

Chapter 2: Strategy, Productivity and History

TRUE/FALSE

1. P/OM history shows that the overall trend in global economies is to decrease productivity.

ANS: F REF: Introduction to Chapter 2

2. High productivity is not necessary but is sufficient to assure competitiveness.

ANS: F REF: 2.2

3. Strategy planning for operations is directly concerned with “Do the right thing.”

ANS: T REF: 2.2

4. Productivity is an important way of grading how well P/OM and the rest of the system are doing.

ANS: T REF: 2.3

5. Operations management views the measurement of productivity as essential for assessing the performance of an organization’s productive capacity over a specific time period and in comparison to the competition.

ANS: T REF: 2.3

6. Capital productivity is measured in dollars as the ratio obtained when the costs for all the resources used are divided into the total output of goods and services.

ANS: F REF: 2.3.2

7. After many years of declining growth rates, and even some years of negative growth, U.S. productivity has now accelerated to levels equivalent to post-World War II years.

ANS: T REF: 2.3.3

8. There have been substantial investments in computers and telecommunications within the service sectors, but there are no signs of improvement in productivity.

ANS: F REF: 2.3.3

9. Capital productivity can be measured in two different ways.

ANS: T REF: 2.3.2

10. Economists believe that productivity improvements translate into lower standards of living and greater prosperity.

ANS: F REF: 2.3.3

11. Many companies measure the productivity of their complaint departments by the ratio of the number of complaints dealt with per day divided by the number of complaint handlers.
- ANS: T REF: 2.3.4
12. The productivity of the company is the composite of the contributions of the individual productivity functions.
- ANS: T REF: 2.4
13. With respect to auto parts, “On average, the plants in Japan were 18 percent more productive than ones in the United States, and 35 percent more productive than ones in Europe.”
- ANS: T REF: 2.4.1
14. Despite other nations experiencing productivity increases, the U.S. economy shows many signs of decreased productivity while increasing the manufacturing labor force and decreasing the service sector labor force.
- ANS: F REF: 2.4.1
15. Product life is becoming longer.
- ANS: F REF: 2.4.2
16. If productivity is being measured in dollars or local currencies, exchange rate problems can distort the picture.
- ANS: T REF: 2.4.1
17. A major factor that accounts for poor productivity is bureaucracy—it can be an inhibitor of flexibility.
- ANS: T REF: 2.4.2
18. When bureaucracy gains control of an organization, it strives to remove corrective counter swings and maintain existing conditions.
- ANS: T REF: 2.4.2
19. Bureaucracy is the opponent of operational change.
- ANS: T REF: 2.4.2
20. Age is correlated with circulatory insufficiencies in human beings and a lack of communication in organizations.
- ANS: T REF: 2.4.2
21. Large, centralized organizations tend to exhibit greater flexibility and adaptability to change than new and small- and medium-sized firms.
- ANS: F REF: 2.4.3

22. Some of the largest expenditures for R&D, amounting to billions of dollars, have been highly unproductive.
- ANS: T REF: Open to discussion
23. Speeding up production will never compromise quality.
- ANS: F REF: 2.4.4
24. Decreasing quality to match lower prices is not a way to keep customers.
- ANS: T REF: 2.4.4
25. Improved productivity, if it is to translate into greater customer satisfaction and loyalty, must come from working harder, not smarter.
- ANS: F REF: 2.3.3
26. A product with high elasticity experiences large decreases in demand when there are price increases.
- ANS: T REF: 2.4.4
27. Elasticity is a complex relationship. There can be kinks in the curve.
- ANS: T REF: 2.4.4
28. It is not necessary to establish how much extra money customers would be willing to pay for superior quality of an added quality feature.
- ANS: F REF: 2.4.5
29. The achievement of quality standards is an indirect responsibility of P/OM.
- ANS: F REF: 2.4.5
30. Variable costs per unit tend to decrease as volume increases.
- ANS: T REF: 2.4.6
31. To make division of labor worthwhile, the volume of production must be sufficient.
- ANS: T REF: 2.4.6
32. The stages of history have moved production and operations capabilities from low-volume custom work through high-volume rapid and continuous output systems.
- ANS: T REF: 2.5
33. Called the father of “scientific management,” Shewhart was one of the key progenitors of industrial engineering (IE).

ANS: F REF: Figure 2.1

34. Ford's contribution to production theory and to the revision of the transformation process had a major impact on the Japanese automobile industry.

ANS: T REF: 2.5.4

35. During the 1970s, Japanese organizations, spearheaded by Toyota, developed a new kind of production methodology called lean production systems. Many global companies continue to refine and apply these methods.

ANS: T REF: 2.5.6

36. It is conjectured that in the future the transformation process will continue decreasing in complexity and productivity.

ANS: F REF: 2.5.8

37. Productivity gets good grades when a low rate of output is obtained at a low cost.

ANS: F REF: 2.1

38. Everyone has the ability to increase or decrease the organization's productivity.

ANS: T REF: 2.1

39. Lower discounts that arise because of smaller purchase volumes, decrease variable costs per unit.

ANS: F REF: 2.4.6

40. Adaptability is critical when product or design technology or style remains constant.

ANS: F REF: 2.2

41. A highly productive manufacturer of buggy whips in 1926 would be no better off today than an inefficient or lackadaisical one.

ANS: T REF: 2.2

42. Another way of stating the measure of productivity is to put a dollar value on the output volume per unit of time.

ANS: T REF: 2.3.1

43. U.S. productivity averaged just slightly over two percent from 1948 through 1973 followed by a shrinking era which lasted until 1995.

ANS: T REF: Table 2.3.3

44. Productivity measures are excluded from inflation calculations.

ANS: F REF: 2.3.3

45. Operational measures of productivity are valuable to companies that are focused on continuous improvement.

ANS: T REF: 2.3.4

46. Formulating appropriate productivity measures to capture the effectiveness of operations is always a P/OM benchmarking challenge.

ANS: T REF: 2.3.4

47. Every function in the company that has some measurable accomplishment can be evaluated with respect to productivity.

ANS: T REF: 2.4

48. Output delivered to the customer is a measure of the ability of the distribution system to be on-time with undamaged deliveries.

ANS: T REF: 2.4

49. Although much knowledge exists about production systems and operations management, there have been and continue to be serious productivity problems in the world.

ANS: T REF: 2.4.1

50. Japan's phenomenal productivity growth rates of the 1980s were easily maintained.

ANS: F REF: 2.4.1

51. Increasingly, companies buy from suppliers located around the world and sell in markets that are equally dispersed.

ANS: T REF: 2.4.1

52. The number of bureaucratic systems is decreasing worldwide.

ANS: F REF: 2.4.2

53. Bureaucracy plays an important stabilizing role in organizations that are undisciplined and prone to accidents.

ANS: T REF: 2.4.2

54. Bureaucratic organizations are very successful at fostering innovation and change.

ANS: F REF: 24.2

55. The employees of a small start-up company are typically involved in constant communication.

ANS: T REF: Open to discussion

56. Asking for increased productivity is another way to ask for lower costs. This is not equivalent to asking for labor cuts.

ANS: T REF: 2.4.4

57. Speeding up production cannot compromise quality.

ANS: F REF: 2.5.6

58. Elasticity can be expressed as a function (f) that relates changes in demand volume (V_p) to changes in price (p), for example: $V_p = f(p)$.

ANS: T REF: Open to discussion

59. For strategic planning it is vital that marketing determine how quality levels of the product line affect competitive status.

ANS: T REF: 2.4.5

60. Technology allows employees to work virtually anywhere on many subjects without geographical restrictions.

ANS: T REF: Open to discussion

MULTIPLE CHOICE

1. P/OM strategic thinking is used to help find the best product line for the marketplace and then to make these products at the ____.
- a. lowest cost.
 - b. highest quality.
 - c. maximum productivity level.
 - d. all of the above

ANS: D REF: 2.2

2. ____ productivity is where the effects of labor and capital are combined and divided into the output.
- a. Labor
 - b. Multifactor
 - c. Total
 - d. both b and c

ANS: D REF: 2.3.3

3. When outputs are ____ and inputs are ____, the system is said to be efficient and productive.
- a. high; low
 - b. low; high
 - c. slow; fast
 - d. fast; slow

ANS: A REF: 2.3

4. Productivity is ____ and equals a measure of production efficiency.
- a. outputs divided by inputs
 - b. outputs added to inputs
 - c. inputs divided by outputs
 - d. inputs minus outputs

ANS: A REF: 2.3

5. Productivity is measured by high customer sales volume divided by low producer expenses or
- a. effectiveness divided by efficiency.

- b. efficiency divided by effectiveness.
- c. dollars divided by hour.
- d. none of the above

ANS: A

REF: 2.3, Equation 2.2

6. Productivity could be measured as units of output per dollar of labor input (in a period of time). This is defined as
- a. productivity.
 - b. capital productivity.
 - c. single productivity.
 - d. labor productivity.

ANS: D

REF: 2.3.1

7. Measured by the U.S. Labor Department, _____ productivity reflects the joint effects of many factors including labor and capital.
- a. multifactor
 - b. labor
 - c. capital
 - d. both a and b

ANS: A

REF: 2.3.3

8. The annual average percentage change in multifactor productivity from 1995–2000 was _____.
- a. 2.2
 - b. 0.5
 - c. 1.3
 - d. 1.7

ANS: C

REF: Table 2.1

9. Capital productivity can be measured by
- a. units of output divided by dollars of capital.
 - b. sales in dollars divided by dollars of labor.
 - c. both a and b
 - d. neither a nor b

ANS: A

REF: 2.3.2

10. _____ productivity compares the performance of competitive processes for which P/OM is accountable.
- a. Multifactor
 - b. Capital
 - c. Relative
 - d. Labor

ANS: C

REF: 2.3.3

11. Productivity measures can be common-sense ratios such as
- a. the value of pieces made in a factory divided by the cost of making them.
 - b. the number of documents produced by the typing pool divided by the number of people doing word processing.
 - c. sales dollars per square foot of space.
 - d. all of the above

ANS: D

REF: 2.3.4

12. The supplier-producer-customer value chain, by definition adds value at every step, which illustrates strategic impact operating on a _____ scale.
- a. local
 - b. organizational
 - c. global
 - d. centralized

ANS: C REF: 2.4

13. Productivity improvements can be registered by companies that
- reduce the number of direct employees.
 - increase the use of part-time help.
 - rely more on subcontracting of parts.
 - all of the above

ANS: D REF: 2.4.1

14. Small- and medium-sized firms are organizations with about _____ people.
- 300
 - 600
 - 700
 - 900

ANS: A REF: 2.4.3

15. A sensible limit for the size of an efficient production system is in the neighborhood of _____ to _____ people.
- 100; 200
 - 300; 500
 - 600; 900
 - 1000; 2000

ANS: A REF: 2.4.3

16. Poor R&D productivity yields
- inferior processes.
 - difficult operations and low profit margins.
 - poor quality and high costs.
 - all of the above

ANS: D REF: Open for discussion

17. _____ is the rate-of-change measure that expresses the degree to which demand grows or shrinks in response to a price change.
- Perfect elasticity
 - Elasticity
 - Perfect inelasticity
 - none of the above

ANS: B REF: 2.4.4

18. _____ is when demand does not change—no matter what the price. This is an accurate description of the situation when an industrial customer is dependent on one supplier for critical, special materials.
- Perfect elasticity
 - Elasticity
 - Perfect inelasticity
 - Inelasticity

ANS: C REF: 2.4.4

19. The elasticity-productivity tie between operations management and marketing is best described by the following:
- marketing tries to control demand volume through pricing.
 - to be competitive it is necessary to find ways to match price decreases offered by competitors.
 - demand volume falls as price rises, but is also relative to what prices competitors charge.
 - all of the above

ANS: D REF: 2.4.4 (item 1 – 7)

20. Customers in the marketplace take _____ into account.
- price
 - quality
 - price and quality
 - none of the above
- ANS: C REF: 2.4.5
21. Market research enables P/OM to determine the kinds of connections that link _____ in the customer's mind.
- quality and price
 - price and elasticity of demand
 - quality and elasticity of demand
 - none of the above
- ANS: A REF: 2.4.5
22. There are three principles that P/OM must be schooled in to take advantage of productive opportunities. They are economies of scale, the division of labor, and _____.
- productivity.
 - economies of scope.
 - volume.
 - variable costs.
- ANS: B REF: Open for discussion: Google "Economies of Scope"
23. _____ are reductions in variable costs directly related to increasing volume of production output.
- Division of labor
 - Economies of scope
 - Economies of scale
 - Total variable costs
- ANS: C REF: 2.4.6
24. The theory of production consists of _____ established steps and a potential _____ one.
- four; fifth
 - six; seventh
 - seven; eighth
 - two; third
- ANS: B REF: 2.5
25. A **first** major step in the history of P/OM development was
- scientific management.
 - lean production systems.
 - interchangeable parts.
 - global competition.
- ANS: C REF: Figure 2.1
26. In the beginning of P/OM's development, production transformations were by hand and _____ were very small.
- input volumes
 - periods of time
 - output volumes
 - both a and b
- ANS: C REF: 2.5.1
27. _____ is software that communicates product specifications to the CAM software, which translates the specs into instructions for the production system.
- Interchangeable parts
 - Computer-aided design
 - Computer-aided manufacturing
 - Design tolerances
- ANS: B REF: 2.5.7
28. The reason that parts are interchangeable is that each one falls within the _____.
- design tolerances
 - design concept
 - price specifications of the buyer
 - manufacturing mandate

ANS: A REF: 2.5.2

29. _____ introduced scientific management, the numerical measurement and analysis of the way work should be done.
- a. Henry Ford
 - b. Frederick Winslow Taylor
 - c. Adam Smith
 - d. The Japanese

ANS: B REF: 2.5.3

30. The important step in _____ added the idea that the transformation processes could be improved by studying and simplifying operations.
- a. lean production
 - b. production theory
 - c. The science of management
 - d. control theory

ANS: B REF: 2.5.3

31. In 1912, _____ developed sequenced assembly, which allows assembly to be a continuous flow shop process.
- a. Adam Smith
 - b. Henry Ford
 - c. Frederick W. Taylor
 - d. Walter Shewhart

ANS: B REF: 2.5.4

32. By means of _____ Ford altered the production transformation process.
- a. principles of interchangeability
 - b. division of labor
 - c. flow synchronization
 - d. all of the above

ANS: D REF: 2.5.4

33. Shewhart developed the theory of _____ that enabled manufacturing to design and control process that could achieve controlled objectives.
- a. lean production systems
 - b. sequenced assembly
 - c. statistical quality control
 - d. scientific management

ANS: C REF: 2.5.5

34. _____ is designed to produce a high variety of outputs at low cost.
- a. Scientific management
 - b. Sequenced assembly
 - c. Statistical quality control
 - d. A flexible manufacturing system

ANS: D REF: 2.5.7

35. Which of the following are the critical components of the strategic imperatives for P/OM?
- a. product
 - b. processes
 - c. products and processes
 - d. neither products nor processes

ANS: C REF: 2.2 - Strategic Thinking

36. Capital Productivity
- a. is the number of units of output per dollar of invested capital.
 - b. is a pure ratio based on dollars of output per dollar of invested capital.
 - c. is a partial accounting for productivity due to invested capital.
 - d. all of the above

ANS: D REF: 2.3.2

37. Bureaucracy is
a. a protector of the status quo. c. usually hierarchical.
b. opposed to change. d. all of the above
ANS: D REF: 2.4.2
38. Small and medium sized firms should not exceed an upper limit of
a. 500 people. c. 1,000 people.
b. 600 people. d. 300 people.
ANS: A REF: 2.4.3
39. Competitors keep jockeying and leapfrogging each other with the adoption of _____ technologies that _____ reduce productivity. There are various explanations for this effect.
a. new; initially c. new; always
b. new; never d. new; seldom
ANS: A REF: 2.4.1
40. Often _____ technology is imposed on _____ processes by employees who lack training and experience with the new technology. Product life is short. This allows little time to enjoy the advantages of new technology applied to evanescent and even obsolescent product lines.
a. new; old c. old; old
b. new; new d. old; new
ANS: A REF: 2.4.1

SHORT ANSWER

1. Define and discuss productivity.

ANS:

Productivity is defined as “an overall measure of the ability to produce a good or a service.” It is the actual output of production compared to the actual input of resources. It is also a relative measure across time or against common entities.

REF: 2.3

2. Define and discuss multifactor productivity.

ANS:

Multifactor productivity is also called total productivity. A change in multifactor productivity reflects the difference between the change in output (the production of goods and services) and the change in labor and capital inputs engaged in the production of the output. It measures the joint effects of many factors, including new technology, economies of scale, managerial skills, and change in the organization of production. It is measured in dollars as the ratio obtained when the costs for all the resources used are divided into the total output of goods and services.

REF: 2.3.3

3. How can you register (or show) productivity improvements without actually achieving the growth through internal improvements.

ANS:

Productivity improvements can be registered by companies that reduce the number of direct employees, increase the use of part-time help, rely more on subcontracting of parts, and employ outside maintenance companies, among other things.

REF: 2.4.1

4. Discuss some of the various hypothesis proposed to explain the inability to sustain stable productivity growth in a turbulent era of new technological developments by nations.

ANS:

Leading industrial nations have experienced productivity declines. One suggestion is that the productivity of industrial nations is converging to a global mean. Another is that old technology gets used up, and it is difficult to switch to the new technologies and make them profitable. It also takes continuous learning on the part of an ever-smarter management.

REF: 2.4.1

5. How is flexibility related to productivity?

ANS:

Flexibility is related to productivity in a number of ways. Conditions change and the ability to adapt to new situations is measured by flexibility. New technology and the need to be global are among the most important changes in conditions that require flexibility. Product life is shorter and the need to modify product designs and their processes requires flexibility.

REF: 2.4.2

6. How can bureaucracy be seen as a stabilizing force in organizations?

ANS:

In organizations that are undisciplined and prone to accidents, bureaucracy plays a stabilizing role. Routines known to be safe are insurance against risk of catastrophic damage. The down side of bureaucracy is that the pendulum swings too far. Once bureaucracy gains control, it strives to remove corrective counter swings, and that impedes the “give and take” in favor of rigidity.

REF: 2.4.2

7. Discuss the elasticity-productivity tie between operations management and marketing.

ANS:

Marketing tries to control demand volume through pricing while P/OM tries to match supply to demand through production schedule and capacity planning. Marketing and P/OM should work together, combining their interactions by using the systems approach. Production is asked to find a way to decrease total variable cost without harming quality. If marketing lowers the price, profit margins will decrease. But to be competitive, it is often necessary to match price decreases offered by competitors. When a competitor lowers price, it is in effect, a price increase for the customer who stays with a supplying company which does not lower price.

REF: 2.4.4

8. Discuss P/OM prior to the Industrial Revolution.

ANS:

Before the Industrial Revolution began (around 1770), craft guilds emphasized pride of workmanship and training for basic manual operations with appropriate hand tools. Parents passed on their knowledge to their children and process techniques were manual skills handed down from generation to generation. The work produced was one-of-a-kind and typically had higher quality and required higher skill levels. Apprenticeships and on-the-job training were the norm.

REF: 2.5.1

9. Discuss the importance of interchangeable parts for P/OM.

ANS:

The concept of interchangeable parts is said to have started the Industrial Revolution. This was the catalyst around which new methods for production transformation began to develop. Interchangeable parts allow batches of parts to be made, any one of which will fit into the assembled product. No longer do parts have to be made by hand, one-at-a-time. This marked the end of the craft or guild era and moved society into mass production of parts.

REF: 2.5.2

10. What is lean production? Who is credited with its invention?

ANS:

During the 1970s-1990s, Japanese organizations spearheaded by Toyota, developed lean production systems. These systems combine a deep understanding of quality with a desire to be fast (if not the fastest) and a fanatical distaste for all kinds of waste. Under lean, time wasted is singled out. Every effort was made to use pre-engineering of production systems and process design to maximize quality achievements, minimize variability, and do it all as rapidly as possible. Lean producers exhibit high-output volume targets, minimum cycle times, and rapid new product development.

REF: 2.5.6

PROBLEM

1. Calculate daily labor productivity for a local bakery if 300 loaves of bread are baked per day. There are three employees working eight hours per day at a pay rate of \$8 per hour.

ANS:

Productivity (t) = units of output (t)/dollars of labor (t)

Thus: daily 300 units of output/(3 employees \times 8 hours/day (each) \times \$8 per hour) =
Daily 300 units/\$192 = 1.5625 loaves per labor dollar per day

REF: Equation 2.4

2. Calculate the change in labor productivity if the bakery increased production from 300 loaves to 380 loaves on Friday. On all days, three employees work eight hours at a rate of \$8 per hour each. How can this be explained?

ANS:

Productivity (t) = units of output (t)/dollars of labor (t)

Productivity on Thursday

$300 \text{ units of output} / (3 \text{ employees} \times 8 \text{ hours each} \times \$8 \text{ per hour}) =$
 $300 / \$192 = 1.5625 \text{ loaves per labor dollar per day}$

Friday

$380 \text{ units of output} / (3 \text{ employees} \times 8 \text{ hours each} \times \$8 \text{ per hour}) =$
 $380 / \$192 = 1.9792 \text{ loaves per labor dollar per day}$

$1.9792 - 1.5625 / (1.5625) = \text{an increase of } 26.67 \text{ percent over the previous day.}$

Explanation: The three workers may not be working at full capacity or they can speed up for short times with a possible loss of quality. Note: each employee produces 100 loaves on a regular day. That is 12.5 loaves per hour. So, 6.4 additional hours of work would be required to produce 80 more loaves. If each worker spent 2.1333 additional hours on Friday, the productivity equation would be:
 $(380 \text{ loaves}) / (3 \text{ employees} \times 10.1333 \text{ hours each} \times \$8 \text{ per hour}) = 1.5625$ which is the productivity rate on regular days. There is no surprise in that result but it is necessary to use the full fraction of 10.1333

REF: Equation 2.4

3. Mr. Tubbs wants to determine the capital productivity of his manufacturing firm. He produced 750,000 units last year and had \$500,000 invested in plant and equipment.

ANS:

Capital productivity (t) = output in units (t)/dollars of capital (t)

$750,000 / 500,000 = 1.5$ is the productivity of Mr. Tubbs' capital.

Equation 2.6

4. Ms. Compton's manufacturing plant wants to examine its productivity for last year in several ways. The cost for all product outputs was \$325,000. Total inputs for resources expended were \$199,000. Compton manufactured a total of 500,000 products and invested capital of \$150,000. What is the firm's multifactor productivity? What is the firm's capital productivity?

ANS:

Multifactor productivity is (total outputs of goods and services)/(total input resources expended) so:
 $325,000 / 199,000 = 1.633$ is Ms. Compton's total productivity

Capital productivity is (units of output)/(dollars of capital) so
 $500,000 / 150,000 = 3.333$ is Ms. Compton's capital productivity.

REF: Equations 2.7 and 2.8

5. Bruce Whitten's company manufactures Bruce's Delight Catfood. His small company grossed \$35,000 (for the year) on its exclusive line of cat food.

Labor cost of manufacture for all three gravy variety flavors was \$16,350 for the year, using part-time employees only. What was BW's labor productivity for the year?

ANS:

Labor productivity is output/input or sales in dollars/dollars of labor or $\$35,000/\$16,350 = 2.14$. This is an index of labor productivity since all \$/yr. dimensions cancel out.

REF: Equation 2.5

6. Determine daily labor productivity for Iris's Cupcake Shoppe which turns out 400 assorted cupcakes per day using two bakers who work eight hours per day at \$12 per hour.

ANS:

Productivity (t) = units of output (t)/dollars of labor (t)

Thus: (400 units of output per day)/(2 bakers \times 8 hours per day \times \$12 per hour) =
Per diem (400 units)/\$192 = 2.083 cupcakes per dollar per day

REF: Equation 2.4

7. Calculate the change in labor productivity if the bakery increased production from 400 cupcakes to 450 cupcakes on the weekend. On weekdays, two bakers work eight hours per day at a rate of \$12 per hour each. On weekends, two bakers work ten hours per day at a rate of \$14 per hour. Discuss these results.

ANS:

Productivity (t) = units of output (t)/dollars of labor (t)

Productivity on weekdays

(400 units of output)/(2 employees \times 8 hours each \times \$12 per hour) =
400/\$192 = 2.083 cupcakes per dollar per day

Productivity on weekends

(450 units of output)/(2 employees \times 10 hours each \times \$14 per hour) =
450/\$280 = 1.607 cupcakes per dollar per day

This represents $2.083 - 1.607/(1.607)$ = a decrease of 29.62 percent for weekend productivity as compared to weekday productivity. Does this make sense?

Answer: It does not make sense in the long term. However, the probable reason is to meet demand and not run out of cupcakes for parties and special catering while building the business. The \$14 per hour penalty for asking bakers to work overtime on the weekend may be negotiable later on. Also, it is evident that the bakers are not working at their full capacities on the weekends. If the goal was 500 cupcakes instead of 450 on the weekend, and the \$12 rate could be maintained with part time bakers doing the extra work, then, productivity would return to 2.083.

REF: Equation 2.4