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THE OPTIMAL DEGREE OF OUTSOURCING

Swapan Sen* And Guangxi Zhu*

Abstract

This paper develops an economic model to determine the optimal degree of outsourcing by a firm and explain conditions for complete, partial, or no outsourcing decisions. It is found that for outsourcing to be profitable, it is not necessary, although sufficient, that a vendor be more efficient than the original producer. Moreover, corporate downsizing and outsourcing appear to be complementary strategies.

INTRODUCTION

Outsourcing occurs when a firm, instead of completing the entire production process in-house, employs a vendor or an outside contractor (*OC*) to make a part of the product or the process by utilizing *OC*'s own resources. The firm (or, the original producer, *OP*) makes a contractual payment to *OC* and incurs additional costs due to coordination of design and other works.[1] Because *OC* is a specialized and bulk producer, it may be more efficient than *OP* in the design and production of the parts (Giffi *et al* 1990, Hayes and Wheelwright, 1984). Outsourcing is also expected to greatly reduce fixed costs in administrative salaries and cost of inventories.[2] It is not clear, however, why most firms do not outsource the entire production process and become a *virtual corporation* that does only assembly and distribution jobs, but outsource only partially, or not at all.[3] This paper develops a simple economic model to determine the optimal degree of outsourcing. It determines conditions under which a firm outsources completely, partially, or not at all. In the model below, the following symbols are utilized:

V	*OP*'s variable (material, capital and labor) cost per unit of output
γV	*OC*'s variable cost per unit of output; ($1 \geq \gamma > 0$)
C_A	*OP*'s additional costs due to outsourcing a part of a unit of the product
P	price of one unit of output
α	portion of the production process outsourced expressed as a fraction of the product; $0 \leq \alpha \leq 1$.
F	fixed cost per unit of output
n	sensitivity of fixed cost, F, to outsourcing, $n>0$.
PMT	payment made by *OP* to *OC* for outsourcing one unit

THE MODEL

1. *OP*'s profit from own production (before outsourcing) is given by its revenue minus cost:

Equation 1

$$\Pi = P - V - F$$

*Michigan Technological University

2. *OP*'s profit with a portion outsourced is given by:

$$\Pi_{op} = P - (1 - \alpha)^n F - (1 - \alpha)V - \alpha(PMT + C_A)$$

which can be rewritten as:

Equation 2

$$\Pi_{op} = -(1 - \alpha)^n F + (P - V) + [V - (PMT + C_A)]\alpha$$

$(1 - \alpha)^n F$ represents *OP*'s fixed costs when α portion is outsourced. A comparison with fixed costs without outsourcing in Equation 1 shows that outsourcing reduces fixed costs irrespective of the value n assumes. When $n=1$, fixed costs decline at a constant rate as α increases. When $n>1$ ($n<1$) fixed costs decline at a decreasing (increasing) rate. Thus, n represents the intensity of fixed costs' response to outsourcing. To give an example, if 1% is outsourced, fixed costs reduce by 1% when $n=1$, by more (less) than 1% when $n>1$ ($n<1$). Thus fixed costs decline as a result of any amount of outsourcing.[4] Variable costs are assumed not sensitive to outsourcing. $1 \geq \gamma > 0$ implies that *OC* is not inherently more efficient than *OP*. All costs are per unit or average costs. The product price is a constant.[5]

3. With a portion outsourced, *OC*'s profit is given by:

Equation 3

$$\Pi_{oc} = \alpha[PMT - (F + \gamma V)]$$

Although fixed costs are assumed the same for both *OP* and *OC*, it is not a required assumption.

4. The combined profit of *OP* and *OC* is obtained by adding (2) and (3):

Equation 4

$$\Pi_{op+oc} = -(1 - \alpha)^n F + [(P - V) + [V - C_A - PMT)\alpha] + [PMT - F - \gamma V]\alpha$$

Notice that in the absence of outsourcing, $\alpha=0$, and (4) reduces to (1).

RESULTS

We present below results regarding conditions for profitable outsourcing, a range of feasible payments, and an expression for the optimal degree of outsourcing. Results differ depending on whether original production before outsourcing was a profitable operation ($\Pi \geq 0$) or not ($\Pi<0$). Accordingly, results are presented separately for these two cases.

Result 1: Profitability Of Outsourcing When Original Production Is Profitable

Outsourcing is profitable if there is at least one α for which $\Pi_{op} - \Pi \geq 0$. This condition is met when (5) below is satisfied:

Equation 5

$$\Pi_{op} - \Pi = [F - (1 - \alpha)^n F] + \alpha[V - (PMT + C_A] \geq 0$$

Since outsourcing reduces fixed costs or leaves them unchanged, $F - (1 - \alpha)^n F \geq 0$. Thus, a cheaper supply by the vendor, $V \geq (PMT + C_A)$, is a sufficient condition for outsourcing to be profitable. If, however, $V < (PMT + C_A)$, then profitable outsourcing requires:

Equation 6

$$[F(1 - \alpha)^n - F] < \alpha[V - (PMT + C_A)]$$

In other words, when *OP*'s variable costs are lower than the cost of outsourcing, *OP* can still profitably outsource if its saving in fixed costs exceeds the loss in variable costs.[6] If $V < (PMT + C_A)$, but this last condition is not met, outsourcing can not be profitable.

Result 2: Profitability Of Outsourcing When Own Production Is Not Profitable

Traditional theory predicts that a firm which is recovering its variable costs and a portion of fixed costs will not shut down. It can be shown that such a firm, by resorting to outsourcing, may not only not shut down, but can even become profitable if the following condition is satisfied for at least one α.

Equation 7

$$F(1 - \alpha)^n - (P - V) \leq [V - (PMT + C_A)]\alpha$$

This condition is obtained by setting $\Pi_{op} \geq 0$ which guarantees that *OP* is profitable and $\Pi_{op} - \Pi \geq 0$ when $\Pi<0$. Condition (7) shows that when original production is unprofitable, outsourcing can improve profits if savings in variable costs exceed or equal savings in fixed costs due to outsourcing *plus* the uncovered portion of fixed costs under original production. The uncovered portion of fixed costs is $F - (P - V)$ where $(P - V) < F$. Notice that $\Pi<0$ makes $(P - V) < F$. Thus the *LHS* in (7) is greater than the *LHS* in (6). Consequently, condition (7) is more stringent than condition (6) on how efficient *OC* has to be in variable costs in comparison to *OP* so that the *PMT* to be made to *OC* can be smaller. If *OC* can produce at vastly lower variable costs and *OP*'s fixed costs sharply decline, there is a possibility that outsourcing will turn a loosing business profitable.

Result 3: A Feasible Range Of Payment When Own Production Is Profitable

PMT is so determined that outsourcing is profitable for both *OP* and *OC*. Profitable outsourcing requires that Π_{op} be positive for at least one α, provided Π_{oc} is also positive. $\Pi_{oc} \geq 0$ yields $PMT \geq F + \gamma V$. For a given $\alpha=\alpha_0$, the range of *PMT* depends on whether $V \geq (PMT + C_A)$ or $V < (PMT + C_A)$. In the first case, the range is given by: $F + \gamma V \leq PMT \leq V - C_A$. In the second case, the range is given by:

Equation 8

$$F + \gamma V \leq PMT \leq (V - C_A) + \left[\frac{1-(1-\alpha_0)^n}{\alpha_0}\right]F$$

The range in (8) suggests that *PMT* has to exceed the sum of *OC*'s total costs in order to make *OC* profitable, but should not exceed the sum of *OP*'s variable cost *less* additional cost *plus* saving in fixed costs. A higher *PMT* reduces *OP*'s savings from outsourcing.

A more stringent condition for profitable outsourcing is that Π_{op} be positive for all α. The condition $\Pi_{oc} \geq 0$ yields $PMT \geq F + \gamma V$. When $n \geq 1$ and $\Pi \geq 0$, $\Pi_{op} \geq 0$ for all α requires $PMT \leq (P - C_A)$. Combining the two, we obtain a range of feasible values of *PMT*:

Equation 9

$$F + \gamma V \leq PMT \leq (P - C_A)$$

A *PMT* in the range suggested by (9) determines how gains from outsourcing is distributed between *OP* and *OC*. Although (9) appears to be easily met when $n \geq 1$ and $\Pi \geq 0$, it is a more stringent feasibility condition than (8) as it requires that n be no less than one. Both (8) and (9) require that *OC*'s viable costs do not exceed *OP*'s.

Notice that $\Pi_{op} \geq 0$ and $\Pi \geq 0$ do not imply that $\Pi_{op} \geq \Pi$. However, if $\Pi_{op} < \Pi$, there will be no outsourcing and no *PMT* to determine. It is also *not* necessary that $\Pi_{op} \geq 0$ for all α.

Result 4: A Feasible Range Of Payment When Own Production Is Not Profitable

If $\Pi < 0$, while $\Pi_{op} \geq 0$ for at least one α, then the range of feasible *PMT* is given by:

Equation 10

$$F + \gamma V \leq PMT \leq (V - C_A) + \left[\frac{(P - V) - (1 - \alpha_0)^n F}{\alpha_0} \right]$$

The difference between (8) and (10) is in the term inside the brackets. Since, $\Pi < 0$ implies $(P - V) < F$, the *RHS* of (10) is smaller than that of (8). Thus the feasible range of payment is narrrower in the case of $\Pi < 0$.

Result 5: The Optimal Degree Of Outsourcing When Own Production Is Profitable

Equation 11

$$(\partial \Pi_{op} / \partial \alpha) = n(1 - \alpha)^{n-1} F + [V - (PMT + C_A)]$$

To evaluate (11), we need to consider cases involving different values of n. Throughout, we assign α a value 1 when it exceeds 1 and a value 0 when it falls below 0.

CASE: ***n>1***

If $V - (PMT + C_A) > 0$, then $(\partial \Pi_{op} / \partial \alpha) > 0$ and $(\partial^2 \Pi_{op} / \partial \alpha^2) < 0$ for $0 \leq \alpha \leq 1$. Thus $\alpha^* = 1$. If $V - (PMT + C_A) = 0$, $(\partial \Pi_{op} / \partial \alpha) = n(1 - \alpha)^{n-1} F$, for $0 \leq \alpha \leq 1$. The first-order-condition (*FOC*) is met only when $\alpha^* = 1$. If $V - (PMT + C_A) < 0$, the *FOC* yields:

Equation 12

$$\alpha^* = 1 - \left[\frac{(PMT + C_A) - V}{nF} \right]^{\frac{1}{n-1}}$$

The *RHS* of (12) implies $0 \leq \alpha^* < 1$ when $-nF \leq V - (PMT + C_A) < 0$. The second-order condition is also satisfied, as $(\partial^2 \Pi_{op} / \partial \alpha^2) < 0$ holds for $0 \leq \alpha < 1$. For $\Pi = 0$, $0 \leq \alpha^* < 1$ also holds as long as $-nF \leq V - (PMT + C_A) < 0$ which makes $\Pi_{op} \geq 0$ for at least one α. If $-nF > V - (PMT + C_A)$, then $\alpha^* = 0$ and the firm should not outsource at all. This condition can be rewritten as $PMT + C_A > nF + V$. Clearly, whether the cost of outsourcing exceeds the cost of own production depends on n. Thus, when $\Pi = 0$, $n>1$, and there are severe losses in variable costs due to outsourcing so that $V - (PMT + C_A) < -nF$, a firm should not outsource.

CASE: ***n=1***

For $n=1$, (2) reduces to $\Pi_{op} = (P - V - F) + [F + V - [PMT + C_A)]\alpha$ yielding $(\partial \Pi_{op} / \partial \alpha) = (F + V) - (PMT + C_A)$. Clearly, when $(F + V) > (PMT + C_A)$, $(\partial \Pi_{op} / \partial \alpha) > 0$ and $(\partial^2 \Pi_{op} / \partial \alpha^2) = 0$ for all α, $\alpha^* = 1$. Thus, when total cost of own production exceeds total cost of outsourcing, optimal outsourcing is 100%.

If, $(F + V) = (PMT + C_A)$, $(\partial \Pi_{op} / \partial \alpha) = 0$ for any a yielding $0 \leq \alpha^* \leq 1$.

If, $(F + V) < (PMT + C_A)$, $(\partial \Pi_{op} / \partial \alpha) < 0$, (always) and $\alpha^* = 0$.

CASE: *n<1*

If V - ($PMT + C_A) > 0$, (11) yields $(\partial \Pi_{op} / \partial \alpha) > 0$ and $(\partial^2 \Pi_{op} / \partial \alpha^2) > 0$ for $0 \le \alpha \le 1$. Thus, $\alpha^*=1$. If V - ($PMT + C_A) = 0$, then $(\partial \Pi_{op} / \partial \alpha) = n(1 - \alpha)^{n-1}F$, for $0 \le \alpha \le 1$. Besides, $(\partial^2 \Pi_{op} / \partial \alpha^2) > 0$. *FOC* is met only when $\alpha^* = 1$. If V - ($PMT + C_A) < 0$, the *FOC* yields:

$$\alpha^* = 1 - \left[\frac{(PMT + C_A) - V}{nF} \right]^{\frac{1}{n-1}}$$

However, if $n<1$, $(\partial^2 \Pi_{op} / \partial \alpha^2) > 0$ and the second-order condition is not satisfied. Thus, when $\Pi \ge 0$ and $n<1$, *OP* will either outsource completely or not at all.[7] Evaluating Π_{op} at $\alpha=0$ and at $\alpha=1$ we find $\Pi_{op}|_{\alpha=0} = P - F - V = \Pi$ and $= \Pi_{op}|_{\alpha=1} = P - (PMT + C_A)$. A comparison of these two values suggests that the firm will completely outsource when its costs of own production exceed costs of outsourcing: $(F + V) > (PMT + C_A)$. If own costs are lower, it will not outsource at all. However, at least one of the two values must be positive (or zero) for making $\Pi_{op} \ge 0$. Thus the condition for 100% outsouring is $P - (PMT + C_A) > Max[\Pi,0]$ and the condition for no outsourcing is $\Pi > Max[0,P - (PMT + C_A)]$.

Result 6: The Optimal Degree Of Outsourcing When Own Production Is Not Profitable

CASE: *n>1*

When $\Pi<0$ and $n>1$, the degree of optimal outsourcing is the same ($\alpha^*=1$) as in the case of $\Pi \ge 0$, if $V - (PMT + C_A) \ge 0$, i.e., the firm saves in variable costs. If, however, there are losses in variable costs, i.e., $V - (PMT + C_A) < 0$, Π_{op} can still be positive if the loss is less than certain critical value[8] so that outsourcing remains feasible. It follows from (12) that the optimal a in this case is an intermediate value between *0* and *1*. (This situation occurs later in Figure 3).

CASE: *n=1*

When $\Pi < 0$ and $n=1$, $\Pi_{op} \ge 0$ requires $(F + V) - (PMT + C_A) \ge (|P - F - V| / \alpha)$. When this condition is met, Π_{op} is maximized at $\alpha^*=1$.

Recall that when $n=1$, $\Pi_{op} = (P - V - F) + [F + V - (PMT + C_A)]\alpha$. $\Pi < 0$ makes the first term negative. To make Π_{op} positive, the second term must be positive and its value must exceed the absolute value of the first term, meaning that when $\Pi < 0$, there must be savings in costs from outsourcing and such savings must exceed losses in own production.

CASE: *n<1*

In the previous case of $n<1$ (when Π was positive), we obtained a situation where the firm either outsourced completely or didn't outsource at all. In this case also, we consider the two corner solutions. Note that $\Pi_{op}|_{\alpha=0} = \Pi$ and $\Pi_{op}|_{\alpha=1} = P - (PMT + C_A)$. Note also that $(\partial^2 \Pi_{op} / \partial \alpha^2) > 0$ for all α but $\Pi_{op}|_{\alpha=0} = \Pi < 0$. Therefore, if $P - (PMT + C_A) \ge 0$, i.e., $\Pi_{op}|_{\alpha=1} \ge 0$, then $\alpha^*=1$. Otherwise, $\Pi_{op} < 0$ for all α. Although $\Pi_{op} < 0$, the firm can cut losses by 100% outsourcing when $0 > P - (PMT + C_A) > \Pi$ or by 0% outsourcing when $P - (PMT + C_A) < \Pi < 0$.[9]

In summary, when *OP*'s fixed costs sharply decline, ($n > 1$), and variable costs of own production exceed costs of outsourcing, *OP*'s profit from outsourcing monotonically increases with the degree of outsourcing and optimal degree of outsourcing is a corner solution where 100% will be outsourced. If *OP*'s variable costs of own production are lower than costs of outsourcing, it can still profit from outsourcing if its fixed costs decline dramatically. In the presence of a trade off between fixed and variable costs, optimal outsourcing is an intermediate $0 \le \alpha^* < 1$. If *OP* is a low variable cost producer and its fixed costs do not greatly respond to outsourcing, it should not outsource at all.

THE OPTIMAL DEGREE OF OUTSOURCING - A GRAPHICAL PRESENTATION

OP's profits from outsourcing is shown by equation (2) which has three terms. The first shows *OP*'s fixed costs when a portion is outsourced. The second and the third terms together form a straight line with intercept $P - V$ and slope $V - (PMT + C_A)$. The intercept stands for *OP*'s operating profit without outsourcing and the slope represents the rate of profit from each unit of outsourcing. The slope is positive when *OP*'s variable cost of own manufacturing is higher than the cost of outsourcing. The slope is positive when *OP*'s variable costs of own manufacturing is higher than costs of outsourcing. In this case, *OP* saves both fixed and variable costs by outsourcing and will outsource without a limit.[10] This is shown in Figure 1. The horizontal axis measures a and the vertical axis measures cost and profits. Fixed costs corresponding to various a are shown by the curve *FR* which is convex (concave) to the origin for values of $n>1$ ($n<1$). It is a straight line when $n=1$.

The straight line is represented by *MN*. Fixed costs and operating profits without outsourcing are shown by *OF* and *OM*, respectively. Profits without outsourcing is shown by the vertical distance *OP*. *OP*'s profits from outsourcing, Π_{op}, is represented by the curve *PN* which is obtained by subtracting the value of the function represented by *FR* from that represented by *MN*. Clearly, when the slope of *MN* is positive, optimal outsourcing occurs at point *R* where $\alpha^*=1$. If, however, *OP*'s variable cost of own production is lower than the cost of outsourcing, so that outsourcing has no apparent benefit, outsourcing can yet be profitable if savings from the decline in fixed costs exceed losses in variable costs. In this case, the slope of *MN* is negative as shown in Figure 2. This is the situation where a trade off between fixed and variable costs occur. In this case, optimal outsourcing is an intermediate a in the range (0,1). This is shown by the point α^* on the horizontal axis in Figure 2 which is drawn for $n>1$ and $\Pi > 0$.[11] If $\Pi < 0$, $\Pi_{op} \geq 0$ requires that at least one point on *MN* is on or above the fixed cost curve. Meeting condition (6) will ensure such an intersection (or a tangency) between *MN* and *FR*.

CONCLUDING OBSERVATIONS

This paper presented an economic model to determine the optimal degree of outsourcing. It explains conditions under which complete, partial, or no outsourcing is optimal for a firm. The main conclusion of this paper is that if outsourcing leads to savings in both fixed and variable costs, optimal outsourcing is 100%. However, when the original producer's variable costs of own production are less than that of an outside contractor, the original producer can still profit from outsourcing if it can achieve substantial savings in fixed costs that exceed losses in variable costs. In such a situation, outsourcing is not an all or nothing proposition and optimal outsourcing can take an intermediate value between 0% and 100%. Although outsourcing may be a profitable manufacturing arrangement in many cases, a firm which is itself a low variable cost producer, should not outsource at all, if its fixed costs will not greatly reduce as a result of outsourcing.

The results in this paper indicate that reduction in fixed costs, in many cases, is critical to successful outsourcing. Although saving in variable costs can outweigh additional costs of outsourcing, a large degree of outsourcing is unlikely without significant reductions in fixed costs. Thus, corporate downsizing and outsourcing are likely to be complementary strategies. In the model, outsourcing always results in a decline of fixed costs, although the rate of the decline varies. In reality, cost reductions are not guaranteed, additional costs can be substantial, and costs can increase over time. To that extent, the above results show an optimistic view of outsourcing.

Distinctions are sometimes made between alternative outsourcing options such as general outsourcing versus outsourcing which are transitional, or business processing or business benefit contracting type (see, Miller (1994) and Wibbelsman and Maiero (1994), for descriptions and examples). The discussion in this paper relate to general outsourcing.

In spite of the above limitations, the model demonstrates meaningful conditions for partial, complete or no outsourcing decisions. The model incorporates several trade-off in costs: between fixed and variable costs, between own cost and outsourcing cost, and between saving in production cost and additional cost of outsourcing. Although costs are generically grouped into fixed and variable costs, they can be extended to include detail cost items for empirical studies.

ENDNOTES

1. Additional transportation and managerial costs can be substantial. For some illustrations, see, Cross (1995), and Lacity and Hirschheim (1995).

2. Outsourcing can be convenient means of downsizing (Hoskisson and Hitt, 1994). Sometimes it allows a firm to reduce an entire division to a few employees overseeing the outsourcing process or assembling jobs. Inventories are substantially eliminated. In high interest rate periods, reduced inventories save costs.

3. The degree of outsourcing differs widely across firms in an industry and across industries. Whereas Chrysler outsources more than Ford, publishing companies outsource more than the auto industry. Corporations tend to differentiate between strategic and commodity based operations: if an operation is a core or strategic one, it is kept in-house so that control is retained. If it is a commodity and if suppliers can provide it for less money, it may be outsourced. (Lacity, Willcocks, and Feeny 1995).

4. Modeling fixed costs in this manner is optimistic. To the extent firms use outsourcing as a means to reduce headcount and costs associated with salaries and benefits of managerial and production staff, (see, Lacity and Hirschheim, 1995, p.25, for such evidence), the reduction in fixed costs through outsourcing is synonymous with downsizing.

5. Changes in the manufacturing system may be associated with changes in product price (Westfield 1981). In outsourcing information systems, some vendors charged higher prices (Lacity and Hirschheim, 1995).

6. By a loss in variable costs we mean that *OP*'s variable cost is less than *OC*'s variable cost plus additional costs of outsourcing: $V < (PMT + CA)$.

7. There are well-known cases of vertical integration being profitable in the extremes but not in the middle (Bowman 1978, Buzzell 1983). Similar result obtains for outsourcing when $n<1$.

8. The critical value obtains from a feasibility condition. In the case $\Pi < 0$, the critical value ensures $\Pi_{op} \geq 0$ for at least one α. If such a feasibility condition is met, then the critical value, k_t, has the value:

$$k_t = -\frac{n^n F}{(n-1)^{n-1}}\left[\frac{P-(PMT+C_A)}{V-(PMT+C_A)}\right]^{n-1}$$

   In the figures in the next section, the critical value corresponds to the slope of *MN* when it is tangential to *FR* when *M* is below *F* in the profit axis. This is the case when $n>1$ and $\Pi < 0$.

9. It is not certain if the firm will not be better off shutting down rather than attempting to cut losses by extreme outsourcing under these circumstances.

10. Positive slope in this case implies that $V > (PMT + C_A)$. Note that the sufficient condition for efficient outsourcing which is $C_A \leq (V - \gamma V)$, is also the necessary condition for $V > (PMT + C_A)$. Thus the slope being positive ensures that $\Pi_{oc} \geq 0$, and $\Pi_{op} \geq \Pi$, therefore, $\Pi_{op+oc} \geq \Pi$. In this case, optimal outsourcing is 100%.

11. If $\Pi < 0$, optimal a can still be an intermediate value. Of course, under competitive conditions, Π can be expected to be zero.

REFERENCES

[1] Bowman, Edward H., "Strategy, Annual Reports, and Alchemy," ***California Management Review***, Spring 1978, Vol. 20, No. 3, pp. 64-71.

[2] Buzzell, Robert D., "Is Vertical Integration Profitable?" ***Harvard Business Review***, January-February 1983, pp. 92-102.

[3] Cross, John, "IT Outsourcing: British Petroleum's Competitive Approach," ***Harvard Business Review***, May-June 1995, pp. 94-102.

[4] Giffi C., A. Roth, and G. Seal, ***Competing In World Class Manufacturing***, 1990.

[5] Hayes Robert H., and Steven C. Wheelwright, ***Restoring Our Competitive Edge***, 1984, John Wiley & Sons, New York.

[6] Hoskisson, R.E, and M.A. Hitt, ***Downscoping***, 1995, Oxford University Press, New York, NY.

[7] Lacity, Mary C., Leslie Willcocks, and David Feeny, "IT Outsourcing: Maximize Flexibility and Control," ***Harvard Business Review***, May-June 1995, pp. 84-93.

[8] Lacity, Mary C., and Rudy Hirschheim, ***Beyond the Information Systems Outsourcing Bandwagon***, 1995, John Wiley and Sons, New York.

[9] Millar, V., "Outsourcing Trends," Paper presented at the Outsourcing, Cosourcing and Insourcing Conference at University of California, Berkley, November, 1994.

[10] Westfield, Fred M., "Vertical Integration: Does Product Price Rise or Fall?" ***The American Economic Review***, June 1981, 71(3), pp. 334-346.

[11] Wibbelsman, D., and Maiero, T., "Cosourcing," Paper presented at the Outsourcing, Cosourcing and Insourcing Conference at University of California, Berkeley, November, 1994.