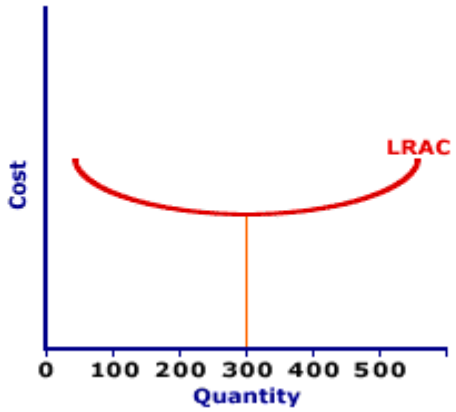
QUESTION 1

1a. Long-run average cost curve.

In the long run, all inputs are variable and firms can enter or exit any industry or market. Therefore, a firm's output and costs are unrestrained in the sense that the firm can chooses to produce any output level by employing the needed quantities of inputs and incurring the total costs of producing that output level.

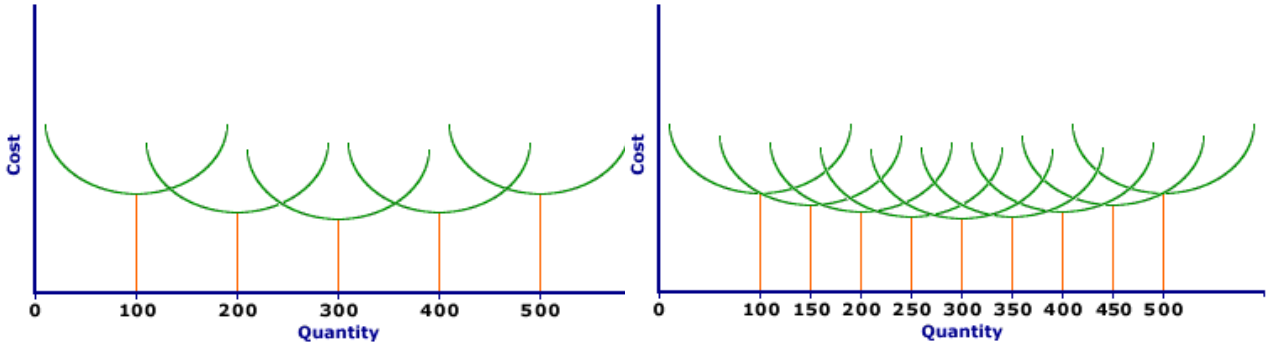
The Long Run Average Cost, LRAC, curve of a firm shows the minimum or lowest average total cost of a group of Short Run Average Cost, SRAC, curve.
The LRAC curve can be derived by identifying the factory size (or quantity of capital) that can produce each quantity of output at the lowest short-run average total cost.
Each of these SRAC curves incurs the lowest average total cost for the production of a given quantity of output. The LRAC curve is then the combination of all minimum short-run average total cost values.

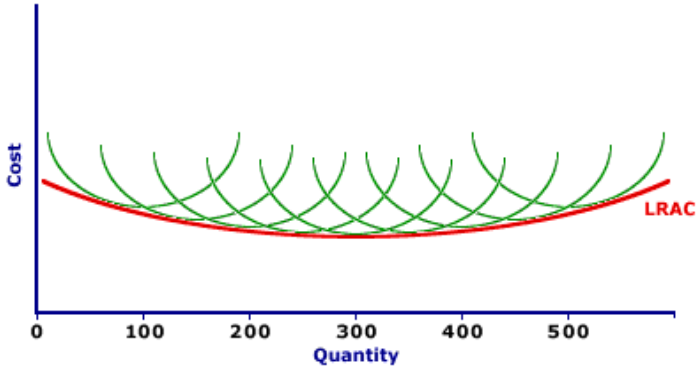


Minimum Efficient Scale

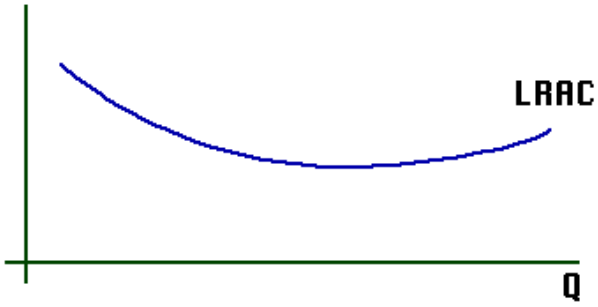
The LRAC curve is extremely important to the long-run production efficiency of a firm. The main point of interest is the minimum of the LRAC curve, achieved at 300 in the exhibit. The quantity of output that achieves this minimum is termed the minimum efficient scale (MES). This level of production achieves the lowest possible average cost in the long run.

It is impossible to produce this good in such a way that reduces the opportunity cost of foregone production, of giving up any less value from other production, than is achieved at the MES.



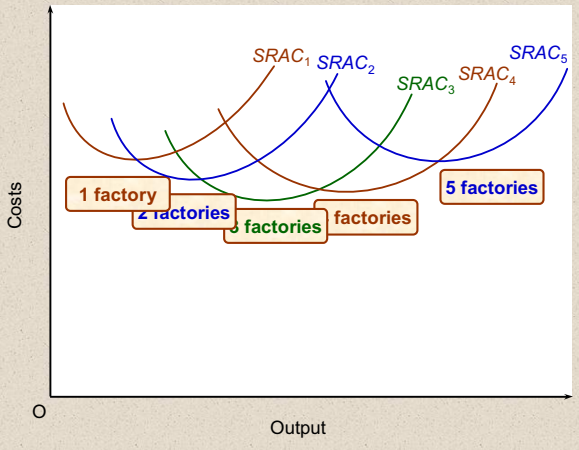


In our examples, the LRAC is (more or less roughly) u-shaped, like this:

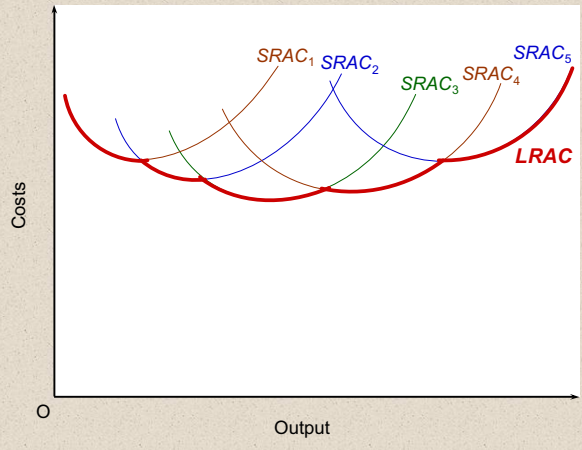


The idea is that:
Long run average cost declines with increasing output. That's reasonable, but we should bear in mind that it is pretty much a guess, and may or may not apply in a particular case. More realistically, an investment planner will have to choose between many different plant sizes or firm scales of operation, and so the long run average cost curve will be smooth, something like this

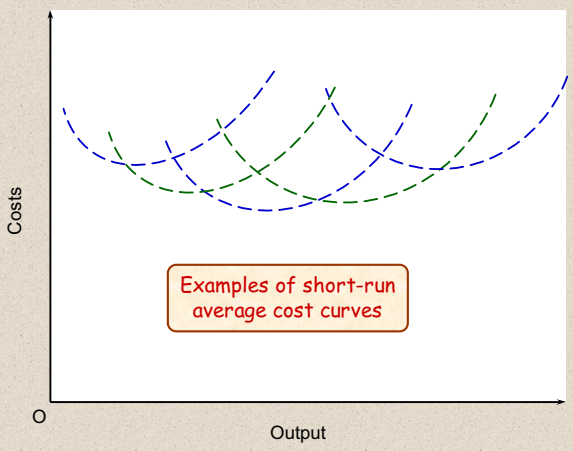
Deriving long-run average cost curves: factories of fixed size



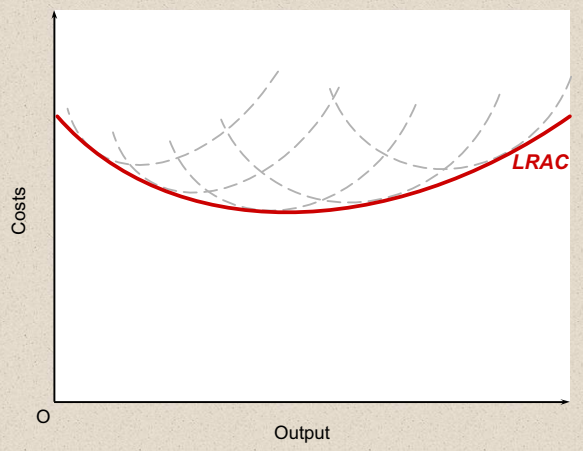
Deriving long-run average cost curves: factories of fixed size



Deriving long-run average cost curves: choice of factory size



Deriving long-run average cost curves: choice of factory size

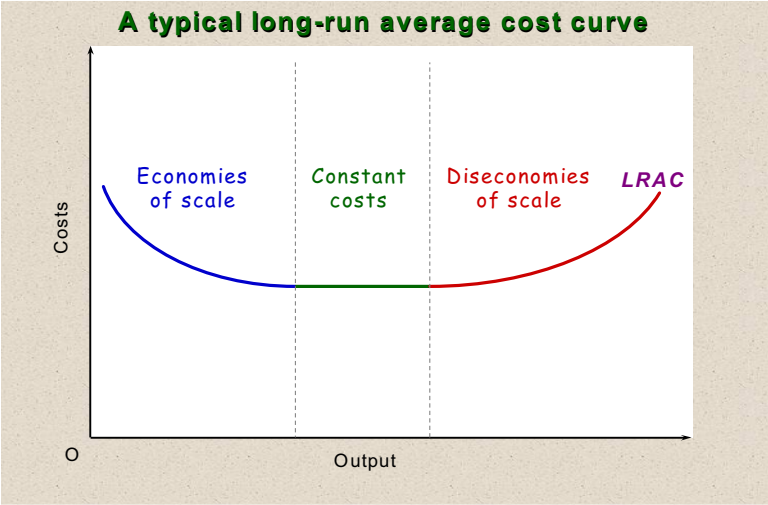


As shown, each point on the LRAC corresponds to a point on the SRAC for the plant size or scale of operation that gives the lowest average cost for that scale of operation.
In the long run, a firm will use the level of capital (or other inputs that are fixed in the short run) that can produce a given level of output at the lowest possible average cost. Consequently, the LRAC curve is the envelope of the short run average total cost (SR ATC) curves, where each SR ATC curve is defined by a specific quantity of capital (or other fixed input).

Characteristics of LRAC

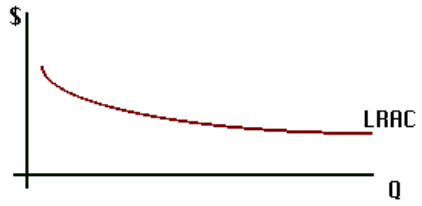
Long-run average cost is guided by scale economies and returns to scale.
Economies of Scale: For relatively small levels of production, a firm tends to experience economies of scale and increasing returns to scale. These result because an increase in the scale of operations (a proportional increase in all inputs under the control of the firm) causes a decrease in average cost.

Diseconomies of Scale: For relatively large levels of production, a firm tends to experience diseconomies of scale and decreasing returns to scale. These result because an increase in the scale of operations causes an increase in average cost.



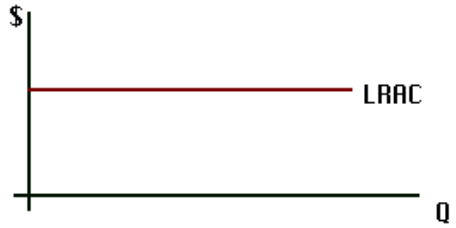
In our pictures of long run average cost, we see that the cost per unit changes as the scale of operation or output size changes. Here is some terminology to describe the changes:

Increasing returns to scale = decreasing cost
average cost decreases as output increases in the long run



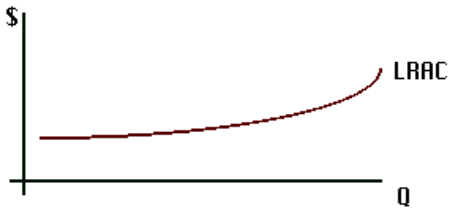
Economists usually explain "increasing returns to scale" by indivisibility. That is, some methods of production can only work on a large scale -- either because they require large-scale machinery, or because (getting back to Adam Smith, here) they require a great deal of division of labor. Since these large-scale methods cannot be divided up to produce small amounts of output, it is necessary to use less productive methods to produce the smaller amounts. Thus, costs increase less than in proportion to output -- and average costs decline as output increases.

Constant returns to scale = constant costs
average cost is unchanged as output varies in the long run



We would expect to observe constant returns where the typical firm (or industry) consists of a large number of units doing pretty much the same thing, so that output can be expanded or contracted by increasing or decreasing the number of units. In the days before computer controls, machinery was a good example. Essentially, one machinist used one machine tool to do a series of operations to produce one item of a specific kind -- and to double the output you had to double the number of machinists and machine tools.

Decreasing returns to scale = increasing costs
average cost increases as output increases in the long run



Decreasing returns to scale are associated with problems of management of large, multi-unit firms. Again with think of a firm in which production takes place by a large number of units doing pretty much the same thing -- but the different units need to be coordinated by a central management. The management faces a trade-off. If they don't spend much on management, the coordination will be poor, leading to waste of resources, and higher cost. If they do spend a lot on management, that will raise costs in itself. The idea is that the bigger the output is, the more units there are, and the worse this trade-off becomes -- so the costs rise either way.

1b. Economies of Scale- Internal & External

It is occur when mass producing a good results in lower average cost. Economies of scale occur within an firm (internal) or within an industry (external).

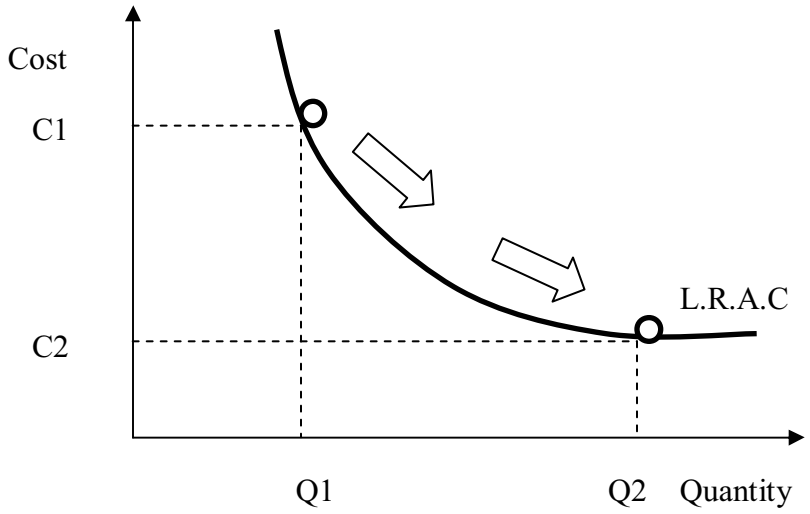
The distinction between internal and external economies of scale:

When more units of a good or a service can be produced on a larger scale, yet with (on average) less input costs, economies of scale (ES) are said to be achieved. Alternatively, this means that as a company grows and production units increase, a company will have a better chance to decrease its costs. According to theory, economic growth may be achieved when economies of scale are realized. eg- Adam Smith identified the division of labor and specialization as the two key means to achieve a larger return on production.

External economies of scale occur outside of a firm, within an industry. Thus, when an industry's scope of operations expands due to, for example, the creation of a better transportation network, resulting in a subsequent decrease in cost for a company working within that industry, external economies of scale are said to have been achieved. With external ES, all firms within the industry will benefit.

There are two main types of economies of scale: internal and external. Internal economies of scale have a greater potential impact on the costs and profitability of a business.

Internal Economic of Scale – movement along LRAC curve
When internal economic of scale happen, the cost of production will drop thus the producer can make more and supply more quantity to the market. It is a movement along the LRAC curve from Q1 to Q2.



Internal Economies of Scale
These are economies made within a firm as a result of mass production. As the firm produces more and more goods, so average cost begin to fall because of:

Technical economies made in the actual production of the good. For example, by applying mass production techniques using machinery or advance technology which are a more efficient form of production.

Managerial economies made in the administration of a large firm, as a firm grows, there is greater potential for managers to specialise in particular tasks (e.g. marketing, human resource management, finance). Specialist managers are likely to be more efficient as they possess a high level of expertise, experience and qualifications compared to one person in a smaller firm trying to perform all of these roles. Others example of managerial economies are: clear-cut chain of command, while improving its techniques for production and distribution.

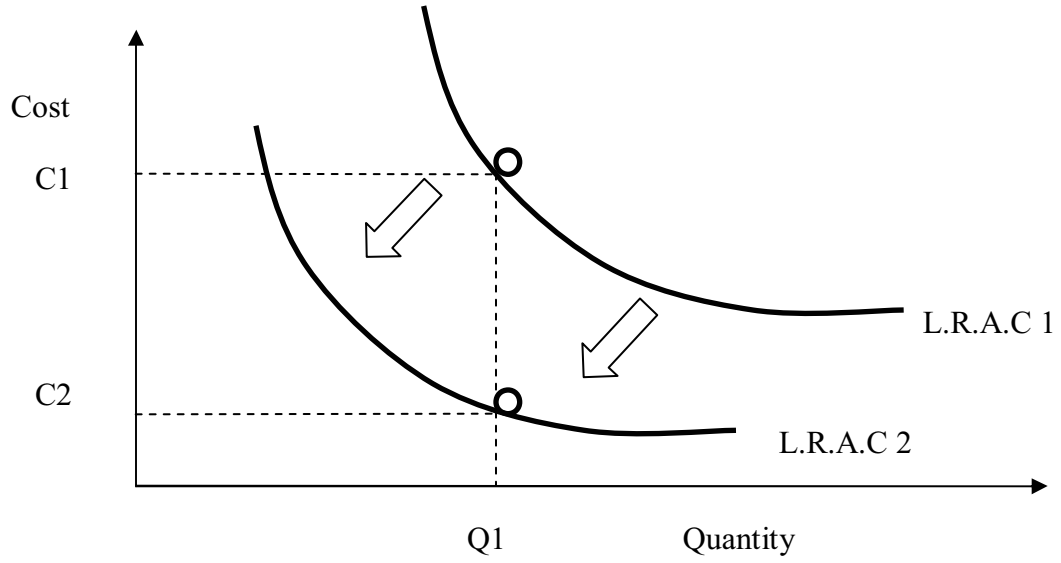
Financial economies made by borrowing money at lower rates of interest than smaller firms. Many small businesses find it hard to obtain finance and when they do obtain it, the cost of the finance is often quite high. This is because small businesses are perceived as being riskier than larger businesses that have developed a good track record. Larger firms therefore find it easier to find potential lenders and to raise money at lower interest rates.

Marketing economies made by spreading the high cost of advertising on television and in national newspapers, across a large level of output. Every part of marketing has a cost – particularly promotional methods such as advertising and running a sales force. Many of these marketing costs are fixed costs and so as a business gets larger, it is able to spread the cost of marketing over a wider range of products and sales – cutting the average marketing cost per unit.

Commercial economies made when buying supplies in bulk and therefore gaining a larger discount. As businesses grow they need to order larger quantities of production inputs. For example, they will order more raw materials. As the order value increases, a business obtains more bargaining power with suppliers. It may be able to obtain discounts and lower prices for the raw materials.

Research and development economies made when developing new and better products. *Learning inputs:* the learning processes related to production, selling and distribution can result in improved efficiency. *Costly inputs:* some inputs, such as research and development, advertising, managerial expertise and skilled labor are expensive, but because of the possibility of increased efficiency with such inputs, they can lead to a decrease in the average cost of production and selling. If a company is able to spread the cost of such inputs over an increase in its production units, ES can be realized.

External Economic of Scale – the LRAC curve shift backwards or downwards
When external economic happen to the industry the cost of producing the same quantity of goods will drop from C1 to C2, this is because the LRAC curve shift from LRAC 1 to LRAC 2.



External Economies of Scale
These are economies made outside the firm as a result of its location. External economies of scale occur when a firm benefits from lower unit costs as a result of the whole industry growing in size. The main types are:

Transport and communication links improve
As an industry establishes itself and grows in a particular region, it is likely that the government will provide better transport and communication links to improve accessibility to the area. This will lower transport costs for firms in the area as journey times are reduced and also attract more potential customers.

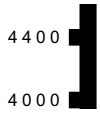
Training and education becomes more focused on the industry
Universities and colleges will offer more courses suitable for a career in the industry which has become dominant in a region or nationally. This means firms can benefit from having a larger pool of appropriately skilled workers to recruit from.

Other industries grow to support this industry
A network of suppliers or support industries may grow in size and/or locate close to the main industry. This means a firm has a greater chance of finding a high quality yet affordable supplier close to their site.

QUESTION 2
A)

Labour (workers per week)	Output (rubber boats per week)	Total Fixed Cost (RM)	Total Variable Cost (RM)	Total Cost (RM)
1	1	1000	400	1400
2	3	1000	800	1800
3	6	1000	1200	2200
4	10	1000	1600	2600
5	15	1000	2000	3000
6	21	1000	2400	3400
7	26	1000	2800	3800
8	30	1000	3200	4200
9	33	1000	3600	4600
10	35	1000	4000	5000

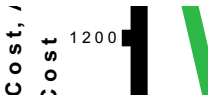
Short-run Total Cost Curve



B)

Labour (workers per week)	Output (rubber boats per week)	Average Total Cost (RM)	Average Fix Cost (RM)	Average Variable Cost (RM)	Marginal Cost (RM)
1	1	1400	1000	400	0
2	3	600	333	267	400
3	6	367	167	200	400
4	10	260	100	160	400
5	15	200	67	133	400
6	21	162	48	114	400
7	26	146	38	108	400
8	30	140	33	107	400
9	33	139	30	109	400
10	35	143	29	114	400

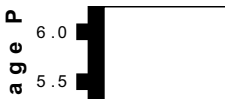
Short-run Average and Marginal Cost Curve



C)

Labour (workers per week)	Output (rubber boats per week)	Total Product	Average Product	Marginal Product	Average Variable Cost (RM)	Marginal Cost (RM)
1	1	1	1	0	400	0
2	3	3	1.5	2	267	400
3	6	6	2	3	200	400
4	10	10	2.5	4	160	400
5	15	15	3	5	133	400
6	21	21	3.5	6	114	400
7	26	26	3.7	5	108	400
8	30	30	3.7	4	107	400
9	33	33	3.7	3	109	400
10	35	35	3.5	2	114	400

Marginal Product & Average Product VS Output



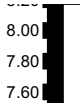
Marginal Cost & Average Variable Cost VS Output

QUESTION 3

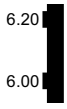
Labour (Workers perday)	Output Cake perday	Varible Cost Labour x $50	Fixed Cost	Total Cost	Average Total Cost Total cost ÷ Output
PLANT 1					
1	20	50	100	150	7.5
2	40	100	100	200	5
3	65	150	100	250	3.84
4	65	200	100	300	4.61
PLANT 2					
1	40	50	200	250	6.25
2	60	100	200	300	5
3	75	150	200	350	4.6
4	85	200	200	400	5
PLANT 3					
1	55	50	300	350	6.36
2	75	100	300	400	5.33
3	90	150	300	450	5
4	100	200	300	500	5
PLANT 4					
1	65	50	400	450	6.92
2	85	100	400	500	5.88
3	100	150	400	550	5.5
4	110	200	400	600	5.45

3a) Average Total Cost Curve For Each Plant

Average Total Cost Curve Plant 1



Average Total Cost Curve Plant 2



Average Total Cost Curve Plant 3

Average Total Cost Curve Plant 4

c) From output 20 to 65 using 1 oven, we can see Cathy experience economics of scale, thus we can say that Cathy don't have to open plant 2, plant 3 and plant 4, because we can see that Cathy experience an decreasing return to scale or in other words we can see an increase in cost from having plant 2, plant 3 and plant 4 if compare to plant 1.

d) From the long run average cost curve, we can see that the more ovens Cathy uses, the higher the out put will be, but she must keep in mind that the more oven than she rent for plant 2, plant 3 and plant 4 dose not help her in achieving Economic of scale. So in this case she should only rent 1 oven this is because with one oven, Cathy had already achieved Economic of Scale.

QUESTION 4

Number of Sweaters	**TVC**	**MC** TC^1-TC^0	**AVC** TVC÷Q	**TFC**	**TC** TFC+TVC	**AFC** TFC÷Q	**ATC** TC÷Q
0	0	0	0	100	100	0	0
1	50	50	50	100	150	100	150
2	90	40	45	100	190	50	95
3	140	50	46.67	100	240	33.3	80
4	200	60	50	100	300	25	75
5	270	70	54	100	370	20	74

a) If Sherry produces zero sweaters, estimate her total fixed cost.

Her total fix cost at zero production is $100, this is because fixed cost are cost that does not change in proportion to the activity of the business, fixed cost are such as rent, insurance and etc.

b) If Sherry produces one sweater, estimate her total variable cost

Her total variable cost at one production are $50, variable cost are directly proportion to the activities of the business eg. product volume in this case direct material cost are an example of a variable cost.

c) If Sherry produce two sweaters, estimate her marginal cost

Her marginal cost would be $40. In order her to produce extra 1 sweater from 1 to 2, she have to spend $40 extra. Or in other words marginal cost is the change in total cost that arise when the quantity produced change by one unit.

d) Estimate Sherry's total variable cost if she produces

i) 3 sweaters = total variable cost $140

ii) 5 sweaters = total variable cost $270

More out put will lead more variable cost.

e) Estimate Sherry's average fixed cost if she produces 4 sweaters.

Total Fixed Cost ÷ Quantity = average fixed cost $26

4) i. Breakeven

TR = TC

π = 0 Price = \$20 TFC = 10,000 AVC = 15

Q = π + TFC ÷ P – AVC

$$Q = \frac{0 + 10{,}000}{20 - 15}$$

$$Q = \frac{10{,}000}{5}$$

Q = 2,000 unit

To get breakeven, the producers have to produce 2,000 unit of product.

ii. Profit

π^t = \$20,000 Price = \$20 TFC = 10,000 AVC = 15

Q = π + TFC ÷ P – AVC

$$Q = \frac{20{,}000 + 10{,}000}{20 - 15}$$

$$Q = \frac{30{,}000}{5}$$

Q = 6,000 unit

To get profit \$20,000 the producers have to produce 6,000 unit of product.

iii. Price Drop

π^t = \$20,000 Price = \$16 TFC = 10,000 AVC = 15

Q = π + TFC ÷ P – AVC

$$Q = \frac{20{,}000 + 10{,}000}{16 - 15}$$

$$Q = \frac{30{,}000}{1}$$

Q = 30,000 unit

If the price of the product drops from \$20 to \$16, the producers have to produce 30,000 unit of product to attain \$20,000 of profit.

QUESTION 5

Economies of scope

Economies of scope is a term that refers to the reduction of per-unit costs through the production of a wider variety of goods or services.

Economies of scope are conceptually similar to **Economies of scale**. Whereas economies of scale primarily refer to efficiencies associated with **supply-side changes**, such as **increasing** or decreasing the **scale of production**, of **a single product type.**

Economies of scope refer to efficiencies primarily associated with **demand-side changes**, such as increasing or decreasing the scope of **marketing** and **distribution**, of **different types of products**. Economies of scope are one of the main reasons for such marketing strategies as product bundling, product lining, and family branding.

Let's assume Company JAT strictly manufactures vacuum cleaners. What would happen if the company decided to branch out into brooms? Adding brooms to the product line would allow JAT to spread certain fixed costs over a larger number of units. Thus, the company could reach more customers with its advertising budget, its sales force could be used to sell both products, brooms could be stored and shipped from the firm's existing vacuum warehouse, and the company's factory could turn leftover broom bristles into cleaning brushes for its vacuums. Furthermore, JAT could then market itself as a "cleaning products" company rather than just a "vacuum" company.

In this example, JAT increased the variety of items produced rather than increasing the number of vacuum cleaners produced. As a result, the company's advertising, selling, and distribution costs may generally remain the same, but its number of products sold will increase. The cost of producing multiple products simultaneously is often less than the costs associated with producing each product line independently. Therefore, because the firm has managed to reduce its total costs per unit produced, JAT could become more profitable.

Although economies of scope are often an incentive to expand product lines, the creation of new products is often less efficient than expected. The need for additional managerial expertise or personnel, higher raw materials costs, a reduction in competitive focus, and the need for additional facilities can actually increase a company's per-unit costs. When this happens, it is often referred to as diseconomies of scope.

If the cost data are known, a quantitative measure of economies of scope can be determined. Consider a firm that can produce both stationary and notebook paper. The cost is $50,000 per 1,000 reams of stationary and $30,000 per 1,000reams of notebook paper if the firm produces only one of these products. However, 1,000 reams of each type of paper can be produced for a total of $70,000 if both are produced together.

A measure of economies of scopes (S) is

$$S = \frac{TC(Q_A) + TC(Q_B) - TC(Q_A,Q_B)}{TC(Q_A,Q_B)}$$

Where $TC(Q_A)$ is the cost of producing product A alone, $TC(Q_B)$ is the total cost of producing Q_B units if product B alone, and $TC(Q_A,Q_B)$ is the total cost of producing both A and B. Given the data on the paper firm, the extent of economies of scope is

$$S = \frac{50,000 + 30,000 - 70,000}{70,000}$$

$$= 0.14 \text{ or } 14\%$$

or a 14% reduction in the total costs associated with producing both products instead of just one. Clearly a firm that can take advantage of economies of scope can have lower cost than other firms. In a competitive market, aggressive decision makers always will be looking for ways to capture such economies

Reference:

Economics: Samuelson Nordhous, Eighteenth Edition, Mc Grow Hill

Economics: Roman F.Warmke Chandriah Appa Rao, Longman

Economics for Hospitality Management : Peter Cullen, Thomson Business Press

Economics for Today : Irvin B.Tucker, Second Edition, South Western.

2001 by WhiteNova
http://www.whitenova.com/thinkEconomics/lrac.html

http://william-king.www.drexel.edu/top/Prin/txt/Cost/cost16.html
Essential Principles of Economics: A Hypermedia Text 2005
Roger A. McCain

http://en.wikipedia.org/wiki/Long_run_average_cost

http://www.amosweb.com/cgi-bin/awb_nav.pl?s=wpd&c=dsp&k=long-run+average+cost+curve,+derivation

Economics Today: The Micro View, Thirteenth Edition
by Roger LeRoy Miller - Institute for University Studies, Arlington, Texas

http://www.answers.com/topic/economies-of-scope

2002 Ross Mayfield.
Last update: 12/20/2002; 5:55:59 PM.
http://radio.weblogs.com/0114726/2002/10/21.html

http://www.tutor2u.net/economics/content/essentials/economies_scale_scope.htm
Panzar, John C & Willig, Robert D. 1981