University of Missouri Extension

BI17, Reviewed October 1, 1993

Make or Buy Analysis

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One of the initial steps to set up operations in a new plant or for a new product is selection of equipment. But before one proceeds to select the equipment that is essential for manufacturing and assembling the designed product, it is necessary to perform a preliminary make-or-buy analysis to determine what can and should be produced in the plant. This is an important step because these decisions often are based on hunch rather than objective reasoning.

The make-or-buy analysis is preliminary at this stage because the data required for the decision generally are based on experience and not necessarily on complete production knowledge (Sule, 1988).

The Bill of Materials (BOM) provides the information on the parts that are necessary to make a finished product. BOM is an extremely important document because of its uses in accounting, inventory control and production planning, and it must be used by every manufacturer. An example of a BOM is shown in Table 1.

Table 1. Bill of materials for a tea kettle (Sule, 1988).

Part number	Part name	Units required	Materials description	Source for materials/parts[1]
1001	Base	1	3/64-inch sheet aluminum	____________
1002	Body	1	3/64-inch sheet	____________
1003	Machine screw	2	Low-carbon plated steel	____________
1004	Handle	1	Bakelite	___________
[1]Entries in the last column would depend on the make-or-buy analysis. It would be the name of an outside vendor for a "buy" decision or that of an appropriate department or supervisor for a "make" decision.				

The questions the engineer should ask are which of these parts should be made in the plant and which ones should be bought from outside vendors. Two determining factors might suggest the answer: expertise and economics.

Parts that require expertise in manufacturing technology other than what the firm possesses should be bought from vendors who have technical know how in such fields. It is a common practice in the automobile industry, for example, to buy tires from tire manufacturers.

The economics of manufacturing also plays an important part in this decision. Production in a small quantity generally results in a larger unit cost than if the same parts are produced in larger volumes. It might be cheaper to purchase 2,000 units of 1/2-inch springs than to buy the equipment and employ the necessary labor as shown in the following example which further illustrates this point.

Example (Sule, 1988):

A prospective kitchen blender manufacturer has a design that requires hard plastic connecting gears between the electric motor and the cutting blade assembly. As shown in Table 2, there are three alternatives for obtaining such parts:

Alternative A: A molding specialty house can supply the parts for a price of $500 per thousand. This price includes the cost to design and build the tools necessary to manufacture the gears; however, the minimum-order quantity is 20,000 units. The company must also spend $2,000 on an engineering effort to review the design before allowing the supplier to begin production.

Alternative B: Plant engineers can design, build and perform initial testing of a single-cavity tool for $50,000. The gears can then be manufactured in the plant on a small automatic mold press at a cost of $200 per thousand. The unit costs include all of the variable costs: labor and material, as well as normal overhead operating costs prorated per unit of output.

Alternative C: It is also possible to design and build a multiple-cavity tool for $100,000. This tool would be designed to run on a larger automatic mold press at a cost of $150 per thousand.

Table 2. Data for the three alternatives (Sule, 1988).

Alternative	Initial cost	Cost per 1,000
A: Purchase mold tool, minimum order 20,000	$2,000	$500
B: Manufacture with a single-cavity tool	$50,000	$200
C: Manufacture with a multiple-cavity tool	$100,000	$150

Determine the preferred alternative, given a specific requirement level. Assume that the time period over which the production will be required is short enough to eliminate the need to consider the time value of money.

Neglecting the time value of the money, the break-even point (Y1) for purchasing the parts versus molding them with a single-cavity tool can be computed from the above data:

$2,000 + ($500)Y1 = $50,000 + ($200)Y1 ($300)Y1 =

$48,000

Y1 = 160,000 parts

The break-even point (Y2) for molding the parts in a single-cavity tool versus a multiple-cavity tool is:

$50,000 + ($200)Y2 = $100,000 + ($150)Y2 ($50)Y2 =

$50,000

Y2 = 1,000,000 parts

It is cheaper to purchase quantities of parts up to 160,000 units from a supplier. From 160,000 to 1,000,000 parts it is better to build a single-cavity tool and mold the parts in the factory; to produce more than 1,000,000 parts, a multiple-cavity tool should be used (see Figure 1).

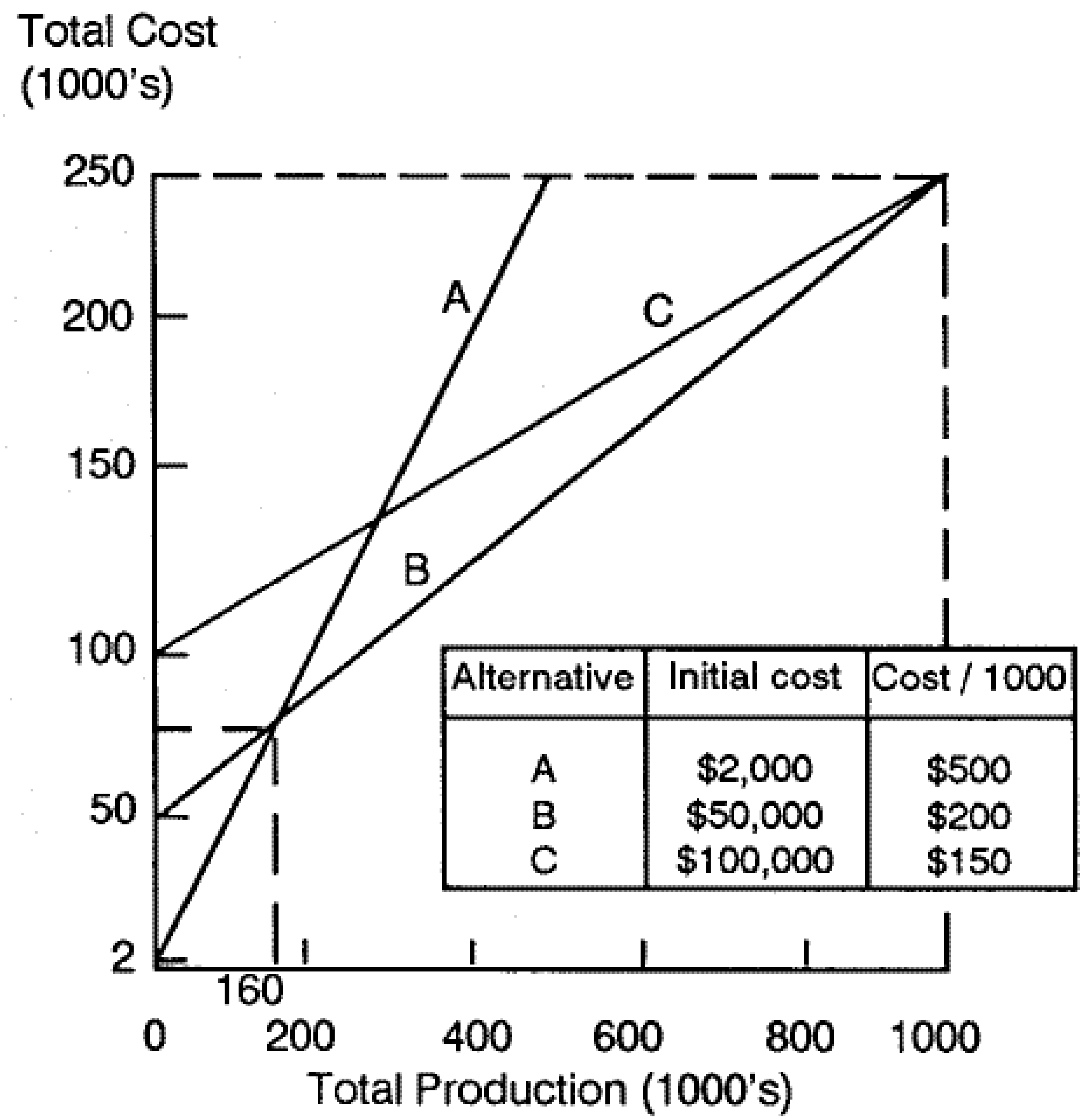

Figure 1. Total cost versus production level for example (Sule, 1988).

Summary

Before one begins to set up a new plant or operations for a new product, it is necessary to conduct a preliminary make-or-buy analysis. Make-or-buy analysis allows a decision maker to analytically identify the components that could be produced within a plant. Such an analysis also brings out the strengths and weaknesses of the manufacturer with respect to a particular component necessary to decide if it has to be made or purchased.

References

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