Operations Management 14th edition Heizer Solutions Manual

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CHAPTER 1

Operations and Productivity

DISCUSSION QUESTIONS

1. The text suggests four reasons to study OM. We want to understand (1) how people organize themselves for productive enterprise, (2) how goods and services are produced, (3) what operations managers do, and (4) this costly part of our economy and most enterprises.

LO 1.1: Define operations management

AACSB: Application of knowledge

2. With some 40% of all jobs being in the OM field, the career opportunities are prolific. The text suggests many career opportunities. OM students find initial jobs throughout the OM field, including supply chain, logistics, purchasing, production planning and scheduling, plant layout, maintenance, quality control, inventory management, etc.

LO 1.3: Identify career opportunities in operations management

AACSB: Application of knowledge

3. Possible responses include: Adam Smith (work specialization/ division of labor), Charles Babbage (work specialization/division of labor), Frederick W. Taylor (scientific management), Walter Shewart (statistical sampling and quality control), Henry Ford (moving assembly line), Charles Sorensen (moving assembly line), Frank and Lillian Gilbreth (motion study), and Eli Whitney (standardization).

LO 1.1: Define operations management

AACSB: Application of knowledge

4. See references in the answer to Question 3.

LO 1.1: Define operations management

AACSB: Application of knowledge

5. The actual charts will differ, depending on the specific organization the student chooses to describe. The important thing is for students to recognize that all organizations require, to a greater or lesser extent, (a) the three primary functions of operations, finance/accounting, and marketing; and (b) that the emphasis or detailed breakdown of these functions is dependent on the specific competitive strategy employed by the firm.

LO 1.1: Define operations management

AACSB: Application of knowledge

6. The basic functions of a firm are marketing, accounting/ finance, and operations. An interesting class discussion: "Do all firms/organizations (private, government, not-for-profit) perform these three functions?" The authors' hypothesis is yes, they do.

LO 1.1: Define operations management

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7. The 10 strategic decisions of operations management are product design, quality, process, location, layout, human resources, supply chain management, inventory, scheduling (intermediate and short-term), and maintenance. We find this structure an excellent way to help students organize and learn the material.

LO 1.1: Define operations management

AACSB: Application of knowledge

8. The 10 decisions as applied to Amazon: (1) *Product design*—defining the product may initiate an interesting discussion. Is the product the over 12 million products available, or is the product the ease of order entry, convenience, and home delivery? Probably both. (2) *Quality management*—quality is built into every aspect of the Amazon culture, from item and order identification, and from the supplier through receipt, process design, human resource training, inventory tracking, etc. Multiple checks of items are standard. Errors in order receipts or shipment are very expensive. (3) *Process strategy*—receipt, movement to storage, and pulling of product for shipment are all state of the art. Amazon's process mimics in many ways an assembly line … where the workers stand still and the product is brought to the worker, rather than movement of personnel up and down aisles to "pull" merchandise. (4) *Location strategy*—Amazon's facilities are strategically located worldwide to facilitate rapid delivery. (5) *Layout strategy*—facilities are designed and redesigned to meet the changing state-of-the-art innovations, from Kivas (moving storage bins) to "pull to light." (6) *Human resources*—a non-union workforce has allowed continuing innovation in job design, work assignments, flexible short-term and long-term (seasonal) work schedules, and benefits. (7) *Supply chain management*—volume has given Amazon substantial negotiating flexibility. Amazon has also been willing to design and produce its own "copycat" products when it seems advantageous. (8) *Inventory management*—sophisticated item receipt and storage over multiple facilities, along with customer order tracking that facilitates shipment of orders from multiple locations to ensure complete orders, gives Amazon a huge advantage. (9) *Scheduling*—the combination of inventory management, superior software, and a great process allows Amazon to ship in 15 minutes … the time from the customer's keyboard order click to shipment is 15 minutes. (10) *Maintenance*—the facility maintenance is rather simple as factories go … it is complex, but they are not making rockets either. However, the software for customer order entry, Kiva control, inventory, and order management—over multiple facilities—is complex and requires ongoing development, backups, and updating.

LO 1.1: Define operations management

AACSB: Application of knowledge

9. Four areas that are important to improving labor productivity are (1) basic education (basic reading and math skills), (2) diet of the labor force, (3) social overhead that makes labor available (water, sanitation, transportation, etc.), and (4) maintaining and expanding the skills necessary for changing technology and knowledge, as well as for teamwork and motivation.

LO 1.8: Identify the critical variables in enhancing productivity

AACSB: Application of knowledge

10. Productivity is harder to measure when the task becomes more intellectual. A knowledge society implies that work is more intellectual and therefore harder to measure. Because the U.S. and many other countries are increasingly "knowledge" societies, productivity is harder to measure. Using labor-hours as a measure of productivity for a postindustrial society versus an industrial or agriculture society is very different. For example, decades spent developing a marvelous new drug or winning a very difficult legal case on intellectual property rights may be significant for postindustrial societies, but not show much in the way of productivity improvement measured in labor-hours.

LO 1.8: Identify the critical variables in enhancing productivity

AACSB: Analytical thinking

11. Productivity is difficult to measure because precise units of measure may be lacking, quality may not be consistent, and exogenous variables may change.

LO 1.8: Identify the critical variables in enhancing productivity

AACSB: Reflective thinking

12. Mass customization is the flexibility to produce to meet specific customer demands, without sacrificing the low cost of a product-oriented process. Rapid product development is a source of competitive advantage. Both rely on agility within the organization.

LO 1.1: Define operations management

AACSB: Application of knowledge

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13. Labor productivity in the service sector is hard to improve because (1) many services are labor intensive and (2) they are individually (personally) processed (the customer is paying for that service—the haircut), (3) it may be an intellectual task performed by professionals, (4) it is often difficult to mechanize and automate, and (5) it is often difficult to evaluate for quality.

LO 1.8: Identify the critical variables in enhancing productivity

AACSB: Reflective thinking

14. Taco Bell designed meals that were easy to prepare; with actual cooking and food preparation done elsewhere; automation to save preparation time; reduced floor space; manager training to increase span of control.

LO 1.8: Identify the critical variables in enhancing productivity

AACSB: Application of knowledge

15. Bureau of Labor Statistics (stats.bls.gov) is a good place to start. Results will vary for each year, but overall data for the economy will range from 0.9% to 4.8%, and mfg. could be as high as 5% and services between 1% and 2%. The data will vary even more for months or quarters. The data are frequently revised, often substantially.

LO 1.7: Compute multifactor productivity

AACSB: Application of knowledge

ETHICAL DILEMMA

AMERICAN CAR BATTERY INDUSTRY

You may want to begin the discussion by asking how ethical it is for you to be in the lead battery business when you know that any batteries you recycle will very likely find their way to an overseas facility (probably Mexico) with, at best, marginal pollution containment. Then after a likely conclusion of "Well someone has to provide batteries," you can move to the following discussion.

(a) As owner of an independent auto repair shop trying to dispose of a few old batteries each week, your options may be limited. But as an ethical operator, your first option is to put pressure on your battery supplier to take your old batteries. Alternatively, shop for a battery supplier who wants your business enough to dispose of your old batteries. Third, because there is obviously a market for the lead in old batteries, some aggressive digging may uncover an imaginative recycler who can work out an economical arrangement for pickup or delivery of your old batteries. Another option is, of course, to discontinue the sale of batteries. (This is a problem for many small businesses; ethical decisions and regulation may be such that they often place an expensive and disproportionate burden on a small firm.)

(b) As manager of a large retailer responsible for disposal of thousands of used batteries each week, you should have little trouble finding a battery supplier with a reverse supply chain suitable for disposal of old batteries. Indeed, a sophisticated retailer, early on in any supply-chain development process, includes responsible disposal of environmentally dangerous material as part of the negotiations. Disposal of old batteries should be a minor issue for a large retailer.

(c) For both a small and large retailer, the solution is to find a "sustainable" solution or get out of the battery business. Burying the batteries behind the store is not an option. *Supplement 5: Sustainability in the Supply Chain* provides some guidelines for a deeper class discussion.

END-OF-CHAPTER PROBLEMS

1.1 (a) $\frac{120 \text{ boxes}}{40 \text{ hours}} = 3.0 \text{ boxes/hour}$

(b) $\frac{125 \text{ boxes}}{40 \text{ hours}} = 3.125 \text{ boxes/hour}$

(c) Change in productivity = 0.125 box/hour

(d) Percentage change = $\frac{0.125 \text{ box}}{3.0} = 4.167\%$

1.2 (a) Labor productivity is 160 valves/80 hours = 2 valves per hour

(b) New labor productivity = 180 valves/80 hours = 2.25 valves per hour

(c) Percentage change in productivity = .25 valve/2 valves = 12.5%

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1.3 $0.15 = \dfrac{57{,}600}{(160)(12)(L)}$, where L = number of laborers employed at the plant

So, $L = \dfrac{57{,}600}{(160)(12)(0.15)} = 200$ laborers employed

1.4 (a) $\dfrac{\text{Units produced}}{\text{Input}} = \dfrac{100 \text{ pkgs}}{5} = 20$ pkgs/hour

(b) $\dfrac{133 \text{ pkgs}}{5} = 26.6$ pkgs per hour

(c) Increase in productivity $= \dfrac{6.6}{20} = 33.0\%$

1.5

Resource	Last Year	This Year	Change	Percentage Change
Labor	$\frac{1{,}000}{300} = 3.33$	$\frac{1{,}000}{275} = 3.64$	0.31	$\frac{0.31}{3.33} = 9.3\%$
Resin	$\frac{1{,}000}{50} = 20$	$\frac{1{,}000}{45} = 22.22$	2.22	$\frac{2.22}{20} = 11.1\%$
Capital	$\frac{1{,}000}{10{,}000} = 0.1$	$\frac{1{,}000}{11{,}000} = 0.09$	–0.01	$\frac{-0.01}{0.1} = -10.0\%$
Energy	$\frac{1{,}000}{3{,}000} = 0.33$	$\frac{1{,}000}{2{,}850} = 0.35$	0.02	$\frac{0.02}{0.33} = 6.1\%$

1.6

	Last Year	This Year
Production	1,000	1,000
Labor-hour @ $10	$3,000	$2,750
Resin @ $5	250	225
Capital cost/month	100	110
Energy	1,500	1,425
	$4,850	$4,510

$$\frac{[(1{,}000/4{,}510) - (1{,}000/4{,}850)]}{(1{,}000/4{,}850)} =$$

$$\frac{0.222 - 0.206}{0.206} = \frac{0.016}{0.206} = 7.8\% \text{ improvement*}$$

*With rounding to 3 decimal places.

1.7 Productivity $= \dfrac{\text{Output}}{\text{Input}}$

(a) Labor productivity $= \dfrac{65}{(520 \times 13)} = \dfrac{65}{\$6{,}760}$

$= .0096$ rug per labor $

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(b) $$\text{Multifactor productivity} = \frac{65}{(520 \times \$13) + (100 \times \$5) + (20 \times \$50)}$$

$$= \frac{65}{\$8,260} = .00787 \text{ rug per } \$$$

1.8 (a) Labor productivity = 1,000 tires/400 hours = 2.5 tires/hour.

(b) Multifactor productivity is 1,000 tires/(400 × $12.50 + 20,000 × $1 + $5,000 + $10,000) = 1,000 tires/$40,000 = 0.025 tire/dollar.

(c) Multifactor productivity changes from 1,000/40,000 to 1,000/39,000, or from 0.025 to 0.02564; the ratio is 1.0256, so the change is a 2.56% increase.

1.9

	Last Year	This Year	Change	Percentage Change
Labor hours	$\frac{1,500}{350} = 4.29$	$\frac{1,500}{325} = 4.62$	$\frac{0.33}{4.29}$	= 7.7%
Capital invested	$\frac{1,500}{15,000} = 0.10$	$\frac{1,500}{18,000} = 0.08$	$\frac{-0.02}{0.1}$	= –20%
Energy (btu)	$\frac{1,500}{3,000} = 0.50$	$\frac{1,500}{2,750} = 0.55$	$\frac{0.05}{0.50}$	= 10%

Productivity of capital did drop; labor productivity increased as did energy, but by less than the anticipated 15%.

1.10 Multifactor productivity is:

375 autos/[($20 × 10,000) + ($1,000 × 500) + ($3 × 100,000)] = 375/(200,000 + 500,000 +300,000) = 375/1,000,000 = .000375 auto per dollar of inputs

1.11 (a) Before: 500/20 = 25 boxes per hour;

After: 650/24 = 27.08

(b) 27.08/25
= 1.083, or an increase of 8.3% in productivity

(c) New labor productivity = 700/24 = 29.167 boxes per hour

1.12 1,500 × 1.25 = 1,875 (new demand)

$$\frac{\text{Outputs}}{\text{Inputs}} = \text{Productivity}$$

$$\frac{1,875}{\text{Labor-hours}} = 2.344$$

$$\text{New process} = \frac{1,875}{2.344} \cong 800 \text{ labor-hours}$$

$$\frac{800}{160} = 5 \text{ workers}$$

$$\text{Current process} = \frac{1,500}{\text{Labor-hours}} = 2.344$$

$$\frac{1,500}{2.344} = \text{labor-hours} \cong 640$$

$$\frac{640}{160} = 4 \text{ workers}$$

Add one worker.

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1.13 (a) Labor change:

$$\frac{1{,}500}{(640 \times \$8)} = \frac{1{,}500}{5{,}120} = .293 \text{ loaf/\$}$$

$$\frac{1{,}875}{(800 \times \$8)} = 0.293 \text{ loaf/\$}$$

(b) Investment change:

$$\frac{1{,}500}{(640 \times \$8)} = \frac{1{,}500}{5{,}120} = .293 \text{ loaf/\$}$$

$$\frac{1{,}875}{(640 \times 8) + (100)} = \frac{1{,}875}{5{,}220} = .359 \text{ loaf/\$}$$

(c) Percentage change: $\frac{.293 - .293}{.293} = 0$ (labor)

Percentage change: $\frac{.359 - .293}{.293} = .225$

$= 22.5\%$ (investment)

The better option is to purchase a new blender because it generates more loaves per dollar.

1.14

$$\text{Old process} = \frac{1{,}500}{(640 \times 8) + 500 + (1{,}500 \times 0.35)}$$

$$= \frac{1{,}500}{6{,}145} = 0.244 \text{ loaf/\$}$$

$$\text{New process} = \frac{1{,}875}{(800 \times 8) + 500 + (1{,}875 \times 0.35)}$$

$$= \frac{1{,}875}{7{,}556.25} = 0.248 \text{ loaf/\$}$$

$$\text{Percentage change} = \frac{0.248 - 0.244}{0.244} = 1.6\%$$

1.15 (a) $\frac{6{,}600 \text{ vans}}{x \text{ labor-hours}} = 0.10$

$x = 66{,}000$ labor-hours

There are 300 laborers. So,

$$\frac{66{,}000 \text{ labor-hours}}{300 \text{ laborers}} = 220 \text{ labor-hours/laborer on average, per month}$$

(b) Now $\frac{6{,}600 \text{ vans}}{x \text{ labor-hours}} = 0.11$, so $x = 60{,}000$ labor-hours

so, $\frac{60{,}000 \text{ labor-hours}}{300 \text{ laborers}} = 200$ labor-hours/laborer on average, per month

1.16

$$\frac{\$ \text{ output}}{\text{Labor-hours}} = \frac{52(\$90) + 80(\$198)}{8(45)}$$

$$= \frac{\$20{,}520}{360} = \$57.00 \text{ per labor-hour}$$

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1.17 (a) $$\text{Last year} = \frac{1{,}500}{(350\times 8) + (15{,}000\times 0.0083) + (3{,}000\times 0.6)}$$

$$= \frac{1{,}500}{2{,}800 + 124.50 + 1{,}800}$$

$$= \frac{1{,}500}{4{,}724.5} = 0.317 \text{ doz} / \$$$

(b) $$\text{This year} = \frac{1500}{(325\times 8) + (18{,}000\times 0.0083) + (2{,}750\times 0.6)}$$

$$= 0.341 \text{ doz} / \$$$

(c) $$\text{Percentage change} = \frac{0.341 - 0.317}{0.317}$$

$$= 0.076, \text{ or } 7.6\% \text{ increase}$$

CASE STUDY

UBER TECHNOLOGIES, INC.

1. First, some drivers (maybe most) may not require a wage that equals those fully engaged in the "taxi" business. It truly could be a supplemental income. . . . "I'm going that way anyhow so let's make a few dollars while on the way." Similarly, the capital investment cost approaches zero as the car is going that direction anyhow. These are idle or underutilized resources.

From society's perspective, Uber and its like competitors are desirable because both idle or wasted labor and capital resources are being utilized. At the same time, as a bonus, Uber is reducing traffic and auto pollution while speeding up the transport of individuals and local commerce.

As a competitor for the traditional taxi service, Uber seems to be an enhancement in efficiency.

For those faculty who what to spend some time on the larger productivity message, this case provides such an opportunity. Uber, as Joseph Schumpeter would suggest, has developed a disruptive technology (creative destruction, in a Schumpeterian translation). Innovations such as this are exactly how economic efficiency is enhanced. The traditional taxi services, with some imagination, could have developed and adopted this technology, but most were ensconced in their own regulatory cocoon. As is often the case, it takes an outsider, such as Uber et al. to be creative by putting unused resources to use and providing society greater efficiency.

LO 1.8: Identify the critical variables in enhancing productivity

AACSB: Analytical thinking

2. Perhaps a business model similar to Uber's can be applied to the trucking industry. And, indeed, Uber has established an Uber app for the trucking industry. An estimated 30% of trucking backhauls are empty. However, the number of independent truckers or truckers with the latitude to alter their route may be very small. And this number must be a tiny fraction of independent automobile drivers. So, the ability to "Uberize" trucking may be very difficult, but utilizing that idle 30% would be huge benefit to society.

LO 1.8: Identify the critical variables in enhancing productivity

AACSB: Analytical thinking

3. Perhaps the Uber model can be used for package delivery, documents, and everything from flowers to groceries. Airbnb (www.airbnb.com) is applying a similar model to short-term rentals of rooms, apartments, and homes—competing with more traditional bed and breakfast facilities and hotels.

LO 1.8: Identify the critical variables in enhancing productivity

AACSB: Analytical thinking

4. As Uber expands into food delivery, package delivery, courier service, etc., many of the disadvantages of the Uber model are slowly being overcome. However, a major ongoing disadvantage is the proliferation of regulations, with some countries and airports even banning ride-sharing companies. Additionally, some jurisdictions, namely California, require ride-sharing companies to treat drivers as employees rather than independent contractors. This is a significant issue as the Uber business model does not hire drivers. This and related liability disputes are still being defined. The issue is compounded by the need to have enough drivers on hand when needed. The other major issue is Uber's very extensive, sophisticated, necessarily complex, and fast software network with its inherent vulnerabilities, from "bugs" to network downtime and hacks.

LO 1.8: Identify the critical variables in enhancing productivity

AACSB: Analytical thinking

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VIDEO CASE STUDIES

1 FRITO-LAY: OPERATIONS MANAGEMENT IN MANUFACTURING

This case provides a great opportunity for an instructor to stimulate a class discussion early in the course about the pervasiveness of the 10 decisions of OM with this case alone or in conjunction with the Hard Rock Cafe case. There is a short video (7 minutes) available in MyLab Operations Management that is filmed specifically for this text and supplements this case.

1.

- *Product design:* Each of Frito-Lay's 40-plus products must be conceived, formulated (designed), tested (market studies, focus groups, etc.), and evaluated for profitability.
- *Quality:* The standards for each ingredient, including its purity and quality, must be determined.
- *Process:* The process that is necessary to produce the product and the tolerance that must be maintained for each ingredient by each piece of equipment must be specified and procured.
- *Location:* The fixed and variable costs of the facility, as well as the transportation costs and the delivery distance, given the freshness, must be determined.
- *Layout:* The Frito-Lay facility would be a process facility, with great care given to reducing movement of material within the facility.
- *Human resources:* Machine operators may not have inherently enriched jobs, so special consideration must be given to developing empowerment and enriched jobs.
- *Supply chain management:* Frito-Lay, like all other producers of food products, must focus on developing and auditing raw material from the farm to delivery.
- *Inventory:* Freshness and spoilage require constant effort to drive down inventories.
- *Scheduling:* The demand for high utilization of a capital-intensive facility means effective scheduling will be important.
- *Maintenance:* High utilization requires good maintenance, from machine operator to the maintenance department and depot service.

LO 1.1: Define operations management

AACSB: Reflective thinking

2. Determining output (in some standard measure, perhaps pounds) and labor-hours would be a good start for single-factor productivity.

For multifactor productivity, we would need to develop and understand capital investment and energy, as well as labor, and then translate those into a standard, such as dollars.

LO 1.6: Compute single-factor productivity

LO 1.7: Computer multifactor productivity

AACSB: Reflective thinking

3. Hard Rock performs all 10 of the decisions as well, only with a more service-sector orientation. Each of these is discussed in the solution to the Hard Rock Cafe case.

LO 1.8: Identify the critical variables in enhancing productivity

AACSB: Reflective thinking

2 HARD ROCK CAFE: OPERATIONS MANAGEMENT IN SERVICES

There is a short video (7 minutes) available in MyLab Operations Management that is filmed specifically for this text and supplements this case.

1. Hard Rock's 10 decisions: This is early in the course to discuss these in depth, but still a good time to get the students engaged in the 10 OM decisions around which the text is structured.

- *Product design*: Hard Rock's tangible product is food and like any tangible product it must be designed, tested, and "costed out." The intangible product includes the music, memorabilia, and service.
- *Quality*: The case mentions the quality survey as an overt quality measure, but quality can be discussed from a variety of perspectives—hiring the right people, food ingredients, good suppliers, speed of service, friendliness, etc.
- *Process*: The process can be discussed from many perspectives: (a) the process of processing a guest, to their seat, taking the order, order processing, delivery of the meal, payment, etc.; (b) the process of how a meal is prepared (see, for instance, how one would make a Hard Rock Hickory BBQ Bacon Cheeseburger (Figure 5.9) or a Buffalo Chicken Mac & Cheese (Figure 14.9) or use the Method Analysis tool discussed in Chapter 10; or (c) some subset of any of these.

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- *Location*: Hard Rock Cafes have traditionally been located in tourist locations, but that is beginning to change.
- *Layout*: Little discussion in the case, but students may be very aware that a kitchen layout is critical to efficient food preparation and that a bar is critical in many food establishments for profitability. The retail shop in relation to the restaurant and its layout is a critical ingredient for profitability at Hard Rock.
- *Human resources*: Jim Knight, VP for Human Resources at Hard Rock, seeks people who are passionate about music, love to serve, and can tell a story. This OM decision is a critical ingredient for success of a Hard Rock Cafe and an integral part of the Hard Rock dining experience.
- *Supply chain management*: Although not discussed in the case, students should appreciate the importance of the supply chain in any food service operation. Some items like leather jackets have a 9-month lead time. Contracts for meat and poultry are signed 8 months in advance.
- *Inventory*: Hard Rock, like any restaurant, has a critical inventory issue that requires that food be turned over rapidly and that food in inventory be maintained at the appropriate and often critical temperatures. But the interesting thing about Hard Rock's inventory is that they maintain $40 million of memorabilia with all sorts of special care, tracking, and storage issues.
- *Scheduling*: Because most Hard Rock Cafe's sales are driven by tourists, the fluctuations in seasonal, daily, and hourly demands for food are huge. This creates a very interesting and challenging task for the operations managers at Hard Rock. (Not mentioned in the case, linear programming is actually used in some cafes to schedule the waitstaff.)
- *Maintenance/reliability*: The Hard Rock Cafe doors must open every day for business. Whatever it takes to provide a reliable kitchen with hot food served hot and cold food served cold must be done. Bar equipment and point-of-sale equipment must also work.

LO 1.1: Define operations management

AACSB: Reflective thinking

2. Productivity of kitchen staff is simply the output (number of meals) over the input (hours worked). The calculation is how many meals prepared over how many hours spent preparing them. The same kind of calculation can be done for the waitstaff. In fact, Hard Rock managers begin with productivity standards and staff to achieve those levels. (You may want to revisit this issue when you get to Chapter 10 and Supplement 10 on labor standards and discuss how labor can be allocated on a per-item basis with more precision.)

LO 1.6: Compute single-factor productivity

AACSB: Analytical thinking

3. Each of the 10 decisions discussed in Question 1 can be addressed with a tangible product like an automobile.

- *Product design*: The car must be designed, tested, and costed out. The talents may be those of an engineer or operations manager rather than a chef, but the task is the same.
- *Quality*: At an auto plant, quality may take the form of measuring tolerances or wear of bearings, but there is still a quality issue.
- *Process*: With an auto, the process is more likely to be an assembly-line process.
- *Location*: Hard Rock Cafe may want to locate at tourist destinations, but an auto manufacturer may want to go to a location that will yield low fixed or variable cost.
- *Layout*: An automobile assembly plant is going to be organized on an assembly line criterion.
- *Human resources*: An auto assembly plant will be more focused on hiring factory skills rather than a passion for music or personality.
- *Supply chain management*: The ability of suppliers to contribute to design and low cost may be a critical factor in the modern auto plant.
- *Inventory*: The inventory issues are entirely different—tracking memorabilia at Hard Rock, but an auto plant requires tracking a lot of expensive inventory that must move fast.
- *Scheduling*: The auto plant is going to be most concerned with scheduling material, not people.
- *Maintenance*: Maintenance may be even more critical in an auto plant as there is often little alternate routing, and downtime is very expensive because of high fixed and variable cost.

LO 1.4: Explain the distinction between goods and services

AACSB: Reflective thinking

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There is a short video (6.5 minutes) available in MyLab Operations Management that is filmed specifically for this text and supplements this case.

1. Celebrity's 10 decisions: It is early in the course to discuss these in depth, but still a good time to get the students engaged in the 10 OM decisions around which the text is structured.

- *Product design*: Celebrity's product consists of a complete "premium" vacation/holiday experience. It includes accommodations, ports-of-call, shipboard facilities, food, service, etc. Students should appreciate the full scope of how Celebrity Cruises designs all of the many attributes of its "product."
- *Quality*: The case mentions the quality survey as an overt quality measure, but quality can be discussed from a variety of perspectives—hiring the right people, food ingredients, good suppliers, speed of service, cleanliness, friendliness, etc.
- *Process*: Operation of a successful cruise line consists of many processes. The process can be discussed from various perspectives: (a) the process of welcoming a guest aboard, (b) bill and payment processing, (c) delivery of meals, (d) supply chain, (e) off ship excursions, etc. The methods analysis tools discussed in Chapter 10 provide a way for students to address and analyze these processes.
- *Location*: Celebrity Cruises provides a unique opportunity for students to address the many aspects of the location decision. First, where in the world are the customers? Second, from what home ports will Celebrity operate? Third, where are the locations of the ports-of-call for the ship?
- *Layout*: How should the ship itself be designed … how many restaurants, how many kitchens, what other amenities (i.e. gym, spa, theater, shops, library, etc.)? What shipboard features will distinguish differences in pricing?
- *Human resources*: The unique international flavor of the crew on cruise ships generates a wide variety of special recruiting, motivational, and teamwork issues. A service-oriented staff, carefully recruited and well trained, is a critical ingredient for success of a "hotel at sea" and an integral part of the premium Celebrity Cruises experience.
- *Supply chain management*: Students should appreciate the importance of the supply chain for a floating hotel that is going to be at sea for days or even weeks at a time.
- *Inventory*: Because there is seldom resupply once at sea, inventory, but particularly food inventory for hundreds of people, is a critical issue. Food requirements must be accurately forecasted and be maintained at the appropriate and often critical temperatures. Food is only one of the many inventory items to be maintained: water, fuel, cleaning supplies, clothes, and memorabilia require all sorts of special care, tracking, and storage issues.
- *Scheduling*: Fluctuations in location and season create a very interesting and challenging task for the operations managers. Not only the ships and port access and excursions, but also food deliveries and crews, must all be scheduled.
- *Maintenance/reliability*: The ship is open every day for business. Minor maintenance is performed while the ship is operating, with more significant maintenance performed annually and major long-term maintenance conducted in dry dock every 5 years.

LO 1.2: Identify the 10 strategic decisions of operations management

AACSB: Reflective thinking

2. Celebrity's 10 OM decisions are also executed by a manufacturing firm. See, for instance, the Frito-Lay case discussed earlier in this chapter. Indeed, the theme of the text is that these 10 decisions are pervasive in OM. It matters little if the product is a Frito-Lay product, an iPhone, or a premium vacation with Celebrity Cruises; all of these 10 decisions are going to be made. The distinction is the implementation and emphasis placed on each. For instance, product design at Frito-Lay may begin with selecting the proper potatoes, cooking oils, and temperature. Celebrity, as noted above, has a very different product design task. Similarly, quality of Frito-Lay chips may be dependent on precise cutting blades and processing temperature, while Celebrity's quality manifests itself in accommodations, food, and service. Students should be challenged to recognize that the 10 decisions are made, albeit with distinctions dependent upon the product and strategy.

LO 1.2: Identify the 10 strategic decisions of operations management

ACSB: Reflective thinking

3 CELEBRITY CRUISES: OPERATIONS MANAGEMENT AT SEA

3. Celebrity's 10 OM decisions are also executed by a retail firm. Indeed, the theme of the text is that these 10 decisions are pervasive in OM. It matters little if the product is a retail firm or a restaurant (such as Hard Rock, discussed in the prior case) or a premium vacation with Celebrity Cruises; all of these 10 decisions are going to be made. Perhaps in a different way and with different emphasis, but they will be made. For instance, Hard Rock's product is a unique memorabilia-filled dining experience. Celebrity's product is a holiday with premium accommodations, food, and service. Students should be challenged to recognize that the 10 decisions are made, albeit with distinctions dependent upon the product and strategy.

LO 1.2: Identify the 10 strategic decisions of operations management

ACSB: Reflective thinking

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4. The differences between a land-based hotel and the "hotel at sea" may be very small in terms of guest expectations and the quality decision. However, the emphasis on various aspects of the other decisions can be expected to change. For instance, for the "hotel at sea" the location decision changes as a function of the season, port-of-call performance, and even weather. A hotel may or may not include dining excellence a part of its product, but for most cruise lines, a premium dining experience is critical. In the case of supply chain, logistics, and inventory, for the ship there is often no resupply; therefore, there is an added emphasis on forecasts, logistics, and inventory. Forecasts must be accurate, suppliers punctual, and inventory counts precise. Similarly, maintenance onboard ship must remove all variability; the emergency backup may be days away. Most hotels will very likely have little in common with the implementation of the human resource function at an international cruise line with employees from dozens of countries. But they both must be successful at the HR decision.

LO 1.2: Identify the 10 strategic decisions of operations management

ACSB: Reflective thinking

ADDITIONAL CASE STUDIES (available in MyLab Operations Management)

1 NATIONAL AIR EXPRESS

This case can be used to introduce the issue of productivity and how to improve it, as well as the difficulty of good consistent measures of productivity. This case can also be used to introduce some of the techniques and concepts of OM.

1. The number of stops per driver is certainly a good place to start. However, mileage and number of shipments will probably be good additional variables. (Regression techniques, addressed in Chapter 4, can be addressed here.)

LO 1.8: Identify the critical variables in enhancing productivity

AACSB: Analytical thinking

2. Customer service should be based on an analysis of customer requirements. Document requirements in terms of services desired (supply needs, preprinted waybills, package weights, pickup and drop-off requirements) should all be considered. (The house of quality technique discussed in Chapter 5 is one approach for such an analysis.)

LO 1.8: Identify the critical variables in enhancing productivity

AACSB: Analytical thinking

3. Other companies in the industry do an effective job of establishing very good labor standards for their drivers, sorters, and phone personnel. Difficult perhaps, but doable. (Work measurement in Chapter 10 addresses labor standards.)

LO 1.8: Identify the critical variables in enhancing productivity

AACSB: Analytical thinking

2 ZYCHOL CHEMICALS CORPORATION

1. The analysis of the productivity data is shown on the next page. Both labor and material productivity increased, but capital equipment productivity did not. The net result is a large negative change in productivity. If this is a one-time change in the accounting procedures, this negative change should also be a one-time anomaly. The effect of accounting procedures is often beyond the control of managers. For example, perhaps the capital allocation is based on an accelerated allocation of depreciation of newly installed technology. This accounting practice will seriously impact near-term productivity and then later years' productivity figures will benefit from the reduced depreciation flows. This highlights the difficulty in accounting for costs in an effective managerial manner. Decisions and evaluation of operating results should be based on sound managerial accounting practices and not necessarily generally accepted financial accounting principles.

LO 1.6: Compute single-factor productivity

LO 1.7: Compute multifactor productivity

AACSB: Analytical thinking

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2. An analysis of adjusted results reduces the negative impact on the capital allocation but there is still a negative growth in multifactor productivity. After adjustment for inflation, the material costs are still higher in 2022. Yet, one must be aware of the extra volatility of the cost of petroleum-based products. Did the manager have control over his price increases? One should look at the changes in a petroleum-based price index, including the cost of oil, over the last two years in order to gain a better understanding of the degree to which the manager had control over these costs. The increase in wages was beyond the manager's control, and a constant rate should be used for comparing both years' results. Yet a negative result still remains. Even when material costs in 2022 are converted to the original cost of $320, a negative 5% growth in productivity remains. The increase in the capital base is responsible yet should not persist in future years if the increase was the result of an adoption of new technology.

LO 1.6: Compute single-factor productivity

LO 1.7: Compute multifactor productivity

AACSB: Analytical thinking

3. The manager did not reach the goal. An analysis of the changes in capital costs is warranted. Even after adjusting for inflation, multifactor productivity was not positive. However, labor and materials productivity were favorable. The capital investment cost (as figured by the accounting department) was so large as to make his multifactor productivity negative. Multifactor productivity has fallen by 11.61% before adjustment and by 7.87% after the adjustment for inflation.

LO 1.7: Compute multifactor productivity

AACSB: Application of knowledge

Single-Factor Productivity Analysis	**2021**		**2022**		**Adjusted Cost***	**Adjusted Total Cost**
Production (Units)	4,500		6,000			
Material Used (Barrels)	700		900			
Material Cost per Barrel	$320.00	$224,000	$360.00	$324,000	$345.60 ← (360/1.04167)	$311,040 ← (900 × 345.60)
Labor-Hours	22,000		28,000			
Compensation Rate	$20.00	$440,000	$22.00	$616,000	$21.12 ← (22/1.04167)	$591,360 ← (28,000 × $21.12)
Capital Applied ($)		$375,000		$620,000	$595,200 ← (620,000)/1.04167)	$595,200
Producer Price Index (PPI)	120		125			
*Change in PPI = 4.167% = (125/120 − 1) = 0.04167						
Total Cost		$1,039,000		$1,560,000		$1,497,600 (Adjusted)

Multifactor Productivity (MFP) Analysis	**2021**	**2022**	**% Change**	
Labor Productivity (Units per hour)	4,500/22,000 = 0.2045	6,000/28,000 = 0.2143	4.79%	Nearly reached the goal
Material Productivity (Units per barrel)	4,500/700 = 6.4286	6,000/900 = 6.6667	3.70%	Positive change
Capital Productivity (Units per $)	4,500/375,000 = 0.0120	6,000/620,000 = 0.0097	−19.17%	Large negative change

	2021	**2022**	
MFP Before Adjustment per $)	0.00508	0.00449	(0.00449 − 0.00508)/0.00508 = −11.61%
MFP After Adjustment (per $)	0.00508	0.00468	(0.00468 – 0.00508)/0.00508 = −7.88%

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CHAPTER 2

Operations Strategy in a Global Environment

DISCUSSION QUESTIONS

1. Global seems the better label for Boeing because authority and responsibility reside in the U.S.—the home country.

LO 2.5: Identify and explain four global operations strategy options

AACSB: Application of knowledge

2. Six reasons to internationalize: Reduce costs, improve supply chain, provide better goods and services, attract new markets, learn to improve operations, attract and retain global talent.

LO 2.5: Identify and explain four global operations strategy options

AACSB: Analytical thinking

3. No. Sweetness at Coca-Cola is adjusted for the tastes of individual countries.

LO 2.1: Define mission and strategy

AACSB: Application of knowledge

4. A *mission* is an organization's purpose—what good or service it will contribute to society.

LO 2.1: Define mission and strategy

AACSB: Application of knowledge

5. *Strategy* is an organization's action plan—how it is going to achieve its purpose.

LO 2.1: Define Mission and strategy

AACSB: Application of knowledge

6. A *mission* specifies where the organization is going and a *strategy* specifies how it is going to get there.

LO 2.1: Define mission and strategy

AACSB: Application of knowledge

7. The answer to this question will depend on the establishment studied, but should probably include some of the following considerations:

The mission: diagnose automobile problems and make the necessary repair at a fair price for the local customer.

Points to consider, or options, within the 10 decision areas are

Decision:	*Option*:
Product	Repair work of American and/or foreign vehicles; specialized (tune-ups, lubrication, wheel alignment, etc.) versus general repair; frame and body repair versus engine and power train repair; repair and maintenance only versus repair, maintenance, and sales of fuel; professional staffing versus rental of tools and space for do-it-yourself repair work
Quality	Appropriate level of quality; warranty; method of measuring and maintaining quality (customer complaints, inspection by supervising mechanic, etc.)
Process	Use of general versus special-purpose diagnostic and repair equipment (in particular, the degree to which computer controlled diagnostic equipment is employed)
Location	In-town, shopping mall, highway

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Layout	Single bay/multibay; general-purpose bay versus special-purpose bay (lubrication/tire repairs and installation/wheel alignment/ engine and power train repair, etc.)
Human Resources	Employment of certified versus noncertified repairpersons; employment of specialists versus general mechanics
Supply Chain	Choice of supplier(s) for both general and original manufacturer parts and supplies
Scheduling	Hours of operation (8:00 A.M.–5:00 P.M.; 24-hour towing; weekends/holidays), repairs versus motor vehicle safety inspections, etc.; service by appointment versus walk-in (or drive-up) service
Inventory	Quantity and variety of repair parts (fan belts, filters, mufflers, headlights, etc.) to stock; whether to stock generic or original manufacturer parts
Maintenance	Bays with hydraulic lifts versus easier-to-maintain "basement" work areas; preventive maintenance of equipment versus breakdown

LO 2.1: Define mission and strategy
AACSB: Application of knowledge

8. Library or Internet assignment: Student is to identify a mission and strategy for a firm. *BusinessWeek*, *Fortune*, *The Wall Street Journal*, and *Forbes* all have appropriate articles.
LO 2.1: Define mission and strategy
AACSB: Application of knowledge

9. OM strategy changes during a product's life cycle: During the introduction stage, issues such as product design and development are critical, then during the growth stage the emphasis changes to product and process reliability; from there we move to concern for increasing the stability of the manufacturing process and cost cutting; and finally, in the decline stage pruning the line to eliminate items not returning good margin becomes important. Figure 2.5 provides a more expansive list.
LO 2.1: Define mission and strategy
AACSB: Application of knowledge

10. The text focuses on three conceptual strategies—cost leadership, differentiation, and response. Cost leadership by Walmart—via low overhead, vicious cost reduction in the supply chain; differentiation, certainly any premium product—all fine dining restaurants, upscale autos—Lexus, etc.; response, your local pizza delivery service, FedEx, etc.
LO 2.2: Identify and explain three strategic approaches to competitive advantage
AACSB: Reflective thinking

11. An operations strategy statement for Southwest Airlines would include a focus on efficient, low-cost service with high capital utilization (high aircraft and gate utilization), flexible non-union empowered employees, low administrative overhead, etc. Southwest's strategy was complicated by the purchase of AirTran. First, there was a major organizational culture issue. Southwest's culture is unique. The company really does think of itself as a family, with a fun culture. AirTran's culture was different. Integrating the two cultures was a challenge. Related to this were human resources issues such as seniority, pay rate, and promotion policies, all of which were complicated by union issues. On the tangible side, Southwest's use of just Boeing 737s was complicated by AirTran's use of other types of planes. To maintain the "one plane" efficiency (pilot training maintenance, inventory, etc.), Southwest leased the planes that were not Boeing 737s to Delta. The merger can be considered a success, providing Southwest with a 20%–25% increase in capacity, 14 new domestic cities, and 7 international cities. The success speaks well of the capability of Southwest management.
LO 2.1: Define mission and strategy
AACSB: Application of knowledge

12. The integration of OM with marketing and accounting is pervasive. You might want to cite examples such as developing new products. (Marketing must help with the design, the forecast and target costs; accounting must ensure adequate cash for development and the necessary capital equipment.) Similarly, new technology or new processes emanating from operations must meet the approval of marketing and the capital constraints imposed by the accounting department.
LO 2.3: Understand the significance of key success factors and core competencies
AACSB: Analytical thinking

13. To summarize outsourcing trends:
- Not everyone who outsources is 100% satisfied, and future arrangements may be revised or insourced.
- IT will be a major expansion area, according to Gartner, Inc.
- More laws may be passed to protect U.S. jobs.

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- Foreign firms will increase their outsourcing to the U.S.
- Outsourcing will continue to grow.
- Current practices will be improved.

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Reflective thinking

14. Cost savings in recent years from outsourcing has been significant. It may be possible to reduce labor costs by as much 75%. But more realistically, this figure is in the 20%–40% range. *Overall* savings in the 10%–30% range are possible.

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Analytical thinking

15. Internal issues include the following:

- Employment—morale may drop, and employees may lose their jobs.
- Facilities—may need to be changed if components arrive in different stages of assembly.
- Logistics—now includes customs, timing, and insurance.

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Analytical thinking

16. The company should identify its own core competencies and then consider a list of candidate activities and firms for outsourcing. The factor-rating method can be used to compare various companies on a set of factors that management considers important.

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Analytical thinking

17. Bad outsourcing decisions may result in the following outcomes:

- Higher transportation cost
- Loss of control
- Future competition from the provider
- Negative impact on employees
- Quick gains at the expense of long-term objectives

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Analytical thinking

18. McDonald's fits the categorization in the text as a *multidomestic*, as opposed to *international*, *global*, or *transnational.* This is the concept of exporting the management talent and process allowing flexibility in the product itself. In the case of McDonald's, this export is operations management expertise, which it has implemented world-wide. Interestingly, McDonald's likes to call itself *multilocal.*

LO 2.5: Identify and explain four global operations strategy options

AACSB: Application of knowledge

ETHICAL DILEMMA

Here is an interesting scenario. A firm can save $10 million in production costs per year. All it has to do is locate manufacturing in Vietnam, which is not a democracy, where sustainability is not an issue, and where some employees are exploited. Nike faced a similar dilemma in Vietnam, where it was accused of paying less than a livable wage ($1.60 per day). Students may (or may not) be prepared to discuss this current and sensitive subject.

AACSB: Reflective thinking

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END-OF-CHAPTER PROBLEMS

2.1 Arrow; Bidermann International, France
Braun Household Appliances; Procter & Gamble, U.S.
Volvo Autos; Geely, China
Firestone Tires; Bridgestone, Japan
Godiva Chocolate; Campbell Soup, U.S.
Haagen-Dazs Ice Cream; great globalization discussion example: Haagen-Dazs was established in New York City; now owned by Pillsbury (U.S.A.), which is owned by General Mills (U.S.A.), but Nestlé SA (Switzerland) is licensed to sell Haagen-Dazs in the U.S.
Jaguar Autos; Tata, India
GE Appliances; Haier, China
Lamborghini; Volkswagen, Germany
Goodrich; Michelin, France
Alpo Pet Foods; Nestlé, Switzerland

2.2 The corruption perception index maintained by Transparency International (www.transparency.org) gives a 1-to-100 scale (100 being least corrupt to 1 being most corrupt). Also see Chapter 8, Table 8.2. For 2020 most corrupt: Venezuela (#176), China (#78), USA (#25), Switzerland (#3), Denmark (#1).

A lively class discussion can also take place regarding who pays bribes, as shown on the same Web site

2.3 The World Bank's "Ease of Doing Business" rankings can be found at www.doingbusiness.org/en/rankings. (Also see Table 8.1 in the text.) For 2019, easiest-to-hardest: USA #6, China #31, Switzerland #36, Mexico #60. These rankings change—and sometimes quickly—based on world events (such as China's new influence over Hong Kong).

2.4 The three methods are cost leadership, differentiation, and response. Cost leadership can be illustrated by Walmart and Dell, with low overhead and huge buying power to pressure its suppliers into concessions. Differentiation can be illustrated by almost any restaurant or restaurant chain, such as Red Lobster, which offers a distinct menu and style of service than others. Response can be illustrated by a courier service such as FedEx, that guarantees specific delivery schedules; or by a custom tailor, who will hand-make a suit specifically for the customer.

2.5 Cost leadership: institutional food services, such as Sodexho, provide meal service to college campuses and similar institutions. Such firms often get their contracts by being low bidder to provide service. Response: a catering firm (the customer picks the menu, time, and date). Differentiation: virtually all restaurants seek differentiation in menu, in taste, in service. This is particularly true of fine dining restaurants, but also true of fast food restaurants. For instance, Burger King likes to talk about meals "anyway you want them," and McDonald's has a playground or seating area for children.

2.6 (a) The maturing of a product may move the OM function to focus on more standardization, make fewer product changes, find optimum capacity, stabilize the manufacturing process, lower labor skills, use longer production runs, and institute cost cutting and design compromises.
(b) Technological innovation in the manufacturing process may mean new human resources skills (either new personnel and/or training of existing personnel), and added capital investment for new equipment or processes. Product design, layout, maintenance procedures, purchasing, inventory, quality standards, and procedures may all need to be revised.
(c) A design change will, at least potentially, require the same changes as noted in (b).

2.7 Specific answers to this question depend on the organization considered. Some general thoughts follow:

(a) For a producer with high energy costs, major oil prices change the cost structure, result in higher selling prices, and, if the company is energy inefficient compared to other producers, result in a change in competitive position. Conversely, when oil prices drop it is a bonanza for heavy fuel users such as airlines.
(b) More restrictive quality of water and air legislation increases the cost of production and may, in some cases, prohibit the use of specific technologies. The high cost of process modification to meet more rigid standards has resulted in the closing of numerous plants including paper mills and steel mills.
(c) A decrease in the number of young prospective employees entering the U.S. labor market can contribute to a tighter job market. High unemployment rates can have the opposite effect.

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(d) Inflation, especially at high or uncertain rates, makes it more difficult to predict both the cost of production and the market demand.
(e) Legislation moving health insurance from a before-tax benefit to taxable income will reduce the take-home pay of employees by the amount of the taxes. This could have a significant effect on the income of employees in the lower pay classifications, putting substantial pressure on operations managers to increase wages in these classifications. (This does not mean that it is not a good idea for society—i.e., to make employees more sensitive to the cost of health insurance.)

2.8 (a) Using the weighted model, with the four weights totaling 1.0, England has a risk of 2.3 and Canada a risk of 1.7. Now Canada is selected.

England = .1(2) + .6(3) + .2(1) + .1(1) = 2.3

Canada = .1(3) + .6(1) + .2(3) + .1(2) = 1.7

(b) When each of the weights is doubled, the selection stays the same: Canada.

2.9 With weights given, the results are

Mexico = 3.3 = [.4(1) + .2(7) + .1(3) + .1(5) + .1(4) + .1(3)]

Panama = 4.1

Costa Rica = 4.4

Peru = 4.2

Mexico is the lowest-risk country for the firm to outsource to.

2.10 (a) The results of the factor rating method are as follows:

	Overnight Shipping	Worldwide Delivery	United Freight
Weighted total	800	815	775
Weighted average	80	81.5	77.5

The best outsource provider is Worldwide Delivery.

(b) Nothing changes in the weighted averages if every one of the weights is doubled. The weighted totals will double.
(c) If the three Overnight Shipping ratings increase by 10%, to 99, 77, and 77, respectively, the new weighted average is 88, and the weighted sum is 880. So Overnight is now the preferred logistics provider.

2.11

Selection Criteria	Criterion Weight	Computations for Manila	Computations for Delhi	Computations for Moscow
1. Flexibility	0.5	$0.5 \times 5 = 2.5$	$0.5 \times 1 = 0.5$	$0.5 \times 9 = 4.5$
2. Trustworthiness	0.1	$0.1 \times 5 = 0.5$	$0.1 \times 5 = 0.5$	$0.1 \times 2 = 0.2$
3. Price	0.2	$0.2 \times 4 = 0.8$	$0.2 \times 3 = 0.6$	$0.2 \times 6 = 1.2$
4. Delivery	0.2	$0.2 \times 5 = 1.0$	$0.2 \times 6 = 1.2$	$0.2 \times 6 = 1.2$
Total score	1.0	4.8	2.8	7.1

Moscow Bell is clearly the highest rated for Walker's help desk.

2.12

Provider	Score
A	$5W + 320 = (60 + 15 + 125 + 15 + 30 + 75)$
B	$4W + 330$
C	$3W + 370$
D	$5W + 255$

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Find all w from 1 to 30 so that:

$3w + 370 \geq 5w + 320$, or $50 \geq 2w$, or $w \leq 25$

$3w + 370 \geq 4w + 330$, or $40 \geq w$, or $w \leq 40$

$3w + 370 \geq 5w + 255$, or $115 \geq 2w$, or $w \leq 57.5$

Company C is recommended for all w such that $1.0 \leq w \leq 25.0$

2.13 Global. Its level of integration goes beyond multinational. The collection of parts and subassemblies coming from other countries is carefully orchestrated. It is not transnational because its "home" is clearly the U.S., and there is little sense of "local responsiveness."

CASE STUDY

RAPID-LUBE

1. To provide economical preventative maintenance and interior auto cleaning, primarily to vehicles owned by individuals (as opposed to businesses), in the U.S.

LO 2.1: Define mission and strategy

AACSB: Reflective thinking

2. This case is a good way to get the student thinking about the 10 decisions around which the text is organized. Rapid-Lube's approach to these 10 decisions includes the following:

- *Product design:* A narrow product strategy could be defined as "lubricating automobiles" (more in Chapter 5).
- *Quality strategy:* Because of limited task variety, high repetition, good training, and good manuals, quality should be relatively easy to maintain.
- *Process strategy:* The process strategy allows employees and capital investment to focus on doing this mission well, rather than trying to be a "general-purpose" garage or gas station.
- *Location strategy:* Facilities are usually located near residential areas.
- *Layout strategy:* The three bays are designed specifically for the lubrication and vacuuming tasks to minimize wasted movement on the part of the employees and to contribute to the speedier service.
- *Supply chain management:* Purchasing is facilitated by negotiation of large purchases and custom packaging.
- *Human resources strategy:* Human resources strategy focuses on hiring a few employees with limited skills and training them in a limited number of tasks during the performance of which they can be closely supervised.
- *Inventory:* Inventory investment should be relatively low, and they should expect a high turnover.
- *Scheduling:* Scheduling is quite straightforward with similar times for most cars. Once volume and fluctuation in volume are determined, scheduling should be very direct—assisting both staffing and customer relations.
- *Maintenance:* There is relatively little equipment to be maintained, and therefore little preventive maintenance is required. With three bays and three systems, there is backup available in the case of failure.

LO 2.2: Identify and explain three strategic approaches to competitive advantage

AACSB: Reflective thinking

3. Specialization of personnel and facilities should make Rapid-Lube more efficient. Jobs/tasks accomplished per man hour would be a good place to start.

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Reflective thinking

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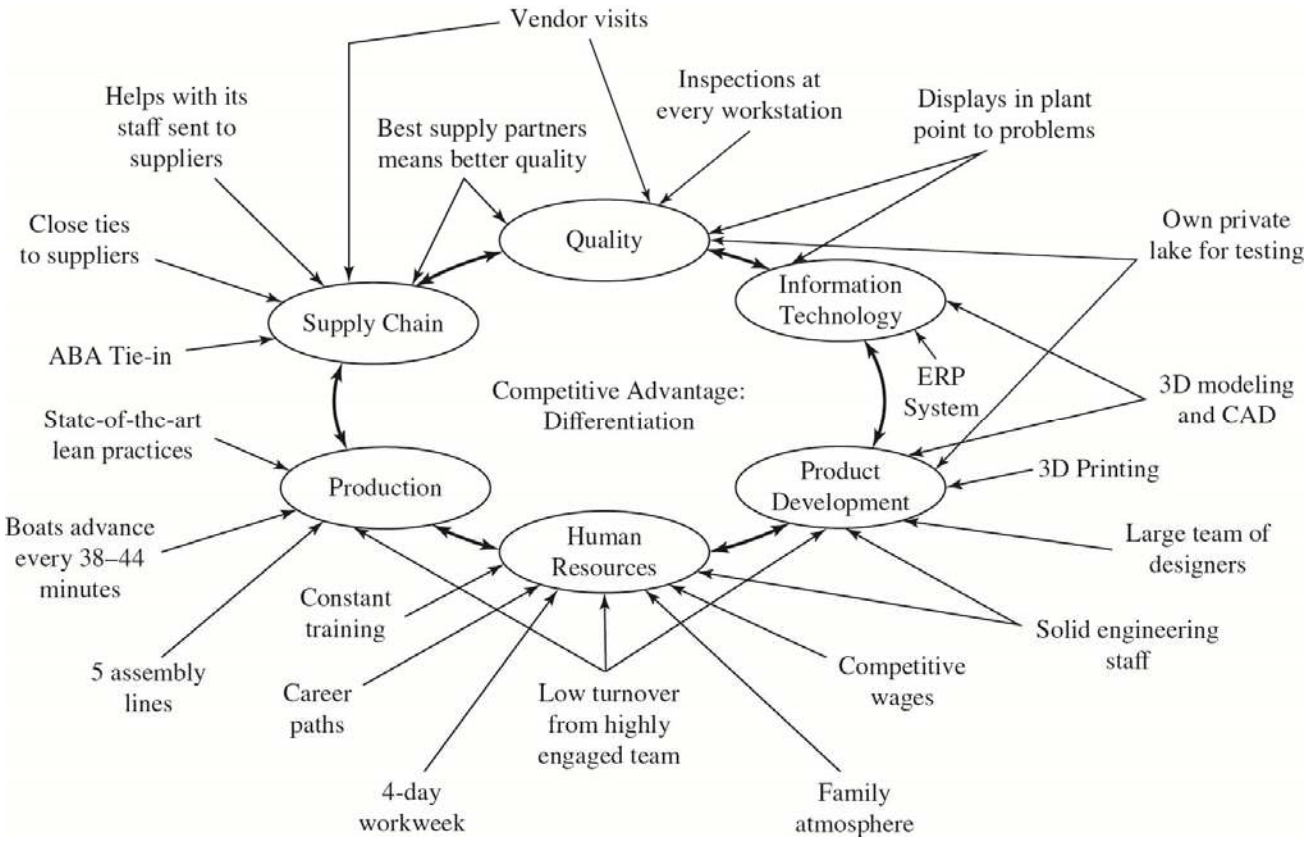
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VIDEO CASE STUDIES

1 STRATEGY AT NAUTIQUE BOAT COMPANY

There is a short video (8 minutes) available in MyLab Operations Management that is filmed specifically for this text and supplements this case.

1. See attached figure for one possible activity mapping for Nautique. Less ambitious students may simply connect the six ovals from material noted in the case.



Activity Mapping for Nautique

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Analytical thinking

2. The *strengths* of Nautique include international name recognition as a product of quality, innovation, and prestige. The firm offers a constant stream of new high-tech products from a world-class product development team. It has dedicated employees and a management team with low turnover. *Weaknesses* include limited production space and facilities for current demand. It can be difficult to maintain an effective, well-trained, and loyal workforce in a tight Florida labor market. Also, factory jobs can be exhausting (10-hour days), hot (no air conditioning), and assigned under challenging working conditions (sprayed epoxy and paint chemicals in the air). The *opportunities* for Nautique include an increase in boat sales corresponding to an affluent society across global markets. The introduction of electric boats opens new doors for eco-conscious buyers. The *threats* to Nautique include a large number of bigger players who provide lower priced products. Heavy investment in electric boats may not necessarily yield success. Overseas tariffs/political issues can have a major impact on foreign sales, which have become a bigger part of the revenue stream in recent years.

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Application of knowledge

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3. This nearly century-old company constantly innovates with upgraded products. Early products were wooden outboards, then mahogany inboards, and now fiberglass inboards—and soon electric inboards. The labor force is increasingly educated (managers with master's degrees) and now has career paths for factory workers and managers. The Ski Nautique brand was introduced in 1961, and by the 1990s the Nautique name became more well-known than "Correct Craft" (the parent company brand). Nautique started expanding from water skiing to wake-boarding in the 1990s, which became the driving force in sales in the 2010s. "Wake Surfing" is now becoming the main sales driver. The move to electric boats in the 2020s is the possible future of the company. The Nautique Regatta brings owners of boats to company sponsored events to enhance customer loyalty.

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Application of knowledge

4. The impact of electric boats is likely parallel to the impact of electric cars and trucks on the auto industry. It is a revolution, but possibly a 10-year transitionary one. Nautique is known as a tech leader in boating and strives to keep that edge. This means major changes in supply chains, away from expensive internal combustion engines to electric motors and battery suppliers.

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Application of knowledge

2 HARD ROCK CAFE'S GLOBAL STRATEGY

There is a short video (9 minutes) available in MyLab Operations Management that is filmed specifically for this text and supplements this case.

1. Identify the strategic changes that have taken place at Hard Rock Cafe. What we want to do here is help the student understand that an optimum mix of internal strengths and opportunities drives strategies in a changing environment.

- Initially, Hard Rock was a London cafe serving classic American food.
- Then it became a "theme" chain with memorabilia in tourist destinations.
- Then it added stores.
- Then it added live music and a rock concert.
- Then it became an established name and began opening hotels and casinos.
- Then it upgraded its menu.
- Then it moved into cities that are not the typical tourist destination.

LO 2.1: Define mission and strategy

AACSB: Reflective thinking

2. As these strategic changes have taken place—the 10 decisions of OM change:

- *Location:* From a London cafe, to tourist destinations, to non-tourist locations.
- *Product design:* New menu items
- *Quality:* The entire evaluation of quality and quality control got much more complex.
- *Process:* The kitchen process changed when Hard Rock went from hamburgers to lobster, and additional changes were made as the firm moved to retail merchandising.
- *Layout:* Added retail stores, added live music facilities.
- *Supply chain management:* Purchase memorabilia and lobsters—new expectations of the supply chain.
- *Inventory:* From food to clothing to memorabilia, to expanded food items in inventory—how do you keep lobsters alive and how long?
- *Human resources:* The range of talents needed keeps expanding; from cooks of classic American fare and waitstaff and bartenders, to merchandisers, to cooks for a wider more expensive menu, to coordinators and performers for the live music facilities.

The case says little about scheduling and maintenance, but every change in product (food or merchandise) and every change in equipment and processes changes scheduling and maintenance.

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Application of knowledge

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3. Hard Rock fits in the multidomestic strategy, which uses the existing domestic model globally.

LO 2.5: Identify and explain four global operations strategy options

AACSB: Reflective thinking

3 OUTSOURCING OFFSHORE AT DARDEN

There is a short video (10 minutes) available in MyLab Operations Management that is filmed specifically for this text and supplements this case. Since this case was written and filmed, Darden spun off in 2015 Red Lobster into a separate company.

1. There are numerous outsourcing opportunities available to a restaurant, including food supplies, all other supplies, janitorial, data processing, benefits, marketing, and bookkeeping. Darden outsources the seafood and produce part of its supply chain, but maintains tight quality standards "from farm to fork."

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Analytical thinking

2. When a giant like Darden procures supplies in 35 countries, it needs to have a large staff "on the ground" to arrange for training, quality control, contracts, expediting, language/cultural issues, and so on. With very tight standards, it will not use a supplier until all its expectations for reliability/quality are met. Once trained, a supplier need not be managed as closely, freeing Darden supply-chain personnel to seek out the next provider.

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Analytical thinking

3. In other industries, perhaps where 48-hour freshness is not a critical issue, supply chains may differ. Challenges come from culture, communications, distance, and documents. Companies like Walmart have used alliances. P&G reorganized along product lines instead of geography to increase coordination. Mercedes decided to build some models in the U.S. to get closer to customers.

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Application of knowledge

4. Darden outsources seafood harvesting and preparation offshore because (a) it may not legally own/control the catch in foreign waters; (b) labor intensity of food preparation means it is cheaper for that work to be done offshore; (c) bulk food purchases are capital intensive and not part of Darden's core competence. Darden has recently spun off its Red Lobster restaurants in part because of the special challenges and costs connected with this part of its business.

LO 2.3: Understand the significance of key success factors and core competencies

AACSB: Reflective thinking

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