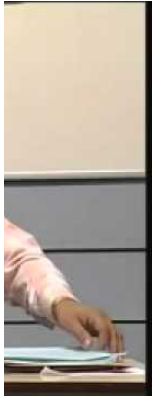


7.3: Capacity Planning

ogy: Professor Arun Kanda's "Forecasting"

the importance of forecasting in identifying capacity requirements. Professor Kanda also reviews a variety of forecasting models along with the



rom this version of the text. You can view it online here: <http://pb.libretexts.org/b/?p=122>

anyway: without enough customers, your business will go nowhere. So, before you delve into the complex, expensive world of developing and questions like those in [Figure 10.5 "When to Develop and Market a New Product"](#). When Bob Montgomery asked himself these questions, he stomers for the PowerSki Jetboard: (1) the dealerships that would sell the product and (2) the water-sports enthusiasts who would buy and use it. act that dealers would want to sell and enthusiasts would buy. When he was confident that he could satisfy these criteria, he moved forward with ird.

Ask yourself:

1

Who are my primary customers?

2

Will I sell to individuals, businesses, or both?

3

If I sell to other businesses, who will be the actual end users, or ultimate consumers, of my product?

Figure 10.5 When to Develop and Market a New Product

tial customers, your next step is finding out as much as you can about what they think of your product idea. Remember: because your ultimate goal is to meet customer needs, you need to know ahead of time what your potential customers want. Precisely what are their unmet needs? Ask them questions such as, “What do you like?” or “What don’t you like?”

idea? What don’t you like?

?

,

in the development of a product, you need to ask yourself yet another question: are there enough customers willing to buy my product at a price that will allow me to cover my costs? Answering this question means performing one of the hardest tasks in business: forecasting demand for your proposed product. There are several methods that can be used alone or in combination.

Want to share proprietary information, such as sales volume, others are willing to help out individuals starting new businesses or launching new products in their respective industry (or one that’s similar) can be especially helpful if your proposed product is a service. Say, for example, that you plan to open a pizza parlor. Your potential customers will be able to eat pizza while watching reruns of their favorite soap operas on personal TV/DVD sets. If you visited a few local pizza parlors and asked the customers they served every day, you’d probably learn enough to estimate the number of pizzas that you’d serve during your first year. If the manager hangs out and make an informal count of the customers.

potential customers. Ask them how often they buy products similar to the one you want to launch. Where do they buy them and in what quantity? If you were contemplating a frozen yogurt store in Michigan, it wouldn’t hurt to ask customers coming out of a bakery whether they’d buy frozen yogurt.

For products like the one you want to launch, you might begin by examining pertinent industry research. For example, to estimate demand for jogging shoes, you could look at data published on the industry association’s Web site, National Sporting Goods Association, <http://www.nsga.org/running/running0617.php> (accessed October 28, 2011); “Sporting Goods Market in 2010,” National Sporting Goods Association, <http://www.nsga.org/running/running0617.php> (accessed October 28, 2011). Here you’d find that forty million jogging/running shoes were sold in the United States in 2008 at an estimated market of the sport,” *USA Track & Field*, <http://www.usatf.org/news/specialReports/2003LDRStateOfTheSport.asp> (accessed October 29, 2011). To estimate the number of joggers older than sixty-five—you could call or e-mail USA Track and Field. You might find this information in an eighty-seven-page sales report published by the National Sporting Goods Association. National Sporting Goods Association, <http://www.nsga.org> (accessed October 28, 2011). If you’re contacting organizations that sell industry data, American Sports Data, for instance, provides demographic information on no fewer than twenty-five different sports. “Trends in U.S. Physical Fitness Behavior (1987–Present),” http://www.americansportsdata.com/phys_fitness_trends1.asp (accessed October 28, 2011), reports that the number of joggers older than sixty-five living in Florida. There’s a lot of valuable and available industry-related information that you can use.

Use the fact that there are three million joggers older than sixty-five and that six hundred thousand of them live in Florida, which attracts 20 percent of the retiree population. Alan Scher Zagier, “Eyeing Competition, Florida Increases Efforts to Lure Retirees,” *Boston Globe*, December 26, 2003, http://www.boston.com/news/yourvoice/2003/12/26/eyeing_competition_florida_increases_efforts_to_lure_retirees (accessed October 28, 2011). How do you use this information to estimate how many shoes you’ll be able to sell during your first year of business? First, you have to estimate your market share: your portion of total sales in the older population in Florida. Being realistic (but having faith in an excellent product), you estimate that you’ll capture 2 percent of the market during your first year. So, 600,000 shoes sold in Florida \times 0.02 (a 2 percent share of the market) = 12,000, the estimated first-year demand for your proposed product.

At best it’s an educated guess rather than a wild one. You’ll still want to talk with people in the industry, as well as potential customers, to hear their feedback. Only then would you use your sales estimate to make financial projections and decide whether your proposed business is financially feasible. We’ll

potential customers, your next step is finding out as much as you can about what they think of your product idea.

Want to share proprietary information, such as sales volume, others are willing to help out individuals starting new businesses or launching new products in their respective industry (or one that’s similar) can be especially helpful if your proposed product is a service. Say, for example, that you plan to open a pizza parlor. Your potential customers will be able to eat pizza while watching reruns of their favorite soap operas on personal TV/DVD sets. If you visited a few local pizza parlors and asked the customers they served every day, you’d probably learn enough to estimate the number of pizzas that you’d serve during your first year. If the manager hangs out and make an informal count of the customers.

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istry data to estimate the total market for products like yours and estimate your **market share**, or portion of the targeted market.

as they've ever eaten, and they're constantly encouraging you to set up a pizza business in your city. You have located a small storefront in a busy for an eat-in restaurant, but it will allow customers to pick up their pizzas. You will also deliver pizzas. Before you sign a lease and start the er of pizzas you will sell in your first year. At this point you plan to offer pizza in only one size.

ese questions:

estimating pizza sales?

imating sales (for example, the hours your pizza shop will be open)?

rmation to calculate an estimate?

will sell in your first year of operations.

ent Wikispace: "Chapter 5: Strategic Capacity Planning for Products and Services"

ntion to the inputs to capacity planning and the determinants and steps in the capacity planning process. This is important to understanding how to ity of your forecasts. In addition, this helps you understand your organization's capability to meet the forecast needs. Answer the questions at the lts with the authors.

Planning for Products and Services

trategic capacity planning is for products and services. The overall objective of strategic capacity planning is to reach an optimal level where apacity needs include equipment, space, and employee skills. If production capabilities are not meeting demand, high costs, strains on resources, tant to note that capacity planning has many long term concerns given the long term commitment of resources.

ffects capacity decisions have on the entire organization. Common strategies include **leading capacity**, where capacity is increased to meet ity, where companies wait for demand increases before expanding capabilities. A third approach is **tracking capacity** which adds incremental

of capacity planning are design capacity and effective capacity. **Design capacity** refers to the maximum designed service capacity or output rate 1 capacity minus personal and other allowances. These two functions of capacity can be used to find the efficiency and utilization. These are

capacity x 100%

acity x 100%

g for Products and Services

or producing goods or delivering services over a specified time interval. Capacity planning involves long-term and short term considerations. Long- l level of capacity; short-term considerations relate to variations in capacity requirements due to seasonal, random, and irregular fluctuations in

uction is less than what is achievable or optimal for a firm. This often means that the demand in the market for the product is below what the firm Excess capacity is inefficient and will cause manufacturers to incur extra costs or lose market share. Capacity can be broken down in two ive Capacity: refers to the maximum designed service capacity or output rate. Effective capacity is design capacity minus personal and other effect capacity tremendously.

for products and services. Capacity is the ability of a systems potential for producing goods or delivering services over a specific time interval. The : very important because they help determine the limit of output and provide a major insight to determining operating costs. Basic decisions about ices and this chapter explains the ramifications of those choices. When considering capacity planning within a company, three key inputs should be l of capacity to be determined, how much of the products will be needed, and when will the product be needed.

y planning is to find a medium between long term supply and capabilities of an organization and the predicted level of long term demand. al changes in capacity, changes in consumer wants and demand, technology and even the environment. When evaluating alternatives in capacity ilitative and quantitative aspects of the business. These aspects involve economic factors, public opinions, personal preferences of managers.

g as a key factor in designing systems. The capacity decision is strategic and long-term in nature. Capacity planning is described as matching the : predicted level of future demand. Many organizations become involved with capacity planning due to changes in demand, technology, the pacities or limits that their system can handle.

ed

inning process

it is best to choose one that doesn't need updating. When dealing with more than one product, it is best to measure capacity in terms of each firm is to either produce 100 microwaves *or* 75 refrigerators. This is less confusing than just saying the capacity is 100 or 75. Another method of availability of inputs. Note that one specific measure of capacity can't be used in all situations; it needs to be tailored to the specific situation at hand.

Expansion are key in the design of facilities. Other facility factors include locational factors (transportation costs, distance to market, labor supply, work area) can determine how smoothly work can be performed.

More uniform the output, the more opportunities there are for standardization of methods and materials. This leads to greater capacity.

Quality is an important determinant of capacity, but so is output quality. If the quality does not meet standards, then output rate decreases because of need for process improvements that increase quality and productivity can result in increased capacity. Another process factor to consider is the time it takes to produce different products or services.

Needed in certain jobs, the array of activities involved and the training, skill, and experience required to perform a job all affect the potential and absenteeism, and labor turnover all affect the output rate as well.

Flexibility can affect capacity by allowing or not allowing capacity options such as overtime or second or third shifts.

Problems may occur when an organization has differences in equipment capabilities among different pieces of equipment or differences in job requirements.

Factors that can affect effective capacity include inventory stocking decisions, late deliveries, purchasing requirements, acceptability of purchased materials and parts, and production procedures.

Questions to include: What impact will the changes have on suppliers, warehousing, transportation, and distributors? If capacity will be increased, will these resources be able to handle the increase? If capacity is to be decreased, what impact will the loss of business have on these elements of the supply chain?

Constraints and performance standards can restrict management's options for increasing and using capacity.

Limiting determining of effective capacity.

Capacity are process and human factors. Process factors must be efficient and must operate smoothly, if not the rate of output will dramatically drop. Workers must be well trained and have experience, they must be motivated and have a low absenteeism and labor turnover. In resolving constraint issues, all possible alternatives should be considered. This is possible by using CVP analysis and the Break-Even Point formula.

s

Steps and identify gaps

Requirements

Alternative

Alternative

Which will be best in the long term

Steps to determining effective capacity *except*:

Click here to reveal answer

Click here to reveal answer

NOT include which of the following?

er[/reveal-answer]

ity decisions **except**:
o meet future demands

st
of resources.

er[/reveal-answer]

asure capacity?

er[/reveal-answer]

initial cost of an investment?

er[/reveal-answer]

straint of capacity planning?
ss or system in achieving its goal
r system in achieving its goal
s or system in achieving its goal
r a system in achieving its goal.
ss or a system in achieving its goal

er[/reveal-answer]

argin

in capacity planning?

er[/reveal-answer]

nswer]

eterminant of effective capacity planning?

tive capacity planning

er[/reveal-answer]

n page 189[/hidden-answer]

n design capacity and effective capacity?

ness of the facility

y vs. the size of the facility

y vs. the effectiveness of the facility

tential maximum amount of output

er[/reveal-answer]

maximum output[/hidden-answer]

ty decisions are important?

on whether or not a company will meet future demands

its

or determinant of initial cost

ess and management

acity decision importance

r[/reveal-answer]

a capacity cushion?

products

3

er[/reveal-answer]

idden-answer]

company would want to outsource?

ecessary skills

requirements

er[/reveal-answer]

en-answer]

ed system?

it

ut

er[/reveal-answer]

97)/[hidden-answer]

er[/reveal-answer]

are equal (203)/[hidden-answer]

1...

level

e in order to decrease average unit costs

il level

r[/reveal-answer]

e optimal level (200)

ng include all of the following *except* :

er[/reveal-answer]

idden-answer]

ces differs from that for goods due to:

nce

r[/reveal-answer]

wer]

ther to outsource production include:

er[/reveal-answer]

wer]

nit costs after the optimal level are:

r[/reveal-answer]

must be satisfied in order to use Cost Volume Analysis?

Revenue per unit

e

er[/reveal-answer]

205)/[hidden-answer]

inary capacity strategy?

er[/reveal-answer]

ning service capacity?

er[/reveal-answer]

city or output rate is known as?

r[/reveal-answer]

mpute the efficiency: Effective capacity = 40 trucks per day, Actual output = 36 trucks per day

er[/reveal-answer]

he capacity planning process?

er[/reveal-answer]

ts of effective capacity?

tive capacity

er[/reveal-answer]

form more effectively and efficiently.
of a system in achieving its goals.
t capacity requirements.

e.

er[/reveal-answer]

l in order for cost-volume analysis to be a valuable tool?
it

ing on volume
nding on volume
er[/reveal-answer]

reak even point in units?

er[/reveal-answer]

acity for a steel mill?

er[/reveal-answer]

planning process?

er[/reveal-answer]

ffective capacity?

er[/reveal-answer]

nulation?

er[/reveal-answer]

er[/reveal-answer]

1 of the following?

er[/reveal-answer]

hat an operating unit can handle.

that an operating unit can handle.

oods or delivering services over a specified time interval.

minant of operating costs.

er[/reveal-answer]

Found on pages 185, 207[/hidden-answer]

iciency and utilization?

t to effective capacity, while capacity utilization is the ratio of actual output to design capacity.

ge, while capacity utilization is not.

ectiveness, while capacity utilization measures capacity tailored to a situation.

it to effective capacity, while efficiency is the ratio of actual output to design capacity.

ge, while efficiency is not.

wer[/reveal-answer]

n-answer]

ation = 72 and actual output = 36 trucks per day.

er[/reveal-answer]

ion = [Actual Output/ Design Capacity] x 100[/hidden-answer]

ions whose capacity is lower than that of the other operations is known as:

wer[/reveal-answer]

n-answer]

of the five steps used to resolve constraint issues:

maximum benefit, given the constraint.

ss are supportive of the constraint.

me the constraint.
 ance when a strategy is expanding.

wer[/reveal-answer]

2[/hidden-answer]

| | Low | Moderate | High |
|--|------|----------|------|
| | \$10 | \$11 | \$11 |
| | 7 | 12 | 12 |
| | (3) | 2 | 16 |

this question. If the company uses Maxi-min Criterion to choose the best alternative, what would be the best choice for this company?

er[/reveal-answer]

ment to Chapter 5)[/hidden-answer]

ion is 38%.

er[/reveal-answer]

is Capacity cushion = 100% – Utilization[/hidden-answer]

| | Annual Demand | Standard Processing Time per Unit (Hr) | Processing Time Needed (Hr) |
|--|---------------|--|-----------------------------|
| | 300 | 5.00 | 1,500 |
| | 400 | 8.00 | 3,200 |
| | 700 | 2.00 | 1,400 |
| | 6,100 | | |

nswer this question. *Note:* department is working one 8-hour shift 250 days a year. How many machines would be needed to handle the required (le number)

er[/reveal-answer]

-answer]

er the following Questions 44-47.

contemplating adding a new line of cookies, which require leasing for a monthly payment of \$4,000. Variable costs would be \$2 per cookie, and

order to break-even?

er[/reveal-answer]

000; VC=\$2 per cookie; Rev.=\$6 per cookie; $Q = FC / (Rev - VC)$; $Q = \$4,000 / (\$6 - \$2) = 1000$ cookies/month.[/hidden-answer]

0 cookies are made and sold in a month?

er[/reveal-answer]

$Q(R - v) - FC$

realize a profit of \$10,000?

er[/reveal-answer]

$(1,000 + \$4,000) / (\$6 - \$2) = 3,500$ cookies[/hidden-answer]

profit is \$8,000, what price should be charged per cookie?

er[/reveal-answer]

$Q(R - v) - FC$

| | Total Annual Fixed Costs | Corresponding Range of Output |
|--|--------------------------|-------------------------------|
| | \$12,00 | 0 to 300 |
| | 15,000 | 301 to 600 |
| | 24,000 | 601 to 900 |

ie is \$42 per unit.

Following Questions 8-10.

range (0 to 300).

er[/reveal-answer]

$(R-v); 12,000/(\$42-\$12)=400$ units.[/hidden-answer]
range (301 to 600).

er[/reveal-answer]

[-answer]

between 580 and 650 units, how many machines should the manager purchase. If break-even point for
0)
> 600)
to 900)

do nothing.

er[/reveal-answer]

As found on page 205.

As to the two ranges for which a break-even point, you can see that the break-even point is 500 units, which is in the range 301 to 600. This means
the range, it would be above the break even point and thus yield a profit. That is not true of range 601 to 900. At the top end of projected demand,
break-even point for that range, so there would be no profit. Thus, the manager should choose two machines.[/hidden-answer]

At a normal level, increasing the output rate results in decreasing average unit costs according to:

er[/reveal-answer]

Efficiency, effective capacity = 40 trucks per day, actual output = 36 trucks per day, compute the efficiency:

er[/reveal-answer]

Effective capacity=36trucks per day/40 trucks per day=90% (Page 188)[/hidden-answer]

offset uncertainty in demand
nt

er[/reveal-answer]

late to?

er[/reveal-answer]

; of a strategy formulation?

er[/reveal-answer]

1-answer]

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