCREASE			50	50%	15	15%
Source: STEELE AND COURT, (1996)						

Steele and Court suggest the impact of functions acting as independent variables can be summarised below in Table 3 together with degrees of difficulty in carrying out the cost reduction exercise.

<i>Table 3</i>		
<b>Summary of independent variables' financial impact on bottom line profit</b>		
	£	Difficulty
Increase sales prices by 5% without losing volume	50,000	Very high
Increase sales volume by 5%	10,000	Very high
Reduce manuf' and O/H costs by 5%	15,000	High
Reduce purchase costs by 5%	30,000	Moderate
Reduce logistics costs by 5%	6,250	Moderate

Hoare shows for a company spending 60% of its turnover on purchases, reducing purchase spend to 58% has the same net impact on bottom line profit as a 50% increase in sales.

Table 4

Alternative financial impact analysis, according to N E C Hoare.

WORLD CLASS PROCUREMENT

	Reduce Purchasing		Increase Sales	
SALES	£100	£100	£150	
COST OF SALES				
Labour	£ 8 8%	£ 8 8%	£ 12 8%	
Overheads	£ 8 8%	£ 8 8%	£ 12 8%	
Purchases	£ 60 60%	£ 58 58%	£ 90 60%	
	£ 76 76%	£ 74 74%	£ 114 76%	
GROSS PROFIT	£ 24 24%	£ 26 26%	£ 36 24%	
General Overheads £	£ 16 16%	£ 16 16%	£ 24 16%	
TRADING PROFIT	£ 8 8%	£ 10 10%	£ 12 8%	
Interest	£ 4 4%	£ 4 4%	£ 6 4%	
OPERATING INCOME	£ 4 4%	£ 6 6%	£ 6 4%	

NEC Hoare, (1995)

Neither Steele and Court, or Hoare give comparative examples based upon the same organisation using activity based cost management principles, which are considered more appropriate to Kanban/JIT manufacturing systems. Hoare's model simplifies the situation due to the directly proportional allocation nature of the overhead. Most organisations however would be forced by their customers to reduce contribution and sales price in return for increased volumes and guaranteed business. A number of factors could be examined to increase operating income. Internal re-organisation may need to be undertaken, as in IBM's Red and Blue Team approach, to reduce internal overheads to externally competitive levels.

The financial impact models do not take into account the possibility of changing the value of the products by options and accessories, which are possible dependent upon the product, eg, automobiles, computers, domestic appliances. Hoare also makes the assumption that the customer will accept all of the increase in overheads, however Steele and Court make a lower estimate.

Hoare does not take into account the potential to simultaneously reduce unit prices from suppliers due to an increased sales turnover. Both analysis examples make the underlying assumption that each variable does not significantly affect the other variables. This assumption is not valid except at a most superficial level to show examples, however accurate and publicly available costing information, which may be quoted, is difficult to obtain. Neither model includes costs of development, or intangibles such as 'off standard' (poor quality and performance) costs.

Connected to Deming's points 6 and 13, 'money spent on training, re-training, and education does not show on the balance sheet; it does not increase the tangible net worth of a company. In contrast, money spent for equipment is on the balance sheet, and increases the present net worth of the company.' (Contributed by Brian L. Joiner, in Deming [3] p53. Hence, this style of financial analysis expounded by Steele and Court [8], and Hoare [5] is fundamentally flawed. Neither the intellectual capital is quantified nor the effect that a change would or could have once learning is undertaken and implemented. The Institute of Personnel and Development [6]

clarify Deming's point by categorising costs in terms of payback and pay-forward. Payback compares financial returns in comparison with alternative uses for the investment. Pay-forward derives benefit from cultural or behavioural change that does not lead directly to financially measurable business results, and increased employee association with the business and its objectives.

BS6143 Parts 1 and 2 [2], [1] focuses on the costs of failure, appraisal and prevention. Hines et al [4] subsequently highlight that the cost of rectification can provide significant returns on investment. Assessment of returns on investment is an integral part of supplier development processes. This inclusion in the process serves to reduce philanthropic attitudes.

Internal failures include processing faulty goods, rework, delays, scrap, overtime payments to catch up lost production, additional resources to rectify problems. External failures include warranty cost, loss of reputation and sales, loss of sales due to lack of availability or reduced apparent capacity. From this perspective, faults in suppliers' processes would be classified as internal failures, from the perspective that end customers perceive the supply network as being an integral part of the branded goods manufacturers' organisation.

Table 5

	£ 000's	£ 000's
<b>Pre-tax Profit</b>	35,000	
Pre-tax Profit		35,000
<b>Total Spend</b>		
Purchase Spend	170,000	
<b>Total Purchase Spend</b>		170,000
<b>Cost of prevention</b>		
Customer assistance	3	
Supplier development	500	
Supplier training	7	
Audit feedback	3	
Supplier suggestions	3	
Training (internal)	26	
Expedition	735	
Penalty clauses	18	
<b>Total prevention costs</b>		1295
<b>Cost of appraisal</b>		
Supplier audit (ongoing)	263	
Performance monitor	105	
Stock take (shortage)	25	
<b>Total appraisal costs</b>		393
<b>Cost of Failure</b>		
Lost business	?	
Lost prestige	?	
Stock excess (buffer)	15,600	
Stock excess (other)	4,950	
Stock discrepancies	3	
Double handling	120	
Re-sourcing	80	
Legal costs	54	
Price query	15	
Discrepancy claim	42	
Technical queries	22	
Rework	70	
Over delivery	10	
Urgent transport	62	
Expediting / rush orders	923	
Customer queries	788	
Excess cost in market	8,000	
<b>Total cost of failure</b>		30,739
<b>TOTAL COST OF SUPPLIER NON PERFORMANCE</b>		<b>32,427</b>

From this several ratios can be calculated, shown in Table 5.

Table 6

<b>Total Prevention Costs</b>	1,295	= 4.21%
<b>Total Cost of Failure</b>	30,739	
<b>Return on Supplier Development per £'000</b>		
<b>Total Cost of Failure</b>	*1,000 30,739	= £18,210.31
<b>Cost of Prevention plus Appraisal</b>	1,688	per £1,000
		<b>= 18 : 1</b>
<b>Total Cost of Failure</b>	30,739	= 18.08%
<b>Total Purchase Spend</b>	170,000	
<b>Total Cost of Failure</b>	30,739	= 87.83%
<b>Pre-tax Profit</b>	35,000	
<b>Total possible pre-tax profit</b>		
Pre-tax Profit + Total Cost of Failure	35,000	+ 30,739
		= 65,739

This analysis shows that profit for this example company could actually increase 88%. This example shows an 18:1 payback ratio! To be sure, statistics like these would boost publicly quoted share prices. It also provides the business with the budget to implement similar quality based initiatives in other companies within its supply chain.

## CONCLUSIONS

Comparing the model by Hines et al [4] in this article to Womack and Jones' [9] model in part one, it would be easy to conclude that:

- management could write off the apparent profit from correcting non-conformances (from Hines') against the deficit incurred in the manufacturing account (in Womack and Jones).

The key question is about implementation. Which comes first is a 'chicken and egg' paradox. Does the company reduce its stock levels to create a budget to undertake non-conformance rectification, or do management force suppliers to increase quality, and then reduce its safety stock? It seems to become questions of who is pointing the finger, and who's house keeping is in order.

These conclusions are expanded in the third article in this series.

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