

MyOMLab

Main Heading	Review Material	MyOMLab
LEAN OPERATIONS (pp. 638–640)	<ul style="list-style-type: none"> ■ Lean operations—Eliminates waste through continuous improvement and focus on exactly what the customer wants. ■ Just-in-time (JIT)—Continuous and forced problem solving via a focus on throughput and reduced inventory. ■ Toyota Production System (TPS)—Focus on continuous improvement, respect for people, and standard work practices. <p><i>When implemented as a comprehensive manufacturing strategy, Lean, JIT, and TPS systems sustain competitive advantage and result in increased overall returns.</i></p> <ul style="list-style-type: none"> ■ Seven wastes—Overproduction, queues, transportation, inventory, motion, overprocessing, and defective product. ■ 5Ss—A Lean production checklist: sort, simplify, shine, standardize, and sustain. U.S. managers often add two additional Ss to the 5 original ones: <i>safety</i> and <i>support/maintenance</i>. ■ Variability—Any deviation from the optimum process that delivers perfect product on time, every time. <p>Both JIT and inventory reduction are effective tools for identifying causes of variability.</p> <ul style="list-style-type: none"> ■ Throughput—The rate at which units move through a process. ■ Manufacturing cycle time—The time between the arrival of raw materials and the shipping of finished products. ■ Pull system—A concept that results in material being produced only when requested and moved to where it is needed just as it is needed. <p>Pull systems use signals to request production and delivery from supplying stations to stations that have production capacity available.</p>	<p>Concept Questions: 1.1–1.4</p>
LEAN AND JUST-IN-TIME (pp. 640–649)	<ul style="list-style-type: none"> ■ Supplier partnerships—Suppliers and purchasers work together to remove waste and drive down costs for mutual benefit. <p>Some specific goals of supplier partnerships are <i>removal of unnecessary activities, removal of in-plant inventory, removal of in-transit inventory, and obtain improved quality and reliability</i>.</p> <ul style="list-style-type: none"> ■ Consignment inventory—An arrangement in which the supplier maintains title to the inventory until it is used. <p>Concerns of suppliers in supplier partnerships include (1) <i>diversification</i>, (2) <i>scheduling</i>, (3) <i>lead time</i>, (4) <i>quality</i>, and (5) <i>lot sizes</i>.</p> <p><i>Lean layout tactics</i> include building work cells for families of products, including a large number of operations in a small area, minimizing distance, designing little space for inventory, improving employee communication, using poka-yoke devices, building flexible or movable equipment, and cross-training workers to add flexibility.</p> <ul style="list-style-type: none"> ■ Lean inventory—The minimum inventory necessary to keep a perfect system running. <p>The idea behind JIT is to eliminate inventory that hides variability in the production system. <i>Lean inventory tactics</i> include using a pull system to move inventory, reducing lot size, developing just-in-time delivery systems with suppliers, delivering directly to the point of use, performing to schedule, reducing setup time, and using group technology.</p> $Q_p^* = \sqrt{\frac{2DS}{H[1 - (d/p)]}} \quad (16-1)$ <p>Using Equation (16-1), for a given desired lot size, Q, we can solve for the optimal setup cost, S:</p> $S = \frac{(Q^2)(H)(1 - d/p)}{2D} \quad (16-2)$ <p><i>Lean scheduling tactics</i> include communicate schedules to suppliers, make level schedules, freeze part of the schedule, perform to schedule, seek one-piece-make and one-piece-move, eliminate waste, produce in small lots, use kanbans, and make each operation produce a perfect part.</p> <ul style="list-style-type: none"> ■ Level schedules—Scheduling products so that each day's production meets the demand for that day. ■ Kanban—The Japanese word for <i>card</i>, which has come to mean “signal”; a kanban system moves parts through production via a “pull” from a signal. $\text{Number of kanbans (containers)} = \frac{\text{Demand during lead time} + \text{Safety stock}}{\text{Size of container}} \quad (16-3)$ <p><i>Lean quality</i>—whereas inventory <i>hides</i> bad quality, Lean immediately <i>exposes</i> it.</p> <p>Lean quality tactics include using statistical process control, empowering employees, building fail-safe methods (poka-yoke, checklists, etc.), exposing poor quality with small lots, and providing immediate feedback.</p>	<p>Concept Questions: 2.1–2.4</p> <p>Problems: 16.1–16.3</p> <p>Problems: 16.4–16.9, 16.11, 16.12</p> <p>Virtual Office Hours for Solved Problem: 16.1</p>

Chapter 16 **Rapid Review** continued

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LEAN AND THE TOYOTA PRODUCTION SYSTEM (pp. 649–650)	<ul style="list-style-type: none"> ■ Kaizen—A focus on continuous improvement. ■ Kaizen event—Members of a work cell or team meet to develop improvements in the process. <p>Toyota recruits, trains, and treats people as knowledge workers. They are empowered. TPS employs aggressive cross-training and few job classifications.</p>	Concept Questions: 3.1–3.4
LEAN ORGANIZATIONS (pp. 650–652)	<p>Lean operations tend to share the following attributes: <i>respect and develop employees</i> by improving job design, providing constant training, instilling commitment, and building teamwork; <i>empower employees</i> by pushing responsibility to the lowest level possible; <i>develop worker flexibility</i> through cross-training and reducing job classifications; <i>build processes</i> that destroy variability; <i>develop collaborative partnerships with suppliers</i> to help them accept responsibility for satisfying end customer needs; and <i>eliminate waste by performing only value-added activities</i>.</p> <ul style="list-style-type: none"> ■ Gemba or Gemba walk—Going to where the work is actually performed. 	Concept Questions: 4.1–4.4 VIDEO 16.1 Lean Operations at Alaska Airlines
LEAN IN SERVICES (p. 652)	<p>The features of Lean operations apply to services just as they do in other sectors. Forecasts in services may be very elaborate, with seasonal, daily, hourly, or even shorter components.</p>	Concept Questions: 5.1–5.4 VIDEO 16.2 JIT at Arnold Palmer Hospital

Self Test

■ **Before taking the self-test**, refer to the learning objectives listed at the beginning of the chapter and the key terms listed at the end of the chapter.

LO 16.1 Match Lean Operations, JIT, and TPS with the concepts shown below:

- Continuous improvement and a focus on exactly what the customer wants, and when.
- Supply the customer with exactly what the customer wants when the customer wants it, without waste, through continuous improvement.
- Emphasis on continuous improvement, respect for people, and standard work practices.

LO 16.2 Define the seven wastes and the 5Ss. The seven wastes are _____, _____, _____, _____, _____, _____, and _____, and the 5Ss are _____, _____, _____, _____, and _____.

LO 16.3 Concerns of suppliers when moving to Supplier Partnerships include:

- small lots sometimes seeming economically prohibitive.
- realistic quality demands.
- changes without adequate lead time.
- erratic schedules.
- all of the above.

LO 16.4 What is the formula for optimal setup time?

- $\sqrt{2DQ/[H(1 - d/p)]}$
- $\sqrt{Q^2H(1 - d/p)/(2D)}$
- $QH(1 - d/p)/(2D)$
- $Q^2H(1 - d/p)/(2D)$
- $H(1 - d/p)$

LO 16.5 Kanban is the Japanese word for:

- car.
- pull.
- card.
- continuous improvement.
- level schedule.

LO 16.6 The required number of kanbans equals:

- 1.
- Demand during lead time / Q
- Size of container.
- Demand during lead time.
- Demand during lead time + Safety stock / Size of container

LO 16.7 The six attributes of Lean organizations are: _____, _____, _____, _____, _____, and _____.

LO 16.8 Lean applies to services:

- only in rare instances.
- except in terms of the supply chain.
- except in terms of employee issues.
- except in terms of both supply chain issues and employee issues.
- just as it applies to manufacturing.

Answers: LO 16.1. Lean = a, JIT = b, TPS = c; LO 16.2. overproduction, queues, transportation, inventory, motion, overprocessing, defective product; sort, simplify, shine, standardize, sustain; LO 16.3. e; LO 16.4. d; LO 16.5. c; LO 16.6. e; LO 16.7. respect and develop people, empower employees, develop worker flexibility, build excellent processes, develop collaborative partnerships with suppliers, eliminate waste; LO 16.8. e.