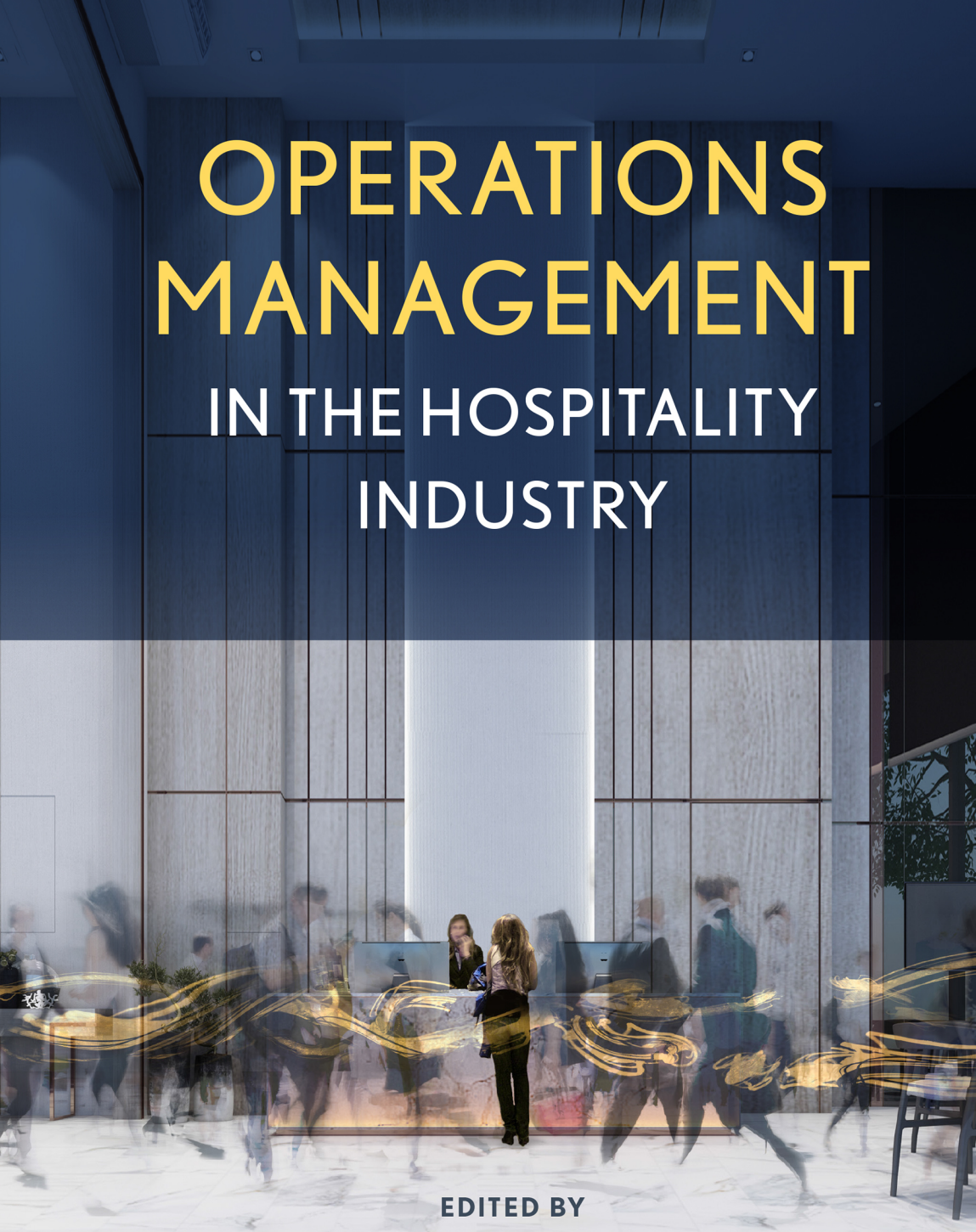
OPERATIONS MANAGEMENT

IN THE HOSPITALITY INDUSTRY



EDITED BY

Peter Szende

Alec N. Dalton

Michelle (Myongjee) Yoo

Operations Management in the Hospitality Industry

This page intentionally left blank

Operations Management in the Hospitality Industry

EDITED BY

PETER SZENDE
Oxford Brookes University, UK

ALEC N. DALTON
Hospitality Leadership Academy, USA

And

MICHELLE (MYONGJEE) YOO
California State Polytechnic University Pomona, USA

United Kingdom – North America – Japan – India – Malaysia – China

Emerald Publishing Limited
Howard House, Wagon Lane, Bingley BD16 1WA, UK

First edition 2021

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-1-83867-542-4 (Print)
ISBN: 978-1-83867-541-7 (Online)
ISBN: 978-1-83867-543-1 (Epub)

ISOQAR certified Management System, awarded to Emerald for adherence to Environmental standard ISO 14001:2004.

Certificate Number 1985
ISO 14001

INVESTOR IN PEOPLE

Contents

This page intentionally left blank

List of Tables and Figures

Chapter 1. Understanding Service Operations Strategy

Chapter 2. Designing Service Experiences

Chapter 3. Designing Service Environments

Chapter 4. Forecasting Demand

Chapter 5. Inventory Control

Chapter 6. Managing Supply Chains

Chapter 7. Organizing Staff

Chapter 8. Managing Capacity and Waits

Chapter 9. Measuring Quality

Chapter 10. Improving Effectiveness and Efficiency

About the Editors

Dr. Peter Szende has over 25 years of management experience in the hospitality industry. His European experience includes a variety of organizations such as Mövenpick, Hilton International, the InterContinental Group, and an independent Château hotel. For more than eight years, he was employed by Four Seasons Hotels & Resorts in North America.

He is currently a Programme Lead in Hospitality Management at Oxford Brookes Business School. He was formerly a Professor of the Practice in the School of Hospitality Administration at Boston University, where he also served as the Associate Dean for Academic Affairs. He has been awarded a Fulbright Scholar grant in 2014.

Alec N. Dalton, CRDE, CHIA, inspires operational excellence through service science. After operating five luxury hotels with companies including The Ritz-Carlton Hotel Company and Walt Disney Parks & Resorts, he now leads quality management programs for Marriott International's global portfolio of nearly 7,500 hotels. He is also Co-Founder and Principal of the Hospitality Leadership Academy, a consultancy offering service-oriented management consulting. In addition to this textbook, he co-authored the first two international best sellers in the series *Customer Experience*. In 2018, *Hotel Management Magazine* named him to the "30 Under 30" list of rising hospitality executives. He graduated from Boston University with dual bachelor's degrees from the Questrom School of Business and the School of Hospitality Administration.

Michelle (Myongjee) Yoo, PhD, is an Associate Professor at The Collins College of Hospitality Management in California State Polytechnic University Pomona (Cal Poly Pomona). Her area of specialty is Hospitality Marketing and teaches Hospitality Marketing Management, Hotel/Resorts Sales, Advertising, and Promotions, Social Media Marketing, and Revenue Management. Prior to her academic career, she worked in various marketing departments, such as Strategic Marketing, Direct Marketing, Database Marketing, and Loyalty Marketing as a marketing analyst at companies including The Ritz Carlton and The Venetian Resort Las Vegas. She received her PhD, MSc of Hospitality Management from UNLV.

This page intentionally left blank

About the Authors

Paul J. Bagdan, PhD, is a Full Professor at the College of Hospitality Management at Johnson & Wales University in Providence, RI. He has taught both undergraduate and graduate courses in strategy, operations, guest service, technology, and contemporary issues for over 20 years. He also teaches courses in the College of Business and in the College of Online Education, where he combines hospitality industry experience with higher education, research, and publication. He has authored numerous chapters, texts, and articles in the areas of hospitality management. He also consults and presents on these topics nationally and internationally.

Suzanne Markham Bagnera, PhD, is a Clinical Assistant Professor in the School of Hospitality at Boston University. Her doctorate is from Iowa State University and her MBA, BS, and AS from Johnson & Wales University. She is the co-author of the textbook, *Human Resource Management in Hospitality Cases*. Additionally, she has authored seven chapters in the new edition of the *Hospitality and Tourism Management Program* textbook by the American Hotel & Lodging Educational Institute. She is also the principal and managing director of Hospitality Leadership Academy, a consulting firm specializing in customer service and leadership training.

Miguel Bendrao Baltazar holds a master's degree in management in hospitality from Cornell University School of Hotel Administration (USA). He brings 14 years of international hospitality management work experience, including general management positions. After his master's, he became fully dedicated to hospitality higher education in Portugal, Switzerland, Spain, and Puerto Rico. He has 16 years of teaching, administrating, and advising experience in public and private prestigious international hospitality management schools. For 10 years, he has been a Lecturer at James Madison University Hart School of Hospitality, Sport, and Recreation Management Harrisonburg, where he teaches Revenue Management and Overview of the Hospitality Industry.

John Bancroft is a Senior Lecturer in Operations Management at Oxford Brookes University. He has previously held positions in WMG, University of Warwick as Senior Teaching Fellow in Supply Chain, and at Coventry University as a Lecturer. He teaches predominately in the fields of Supply Chain Management and Operations Management across both undergraduate and postgraduate levels. His

research interests are in the fields of health-care operations management and sustainable supply chain management.

Vanja Bogicevic is a Clinical Assistant Professor of Hospitality Marketing at the NYUSPS Jonathan M. Tisch Center of Hospitality. She earned a PhD in Consumer Sciences from the Ohio State University, an MS in Hospitality Administration Management from the College of Hospitality & Tourism Leadership, University of South Florida, and an MArch in Architecture and Urban Planning from the University of Novi Sad, Serbia. Her research explores the role of design, service technologies, and virtual reality on consumer behavior in the hospitality, tourism, and travel industries. Her professional practice is in interior design, architectural visualization, and design consultancy.

Hyeyoon Choi, PhD, is an Associate Professor in the Restaurant, Hotel, and Tourism program at Ohio University. She received her doctoral degree in Hospitality Management from The Ohio State University. Her research has a customer-behavior orientation in the hospitality industry, including operations management and hospitality and tourism marketing. She has presented at numerous national and international conferences and received two best paper awards – TOSOK International Tourism Conference held in Korea, 2016, and ApacCHRIE Conference held in China, 2018. In addition, she has published in numerous journals, including *International Journal of Hospitality Management* and *Journal of Service Management*.

Andrew M. Daw is an Assistant Professor of Data Sciences and Operations in the Marshall School of Business at the University of Southern California. He studies the interactions within operations, and his research interests include service systems, stochastic models, and contagion processes. Prior to joining USC, he completed his PhD in the School of Operations Research and Information Engineering at Cornell University.

Susan L. Hyde is the Director of Quality Assurance and Performance at Crystal Cruises. She is responsible for developing quality processes and project management. Previously, she led a performance improvement team for The Ritz-Carlton and other Marriott International Luxury Brands across the United States: her team facilitated over 100 projects annually at six brands. They used quality sciences to elevate voice of the customer metrics. Prior to The Ritz-Carlton, she worked at Norwegian Cruise Line developing and managing the quality management systems and brand standards and achieving ISO 9001 certification. She earned a bachelor of science degree in hospitality from the University of Nevada Las Vegas and then an MBA from the University of Miami.

Di Li, PhD, is a Senior Teaching Fellow (Senior Lecturer) in International Business at WMG, the University of Warwick. Previously, she is a Lecturer in Supply Chain Management at Birmingham City University, as well as the course

leader of MSc in Global Business Operations. She conducts research, teaching, and projects in the fields of supply chain and operations management, and international business. Her interested research dimensions include global supply network design (reshoring and offshoring, manufacturing locations), supply chain in industry 4.0, sustainability, supply chain resilience, reversed FDI, international operations strategy, decision making and optimization, etc.

Yuan Li is an Assistant Professor in Hospitality Management at the Hart School of Hospitality, Sport, and Recreation Management of James Madison University. She has a PhD degree in Business Administration from Virginia Tech and a master's degree in Hospitality and Tourism Management from Purdue University. She has published research papers in several hospitality and tourism journals such as *Tourism Management*, *International Journal of Hospitality Management*, and *Journal of Hospitality and Tourism Research*. Her industry experience includes a front office manager and an assistant revenue manager role at a hotel and various other roles in the restaurant and golf industries.

Sybil Yang, PhD, is an Associate Professor and Director of the Innovation & Entrepreneurship Program for the Lam Family College of Business at San Francisco State University. She has served as an operations and revenue management consultant to organizations including Gaylord Hotels (now a part of Marriott International), Disneyland, and Harrah's Resorts. Prior to her career in academia, she was an investment banker with Salomon Smith Barney, and a venture capital analyst for the firm Skipstone Ventures, LLC. She received her PhD, MBA, and Master of Hospitality Management from Cornell University and her bachelor's in finance and accounting from the Haas School of Business at the University of California at Berkeley.

This page intentionally left blank

Preface

Welcome to the first edition of *Operations Management in the Hospitality Industry*. This introductory textbook provides students with fundamental techniques and tools for analyzing and improving operational capabilities within any hospitality organization.

Understanding hospitality operations is not easy. Services are intangible, highly variable, not transportable, and perishable. In addition, hotels, restaurants, and similar experiences involve more customer touchpoints and are significantly less productive than manufacturing sectors – and even other service industries like retail and professional services. As a result, hospitality operations often require specialized analytical frameworks and tools.

Traditionally, hospitality management programs have offered hotel and restaurant operations courses. These courses focus on industry-specific techniques for managing the service operations of a facility (i.e., how a hotel is organized, how to use a restaurant point-of-sale information systems, etc.) instead of incorporating concepts and tools for general operations management (i.e., how to assess and improve quality, how to procure supplies, etc.).

Intense competition in a fast-paced global hospitality scene requires organizations to determine the best, most efficient ways to improve services in terms of cost, quality, and innovation. As the COVID-19 crisis unfolded globally, hospitality organizations across the world additionally proved that risk and crisis readiness are necessary for business continuity and managerial success.

To address these challenges, we perceive that hospitality operations courses are gradually transitioning into – or being supplemented with – more traditional operations management courses, with embedded applications spanning hotels, restaurants, cruise lines, casinos, and other experiential services. We foresee that these courses will become increasingly critical in the curricula of academic hospitality management programs, as well as in operations management education programs that want to offer exploratory courses specific to this exciting industry.

Our book introduces some critical decision areas in which hospitality managers are involved, in chapters written by an assemblage of leading scholars and seasoned professionals – industry experts alike. Fundamental quantitative analytical tools are highlighted to support decision making, as are key theories and frameworks for managerial success. The wide range of pedagogical features will accommodate a variety of teaching and learning styles. Our streamlined approach focuses on key concepts in order to leave room for additional content, such as

case studies, simulations, or other class activities. Further, each chapter of this textbook offers a self-contained view of a specific aspect of hospitality operations management, providing the greatest instructional flexibility.

We present this book and wish the reader – students, instructors, and industry practitioners alike – success with operations management in the hospitality industry.

Dr. Peter Szende
Alec N. Dalton, CRDE, CHIA
Dr. Michelle (Myongjee) Yoo

Chapter 1

Understanding Service Operations Strategy

Alec N. Dalton and Michelle (Myongjee) Yoo

Abstract

This chapter covers four main concepts: (a) providing an understanding of service; (b) organizing hospitality decisions and processes; (c) defining strategic service visions; and (d) dissecting operations strategies for hospitality services. In the first section, the definition of service, the five service dimensions, and the service package are covered. In the second section, hospitality decisions and processes are framed by service concepts and the service-profit chain. A service concept is the starting point for developing hospitality operations strategies, while the service-profit chain explains the link from customer satisfaction and customer loyalty to a service firm's growth and profitability. In the third section, the strategic service vision is explored. Successful service firms all have a strategic service vision, which includes a set of ideas and actions organized in a systematic way to maximize a firm's performance. In the fourth and final section, the operations strategy for hospitality services is covered. Successful service operations occur when management defines and adheres to a competitive operations strategy.

Keywords: Hospitality operations management; operations strategy; service; service decisions; service process; strategic service vision

Learning Outcomes

After completing this chapter, you should be able to:

1. Classify services to understand common and variable managerial issues across hospitality businesses.
2. Describe a hospitality service using the five dimensions of the service package.

Operations Management in the Hospitality Industry, 1–21

doi:10.1108/978-1-83867-541-720211001

3. Articulate the service concept for a hospitality organization to develop operations strategies.
4. Explain the service-profit chain for a hospitality organization.
5. Formulate a strategic service vision framework for a hospitality organization.
6. Identify the competitive dimensions of operations strategy for a hospitality organization.

Outline

Getting Started

The hospitality industry contributes to a significant portion of the service sector, and its growth had been constantly accelerating over the past decade leading to the COVID-19 pandemic. Since 2009, the US hospitality industry developed steadily and total revenues surpassed $1.6 trillion in 2017, supporting 7.8 million jobs (National Travel and Tourism Office, 2018). While COVID-19 substantially stunted industry growth, the crisis also illuminated the significance of the industry to national and global economies.

It is important to note at the beginning of this chapter that this book specifically focuses on the hospitality industry in terms of operations management. The hospitality industry extends beyond the most prominent sectors of hotels and restaurants: hospitality broadly includes lodging, food and beverage service, meetings and events facilitation, theme parks and amusements, casino gaming, clubs of several types, and a variety of travel services – air, rail, automotive, and cruising among them. To deliver experiences in any of these sectors, a critical business function is needed: hospitality operations management seeks to profitably coordinate the design, development, and delivery of service experiences. It includes all of the activities, decisions, and responsibilities for business success by utilizing company resources. These resources involve the employees, equipment, technology, and even the customers. Effective operations management can make a real difference for hospitality firms. Overall, hospitality operations management is concerned with understanding customer needs, designing and delivering quality service, managing efficient and effective service processes, producing continuous

service improvements, and meeting company objectives. Excellent hospitality operations management will lead to better services and experiences for customers and staff, which will further the goal of business success. This chapter intends to explain the role of hospitality operations management by first introducing some key concepts, starting with a foundational understanding of services.

1. What is "Service"?

1.1. Definition of Service

Services are abundantly experienced in daily life, and they occur in an array of styles and outcomes. Services can be provided directly to the customer (e.g., spa treatments) or for the customer (e.g., food deliveries). Services can be delivered by personnel (e.g., luggage delivered to hotel rooms by bellmen) or via technology (e.g., restaurant reservations made online by guests themselves). Generally, a **service** is the action, performance, or process that takes place between a customer and a service provider: a service is the intangible part of the transaction relationship, whereas a product is the tangible component. For example, at Dunkin coffee shops, guests experience the intangible service (e.g., ordering the coffee, interacting with the staff) and receive the tangible, physical product (e.g., a cup of coffee, a doughnut). Likewise, when a guest stays at a hotel, they experience the intangible service (e.g., checking in at the front desk) and engage with a tangible, physical product (e.g., the hotel room they occupy during the visit). Services surround virtually every part of consumers' lives, and they are especially pronounced in the human-centric hospitality industry.

1.2. Dimensions of Services

In his book *Service Science: Concepts, Technology, Management*, Katzan (2008) outlines five dimensions on which services can be classified:

1) Service process;
2) Service nature;
3) Service delivery;
4) Service availability; and
5) Service demand.

Each of these dimensions offers a spectrum on which businesses can determine and distinguish operations strategies. Collectively, the dimensions help to define the overall service model for a business.

The dimension of **service process** captures the relationships between the labor intensity of a service and how much the service is customized. Schmenner (1986) developed the **service process matrix** (Fig. 1) to visualize the relationships.

The *Y*-axis represents the degree of labor intensity, or the significance of labor costs relative to capital (e.g., equipment, software) costs. The *X*-axis reflects the degree to which each service interaction is customized for the guest. **Service factories** are businesses like airlines or cruise lines that employ heavily standardized processes (often driven by technology) to deliver generic services to many guests.

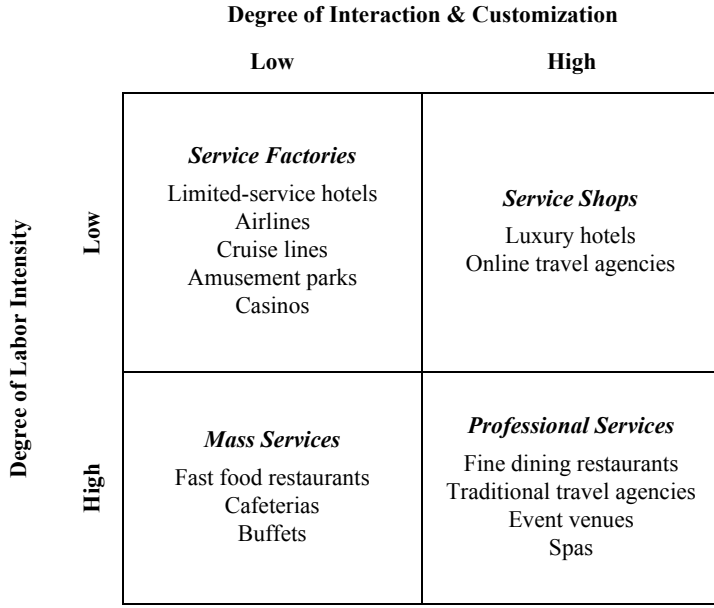


Fig. 1. The Service Process Matrix. *Source*: Adapted from Schmenner (1986, p. 25). Copyright 1986 by the Sloan Management Review Association.

Professional services, like spas or fine dining restaurants, are at the opposite end of the spectrum: these businesses offer highly customized services to guests, and the services require the devotion of significant time by trained professionals in order to create the experiences. **Service shops** may not require as much labor (relative to capital costs), but they still achieve high personalization; think about the way luxury hotels customize the stays of large numbers of guests staying each evening. **Mass services**, finally, offer little customization but still require heavy labor: this is especially common in foodservice, where large volumes of standard food items might need to be prepared for large numbers of guests. The four quadrants of the matrix ultimately represent the four dominant schemes for service processes.

The **service nature** dimension characterizes how a service acts upon an object to achieve a result. A **service object** is the person or thing upon which the service is enacted. The **service result** is the tangible or intangible outcome of the service. The service nature matrix (Fig. 2) maps these dimensions.

In hospitality businesses, it is most common that the service objects are people. Service results, however, can vary between being tangible or intangible. While many services involve tangible items (e.g., printed hotel folios, restaurant menus, dinnerware), it is important to distinguish here that service artifacts or props are not necessarily service results: service results are the outcomes of service, *not* all physical items that help to facilitate a service.

The third dimension is **service delivery**. This dimension, as represented by the service delivery matrix (Fig. 3), relates to the timing of service delivery. In one sense, **service scheduling** can either be scheduled or unscheduled: guests might need to make reservations for a fine dining restaurant, while they can go unannounced

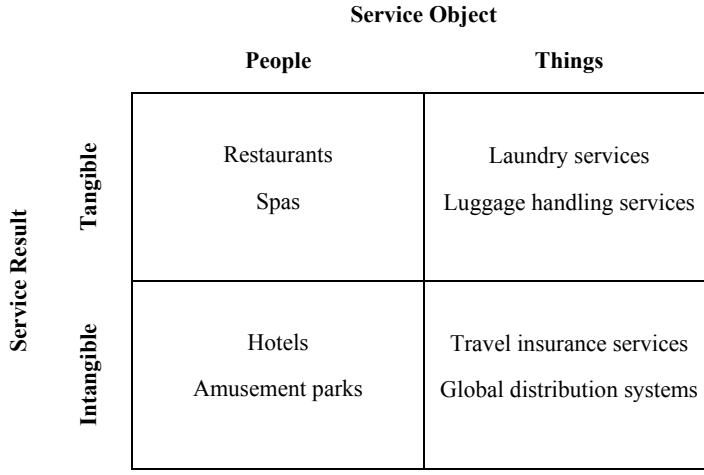


Fig. 2. The Service Nature Matrix. *Source*: Adapted from Katzan (2008, p. 19). Copyright 2008 by the Harry Katzan.

to a fast-food restaurant at any time. The service delivery matrix also accounts for the **service mode**: does service occur in specific, fixed increments or does it occur continuously?

The fourth dimension is **service availability**. This dimension relates to the service setting and characterizes the **service site** where the service occurs (whether it happens in one specific place or is available in multiple places), and whether the service guest or service provider (or neither) need to exert effort to reach the service setting – a process referred to as **service execution**. The service availability matrix (Fig. 4) frames this dimension.

The evolution of digital services and mobile technology is increasing the instances of service being executed without travel: it is easy for a guest to book a

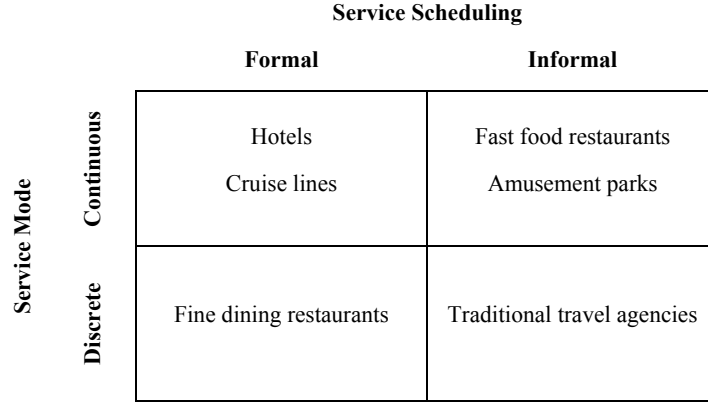


Fig. 3. The Service Delivery Matrix. *Source*: Adapted from Katzan (2008, p. 20). Copyright 2008 by the Harry Katzan.

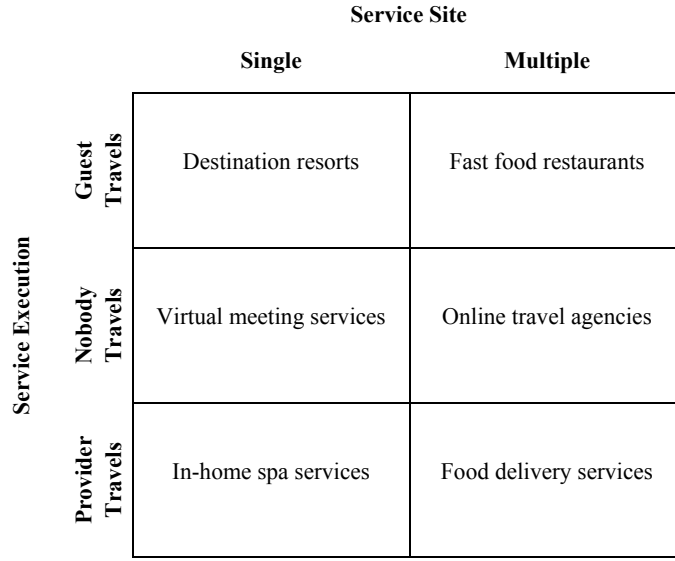


Fig. 4. The Service Availability Matrix. *Source*: Adapted from Katzan (2008, p. 21). Copyright 2008 by the Harry Katzan.

vacation with a travel agency by phone or online, for instance. It is also common in the hospitality industry for multiple establishments to share the same brand, especially with the franchise operating model common for hotels and restaurants.

The final dimension considers **service demand**. As the service demand matrix (Fig. 5) shows, service demand is a factor of customer demand for a service and the **service capacity** with which the service provider can accommodate that demand. Attendance at amusement parks can vary widely due to factors like weather and holidays, but parks are so large that they can usually accommodate

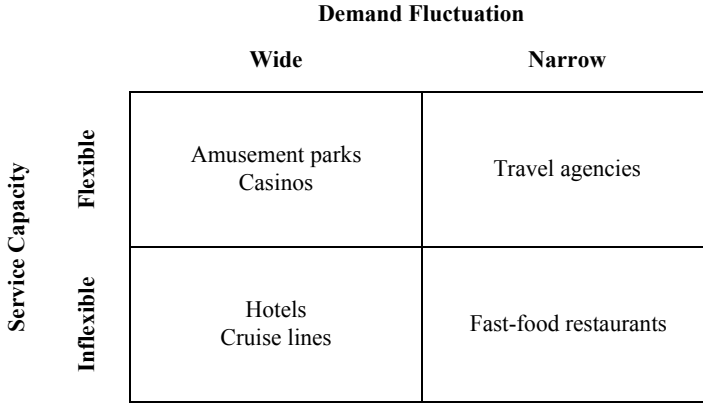


Fig. 5. The Service Demand Matrix. *Source*: Adapted from Katzan (2008, p. 22). Copyright 2008 by the Harry Katzan.

peak demand without major delays in service. Hotels, on the other hand, have much more fixed capacities of rooms that may not satisfy full demand for space; revenue management strategies help to optimize hotels' income and occupancy levels. Fast-food restaurants may have fairly consistent demand throughout any given day, but it is common for guests to wait because demand exceeds capacity for food production. Service demand, in a sense, is the dimension of service strategy relating to the pure economics of supply and demand.

Taken together, these five dimensions can help scope the operating model and strategy of a business. Managers can evaluate each dimension when developing an operating model, which will govern how their services and products will be produced and consumed in order to accomplish the service vision and bring the service concept to life.

1.3. The Service Package

The dimensions of services represent, in some respects, the conditions by which a service exists – how and when it is brought into existence, and for and by whom. When looking at the service itself, a concept called the **service package** can be used to assess the various components that are bundled together to form what is delivered to the guest. According to Fitzsimmons and Fitzsimmons (2004), there are five components to the service package:

1) **Supporting facilities**: Services usually require a combination of location, equipment, and technology in order to be performed. A hotel, for instance, needs to be built, it should be appointed with interior design, it should possess some sensory ambience (music, lighting, and other esthetic elements), and it requires supporting equipment (computers for the front office, dishware for the restaurants, etc.). Location, architecture and decoration, layout, and equipment are also elements of supporting facilities.
2) **Facilitating goods**: Many services require a good to be transformed or consumed in the service process. Consider a restaurant experience, in which food and beverages are tangible goods served to guests in the course of a meal. Note that not all tangible items, however, are facilitating good – plates, tables, chairs, etc. are supporting facilities, because they are part of the service provider's infrastructure and are *not* consumed in the process of facilitating the service. If the customer brings his or her own supplies to a service, such as a golfer bringing clubs to a course, those supplies are considered facilitating goods even if they are not consumed by the end of the service. Facilitating goods can be evaluated along several dimensions, such as selection (e.g., the variety of items on a restaurant menu), consistency (e.g., whether the plating of a menu item is executed in a consistent way each time it is served), and quantity (e.g., how large or small the portioning of a menu item is).
3) **Service information**: From the perspective of the service provider, information consists of knowledge from and about the customer that can be used to deliver the service. The Ritz-Carlton brand of hotels notoriously captures details about guest preferences to personalize their stays. Uber uses

customers' cellular location data to determine where to pick up and drop off passengers.

4) **Explicit services**: This component of services is an obvious characteristic of the process or outcome. A spa guest will feel muscle relaxation following a massage treatment, for instance. When dinner is presented in a restaurant, the guest may appreciate the aroma of the food. Explicit services also have frictional dynamics: guests may have to queue at a hotel until a clean room is ready for check-in, or they may be presented with an available room immediately upon arrival; the crew on a cruise ship may know and clearly communicate the process for disembarkation, or an untrained crew might cause confusion among passengers when providing unclear instruction. Explicit services are direct consequences of the service as perceived by the guest.
5) **Implicit services**: This component is less obvious to guests, but it still results in indirect emotional effects. The luxurious atmosphere and architectural design of a St Regis resort may inspire a guest, or the convenience of keyless hotel room entry at a Hilton hotel may allow a guest to conveniently proceed with other business rather than hassle with a plastic key card. Factors like server attitude, ambience and atmosphere, waiting, status, sense of well-being, privacy and security, and convenience are examples of implicit services.

2. Hospitality Decisions and Processes

2.1. Service Concepting

A **service concept** identifies the "what" and the "how" of the service nature. It is the way in which service firms want their customers, staff, and shareholders to perceive the service. In the hospitality industry, service providers need to create a clear service concept so that the customers know exactly what they are buying or receiving. Additionally, the staff needs to understand precisely what they are selling and how they are creating products and services. The service concept is the starting point of developing operations strategies for hospitality firms. It is used to articulate the business nature, to link different organizational functions, and to challenge the status quo. Thus, a detailed service concept helps firms to strategically manage their operations and develop competitive advantages. A service concept should include the following components suggested by Johnston, Clark, and Shulver (2012). See Fig. 6 for an example of a service concept, depicting the coffeehouse chain Starbucks.

1) The **organizing idea** underscores the core service that the customers are purchasing. Thus, a service firm must focus resource allocation and service design on the organizing idea. For instance, a hotel's organizing idea may be "providing a home-like environment." This would require the hotel to focus on creating rooms for their customers to feel like they are at home.
2) The **service provided** reflects the entire service process and outcomes designed by the operation. For example, checking into the "home-like environment" hotel room may be pleasant due to the presence of helpful staff. Other than

Service firm	Starbucks Coffee Company	
Organizing idea	Expect more than a coffee	
Service concept (summary)	Starbucks is a neighborhood gathering place, a part of the daily routine where it is more than just a comfortable coffeehouse. It does not limit itself to simply coffee but expands to premium teas, fine pastries, and other delectable treats. Starbucks provides top quality service and top quality products through the lens of humanity.	
Service provided	Helpful staff	Coffee
	Experienced baristas	Premium teas
	A place to gather	Fine pastries
	Mobile order and pay	Delectable treats
	Delivery	Rewards program
	Music	Gift card
Service received	**Customer experience:**	**Service outcomes:**
	Easy ordering	High-quality coffee
	Clean setting	Free Wi-Fi
	Artistry and appeal	Satisfying ambience
	Pleasant staff	Excellent value for price
	Variety of menu	Will come back

Fig. 6. A Sample Service Concept for Starbucks.

the basic amenities, a "home-like environment" hotel may offer living essentials like kitchenettes within the guestrooms and on-site laundry facilities for guests to use.

3) The **service received** includes the customer experience and the service outcomes. The customer experience indicates the customer's negative or positive response to the complete service process, including the service interactions. The service outcomes indicate what the customers gain at the end, including products (e.g., a home-like hotel room), benefits (e.g., free Wi-Fi), emotions (e.g., satisfaction versus dissatisfaction), judgments (e.g., perceptions of good value for price paid), and intentions (e.g., willingness to return for future visits).

2.2. Service-profit Chain

The **service-profit chain** explains the link from customer satisfaction and customer loyalty to a service firm's growth and profitability. Customer loyalty is a major source of competitive advantage for firms and impacts a firm's performance considerably. Therefore, retaining existing customers is just as important as creating new customers. Service firms need to manage entire operations to affect customer satisfaction, because satisfied customers show higher loyalty levels.

The important point that service operators must understand is that managing customer satisfaction begins with satisfying employees internally. The logic behind the service-profit chain is as follows (see Fig. 7) suggested by Heskett, Jones, Loveman, Sasser, and Schlesinger (1994):

1) **Internal service quality drives employee satisfaction**. The internal quality of a working environment is one of the most important factors that influence employee satisfaction. Internal service quality here indicates preparing employees with the skills and power to serve customers and to the way people serve each other within the organization.
2) **Employee satisfaction drives employee retention and productivity**. Employees who are satisfied are less likely to leave the company. Turnover rates may be three times lower for satisfied employees.
3) **Employee retention and productivity drives external service value**. When employees are highly productive, customers' perception of value are very high. Other than the physical attributes, customers place high worth on external service values, such as on-time service and friendly employees.
4) **External service value drives customer satisfaction**. With services and products becoming more commoditized, customers are becoming extremely value-oriented. Value is created in the experience and outcomes at the point of consumption and only customers are the final judges. Ultimately, service firms attempt to maximize a customer's perceived value because it highly influences their satisfaction.
5) **Customer satisfaction drives customer loyalty**. Satisfaction is undeniably one of the most decisive precursors in building customer loyalty. Satisfied

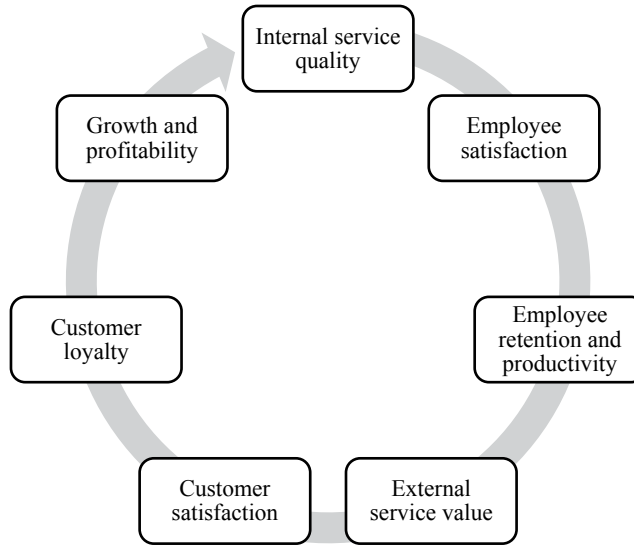


Fig. 7. The Service-Profit Chain.

customers visit the service provider more frequently and spread positive word of mouth to their friends and families. Industry experts find customers who are satisfied with their service and products are likely to become loyal up to six times more than those who are dissatisfied.

6) **Customer loyalty drives growth and profitability**. Even a small increase in loyal customers can significantly increase revenue growth and profitability for businesses. For example, a 5% increase in customer loyalty may lead to profit increases from 25% up to 125% for service industries. Additionally, it is more expensive to attract new customers than it is to retain existing customers. Enhanced loyalty reduces acquisition costs and ultimately increases profitability, thus foster growth for service firms.

3. The Strategic Service Vision

Successful service firms have one thing in common: they have a **strategic service vision**. A strategic service vision is a framework for strategic planning. It includes a set of ideas and actions in a systematic way that maximizes a firm's performance. The framework applies to both customers and employees of a service firm.

3.1. Elements of the Strategic Service Vision

The strategic service vision comprises four basic elements developed by Heskett (1986): target market segment, service concept, operating strategy, and the service delivery system. A firm can be successful when these elements are carefully incorporated for positioning, value leveraging, and system integration. Fig. 8 provides an example of the strategic service vision for Starbucks.

1) **Target market segment (who is the business serving?)**. Hospitality operations cannot satisfy everybody. Therefore, companies need to accurately identify their primary customers and consider how they will be served differently than non-target customers. By correctly identifying and carefully selecting the customers they can serve, hospitality businesses can effectively manage their operations and save significant amounts of cost. Hospitality operations managers need to consider the following in targeting their markets:
   a. What dimensions (demographic, geographic, behavioral, and psychographic) can be used to segment the market?
   b. What are the key characteristics of the primary market segment?
   c. What needs are priorities for each market segment?

2) **Service concept (what is the business providing to customers?)**. A service concept describes the nature of the service for customers, employees, and other stakeholders. It is basically a business' definition. Hospitality operations need to have well-defined service concepts that are clearly communicated in order to develop competitive advantages. Service concepts must answer these questions:
   a. What are the customers' expectations and needs?

	Target Market Segments	Service Concepts	Operating Strategy	Service Delivery System
Customers	• Main target segments are 25 and 40 years of age with high incomes. • The second target group is 18–24 years of age and belongs to richer families. • Upper-middle class and generally have college education. • Socially conscious consumers.	• A neighborhood gathering place, a part of the daily routine. • Not about the coffee exclusively but about the experience of drinking coffee.	• Strong market position and global brand recognition at prime locations. • High friendly and interactive relationship marketing. • Execution of corporate social responsibility. • Ethically sourcing the highest quality coffee.	• Offer a selection of premium teas, fine pastries, and other delectable treats. • Experienced and educated baristas. • Use of technology and mobile outlets. • Esthetically appealing eco-friendly stores.
Employees	• Opportunity for all (youth, refugees, veterans, military spouse, people with disabilities, diverse cultures).	• Committed to maintaining a culture where inclusion, diversity, equity and accessibility are valued and respected. • Performance driven, through the lens of humanity. • Creating shared value.	• Employees are addressed as "partners" giving them a sense of belonging. • Training and education system for future development. • Extensive benefits package for employees.	• Treated warmly and with transparency, dignity, and respect. • Provide assistive technologies to do their job. • Pleasant working environment.

Fig. 8. The Strategic Service Vision for Starbucks.

b. What are important elements (organizing ideas, services provided, and services received (customer experiences and service outcomes)) of the services to be provided?
c. How do customers (in general, versus the target market), employees, stakeholders, and others perceive the service concept?

3) **Operations strategy (what needs to change for us to advance?)**. An operations strategy is the set of strategies, plans, and policies regarding the operations, financing, marketing, human resources, and control of an organization. The operations strategy considers how the service firm should be structured to manifest the service concept. Hospitality operations need to design operations strategies that create value for customers. Such strategies should cover these considerations:
   a. What role do the business functions (e.g., operations, finance, marketing, human resources) play in executing the operations strategy?
   b. Where should the firm's efforts and investments be concentrated?
   c. How will quality and cost be controlled?

4) **Service delivery system (does the process support our strategy?)**. A service delivery system is designed to execute successful service offerings. It implies the specific decisions made by the organization in managing service encounters, in terms of personnel and job descriptions, procedures, capacity, equipment, facilities, layout, and technology. Hospitality operators need to design service delivery systems that can achieve customer satisfaction and address the following:
   a. What are the important features of the service delivery system?
   b. What capacity does the service delivery system provide (peak versus non-peak)?
   c. To what extent does the service delivery system assure quality standards, differentiate the service from competitors, and provide barriers to competitor entry into the market?

4. Operations Strategy for Hospitality Services

Successful services occur when management defines and adheres to a competitive operations strategy. Comprehensively, Lowson (2002) defines **operations strategy** as:

> Major decisions about, and strategic management of: core competencies, capabilities and processes, technologies, resources, and key tactical activities necessary in any supply network, in order to create and deliver product and service combinations and the value demanded by a customer. The strategic role also involves the blending of various building blocks into one or more unique, organizational-specific, strategic architectures. (p. 57)

Perhaps more succinctly, operations strategy consists of the decisions that allow a business to serve its customers. The strategy guides the organization of resources and activities to deliver a valuable customer experience.

In the case of hospitality businesses, Ford, Sturman, and Heaton (2012) formulate guest experience strategy as follows:

$$\text{Guest experience} = \text{Service product} + \text{Service setting} + \text{Service delivery system}$$

The **service product** (or service package) refers to the bundle of tangible and intangible outcomes of service. Using restaurant dining as an example, the service product includes the food and beverages in addition to the interaction with the server, and even residual memories of the experience. Next, the **service setting** (also known as a service site) represents the place where the service occurs. The restaurant itself is a service setting, but it can be further segmented by locations within the restaurant, such as a bar or separate dining rooms or private event space; on a macro level, the geographic location of the restaurant itself and its proximity to other venues encompasses the service setting. Settings do not have to be physical locations, either: many restaurant chains, such as Olive Garden offer mobile apps and websites with services like virtual queuing, take-out, and delivery ordering; in these cases, the service setting is actually a digital environment. The final component of the formula is the **service delivery system**, which encompasses the people, technology, and processes that create and deliver the service product in the service setting. In a restaurant, service delivery systems include the procedure for greeting guests upon arrival, coordinating their seating and waiting, attending to them through their meals, transacting the services, and preparing settings for the next guests.

In a restaurant, the guest experience is the sum of the tangible food, the intangible relationship-building with the server and other guests, the setting of the surrounding restaurant, and the service process that connects it all together.

4.1. Competitive Dimensions of Operations Strategies

When presented with multiple options and alternatives for a service they wish performed, customers need to make decisions about which business they want to perform the service. Successful operating strategies consider the competitive environment and, in line with the service vision, pursue customer preference through one or several of the following dimensions outlined by Fitzsimmons and Fitzsimmons (2004):

1) **Availability:** In many instances, guests seek services with as much availability as possible; McDonald's, for instance, benefits from having locations open 24 hours a day. In some instances, however, the rarity of a service can also be a competitive advantage: some fine dining restaurants, such as French Laundry and the former El Bulli, possess valuable notoriety because of the novelty created by limited capacity and exclusive price.
2) **Convenience:** Convenience is the ease with which a customer can access, purchase, and consume a service. Again, fast-food giant McDonald's succeeds in this category because of its global distribution of thousands of restaurants.
3) **Dependability:** Guests want assurance of effectiveness in the services they purchase, before they transact their purchases. Some organizations, such as Marriott International's Fairfield brand, provide dependability through service guarantees. Others, like airlines, are required by law to publish performance statistics like on-time departure rates to maintain transparency with customers.
4) **Personalization:** Customers value when a service is tailored to meet their precise needs. Many luxury brands, like Four Seasons Hotels & Resorts, succeed with this factor through their ability to learn and act upon guest preferences to deliver unique experiences. Loyalty programs help guests feel recognized for continued business, and they also allow companies to manage customer relationships.
5) **Price:** The price of a service is a straightforward, quantitative means by which customers can compare services. Some customers seek the lowest-costing option to meet their needs, while others might seek the status associated with more luxurious offerings. Each customer has a perception of value, and companies should determine prices in sync with the value perceptions of their target customers.
6) **Quality:** In services, quality is evaluated by guests as a combination of the efficiency of the service process and the effectiveness of service results meeting their needs.
7) **Reputation:** Customers want assurance that the service they buy will meet or exceed their expectations. Information sources like social media (e.g., TripAdvisor, Google) and professional review companies (e.g., Forbes Travel Guide, AAA) can give guests confidence – or a lack thereof – in a vendor before purchasing a service. Customers may also wish to purchase from a vendor in order to achieve a sense of status from affiliation with that brand, service, or product.
8) **Safety:** Confidence that they will not be harmed – physically or with the loss of property – is a consideration many guests make when deciding which service to purchase.
9) **Speed:** Timeliness is critical to modern consumers. Companies need to reduce the time it takes to complete a service transaction, including intermittent waiting.

According to Hill (2000), some markets require a minimum level of performance on one of these dimensions in order to be perceived as a viable competitor. An example of such a **service qualifier** is that modern hotels ought to amplify dependable wireless Internet; increasingly, many guests also expect hotels to provide *free* wireless Internet to qualify for their patronage. Some dimensions (like reputation and speed) are not essential to the performance of a service but can result in a business being seen as a **service winner** if delivered exceptionally well: Walt Disney Parks & Resorts, for instance, are highly regarded for safe, reputable theme parks. Some dimensions (like safety and availability) are critical to basic performance, and companies that fail to meet the expected level of performance can be considered **service losers**. Spirit Airlines, a low-cost airline, is regularly cited as having uncomfortable flight accommodations and price-gouging add-ons for basic services like seat selection and baggage checking. Most important to note, though, is that these dimensions can vary in importance from customer to customer.

Discussion Questions

1. Select two hospitality organizations that offer similar services. Define the service concept for each organization and discuss the similarities and differences of the key elements. Finally, develop a new service concept to drive strategic advantages for both organizations.
2. Select a hospitality organization of your choice and apply the strategic service vision for both customers and employees. Discuss how the elements maximize the firm's performance.
3. Select a hospitality organization of your choice and research each competitive dimension of operations strategy for that company. Discuss how these dimensions can gain strategic advantages for the hospitality organization you selected.

Case Exercises

1. Bill Townsend is the General Manager of the Wild West Grill, a moderately priced, single-site steakhouse appealing to families. The restaurant is decorated in the styles of the American frontier, with sit-down service and cuisine derived from the Southwest. Across Katzan's five dimensions of service, how would you classify Wild West Grill?
2. Jenna Wong has just opened a new fast-casual salad shop downtown. She finds that the shop gets particularly busy during the lunch meal period and around dinnertime, but otherwise demand is low. A consequence of these peak times is that service becomes slower when her team reaches or exceeds their capacity to take and fulfill salad orders. Considering the concept of service scheduling, what can Jenna do to better satisfy demand?
3. Alejandra Terano plans to open a boutique hotel on Miami Beach, appealing to a fashion-forward guest with art deco design, a fine dining restaurant, and a luxurious spa. She needs help unifying her strategy for service operations. Help her develop a service concept by defining her organizing idea, the services provided, and the services received.

Managerial Challenge

Mahidza Zain saw a new business opportunity, and she seized it. In an affluent neighborhood in Kuala Lumpur, Malaysia, a large gas station sought to replace its retail space with a new dining option. Mahidza knew the area well, and after researching the needs of motorists and local city dwellers alike, she realized the vacant space would be perfect for a hybrid restaurant. Calling it "the FILLING STATION," her innovative marketplace restaurant would offer both grab-and-go options for the busy traveler and full-service dining for guests seeking a more leisurely meal. Her research also confirmed that the intended cuisine – a mix of Asian and Western dishes – would broadly appeal to both groups of customers. With financial support arranged and designs prepared, Mahidza brought the FILLING STATION into existence.

Opening a new restaurant always comes with challenges, and the FILLING STATION experienced some. Creative marketing techniques were deployed to combat consumer perceptions about the quality of foodservice connected to gas stations. Focused hiring practices helped attract young culinarians to operate the restaurant, and special training programs were created so the staff was prepared to serve international clientele. The food itself presented several challenges: ultimately, how could the restaurant prepare a wide-ranging menu – with both takeaway and eat-in options – that satisfy the tastes of a broad mix of customers?

Question

To reflect the service concept and service process, how would you recommend that Mahidza create a profitable menu? Consider that profitability results not only from the pricing of food but also from the popularity of different menu items, from the cost of ingredients, and from the efficiency of preparations in the kitchen.

Added Insight

This chapter underscores the many decisions that hospitality businesses face when developing operations strategies. Adding a degree of complexity, consider that companies can vary their strategies even within different parts of the same firm. This versatility is especially necessary as companies globalize, because different parts of the world are affected by varying customer preferences, supplier availabilities, and regulatory controls.

One factor that companies can adjust regionally is the mix of products they offer. This is most commonly affected by local customer preferences and supplier diversity. Consider KFC, the fast-food chain by Yum! Brands that specializes in American "soul food." While the Southern-style menu has novelty appeal internationally, it has to be regionally adapted: in India, where vegetarianism is prevalent, menus include items like a potato patty burger; in Japan, KFC meals are available in the form of a yakiniku bento box (Cornelius, 2018). Similarly, hospitality companies may need to adjust which services they offer. McDonald's, for instance, has various incarnations of a delivery service – called McDelivery – in different parts of the world: in the United States, McDelivery is outsourced via

Uber Eats (McDonald's, 2019a); in China, McDonald's self-operates its delivery service by motorbike (McDonald's, 2019b).

Entire brands may also have regional limitations. The legendary hotel brand The Ritz-Carlton has development restrictions in certain parts of Europe due to legal terms restricting the licensing of the brand name. César Ritz himself opened The Ritz London and Ritz Paris and, per terms of the trademark agreement secured by the present day company, new Ritz-Carlton hotels cannot be branded as such within France and the United Kingdom (Berman, 2018). Voluntary or not, the strategic opportunities and implications of globalization are important to consider when scaling a hospitality service internationally.

Question

Select a hospitality company with international presence. Using the competitive dimensions of operations strategy as a framework, conduct some research and identify different ways the company offers products and services in various regions of the world. Explain these differences, and why they are appropriate.

Risk and Crisis Management

Hotels ask for an array of personal information when guests register. This information includes standard personal details, such as names, addresses, phone numbers, and email addresses. This data also includes extremely sensitive information, such as credit card numbers, automobile license plate numbers, and even passport numbers. When hotel guests share their sensitive information, they assume their data will be protected with the proper security measures in place.

Data breaches are security incidents where protected information is released to an untrusted environment. Cyber hackers are increasingly breaking into corporate databases to access customer data, and the number and scale of data breaches have become larger. The hospitality industry is not immune: hotels are continuously being attacked for their giant databases (Wroten, 2019). Since 2010, more than 30 data breaches have been reported by hotels, from major multinational corporations to independent properties. Personal data, including credit card and passport numbers, were at risk of identity fraud that affected as few as 10,000 guests and as many as 380 million (Kubacki, 2020).

The consequences of data breaches can be expensive for hotels, especially for those who do not take any precautions. The direct and indirect costs related to the time, effort, and labor dealing with the breach, regulatory fines, future security costs, and other disputes can add up to millions of dollars. Additionally, there can be disastrous personal impacts when passport and credit card numbers of hundreds of millions of people are stolen. Importantly, additional damage to a company includes the loss of customer trust and diminished reputation.

The hospitality industry has become an attractive target for cyber hackers as travel data is rich in information that can offer key insights to personal finances, consumer behavior, and lifestyles. It is essential for hospitality leaders to recognize how critical data security and privacy have become to maintaining

successful businesses, and how cybersecurity must be addressed as part of risk management strategies. It is no longer realistic for any hospitality business to believe that they will be lucky to avoid data hacks without the proper security procedures implemented.

Questions

1. How can hospitality businesses prepare, adapt, and respond to data hacks and information security incidents?
2. What type of service recovery actions can hospitality businesses take to improve guest perceptions in case of a data breach?

Glossary

Explicit services: The intangible, direct, and intended outcomes of a service being performed.

Facilitating goods: The physical inputs into a service which are consumer or transformed (by the producer or consumer) in order to conduct the service.

Implicit services: The intangible, indirect, and sometimes unintended outcomes of a service being performed.

Mass service: A service (e.g., fast-food restaurants, buffets) characterized by high labor intensity per guest but limited-service customization.

Operations strategy: Major decisions about, and strategic management of, core competencies, capabilities and processes, technologies, resources, and key tactical activities necessary in any supply network, in order to create and deliver product and service combinations and the value demanded by a customer.

Organizing idea: The central service objective supported by all other service factors and decisions.

Professional service: A service (e.g., fine dining restaurants, spas) characterized by high labor intensity per guest and substantial service customization.

Service: An action, performance, or process that takes place between the customer and a service provider: service is the intangible part of the transaction relationship, whereas a product is the tangible component.

Service availability: The manner in which customers and providers connect to facilitate a service.

Service capacity: The volume of service that a service provider can generate.

Service concept: A service concept identifies the what and the how of the service nature. It is the way in which service firms want their customers, staff, and stakeholders to perceive its service.

Service delivery: The location and timing whereby a service occurs.

Service delivery system: The process by which a company organizes its people, processes, and policies to deliver a service.

Service demand: The volume of customer desire (both the number of customers and the purchase size of each customer) to undergo a service.

Service execution: The responsibility of a party (the customer, provider, or neither) to exert effort to reach the service site.

Service factory: A service (e.g., casinos, airlines) characterized by low labor intensity per guest and limited-service customization.

Service information: The knowledge of the service provider about the customer that is used to complete the service.

Service mode: The degree to which a service is continuous or constant versus discrete (defined by distinct start and stop points).

Service loser: Companies that underperform competitors on the various competitive dimensions of operations strategy.

Service nature: The manner in which a service achieves its results upon some service object.

Service object: The person or thing upon which a service process is directed to achieve service results.

Service package (or service product): The complete set of service results delivered to a customer through a service process, using a service delivery system.

Service process: The means and manner in which inputs (including physical supplies and human factors, both employees and customers) are transformed into service results.

Service-profit chain: The service-profit chain explains the link from internal service quality to customer satisfaction and customer loyalty, and further to a service firm's growth and profitability.

Service provided: The service process and outcomes designed and delivered by the producer.

Service qualifier: Considering the competitive dimensions of operations strategy, the minimum capabilities needed for a service provider to deliver a viable and competitive offering.

Service received: The experience and service outcomes that transform the customer.

Service result: The tangible and intangible outcomes of a service.

Service scheduling: The degree to which a service occurs formally or informally, in terms of the service provider anticipating the arrival of the customer and/or the timely need for the service to be provided.

Service shop: A service (e.g., luxury hotels, online travel agencies) characterized by low labor intensity per guest and substantial service customization.

Service site (or service setting): The place at which a service occurs.

Service winner: Companies that outperform competitors on the various competitive dimensions of operations strategy.

Strategic service vision: A strategic service vision is a framework for strategic planning that includes a set of ideas and actions in a systematic way that maximizes a firm's performance.

Supporting facilities: The location, equipment, and information systems that serve as the infrastructure for hosting and executing a service.

References

Berman, N. (2018). *The history and evolution of The Ritz-Carlton Hotel Company*. Money Inc. Retrieved from https://moneyinc.com/the-history-and-evolution-of-the-ritz-carlton-hotel-company/

Cornelius, I. (2018). 25 of the most unique KFC menu items from around the world. *The Travel*. Retrieved from https://www.thetravel.com/25-of-the-most-unique-kfc-menu-items-from-around-the-world/

Fitzsimmons, J. A., & Fitzsimmons, M. J. (2004). *Service management: Operations, strategy, and information technology*. New York, NY: McGraw-Hill/Irwin.

Ford, R. C., Sturman, M. C., & Heaton, C. P. (2012). *Managing quality service in hospitality: How organizations achieve excellence in the guest experience*. Clifton Park, NY: Delmar.

Heskett, J. L. (1986). *Managing in the service economy*. Boston, MA: Harvard Business School Press.

Heskett, J. L., Jones, T. O., Loveman, G. W., Sasser, W. R., & Schlesinger, L. A. (1994). Putting the service-profit chain to work. *Harvard Business Review*, *72*(2), 164–174.

Hill, T. (2000). *Manufacturing strategy: Text and cases*. London: Palgrave.

Johnston, R., Clark, G., & Shulver, M. (2012). *Service operations management: Improving service delivery*. Harlow: Pearson.

Katzan, H. (2008). *Service science: Operations, technology, management*. Bloomington, IN: iUniverse.

Kubacki, D. (2020, April 7). Timeline: The growing number of hotel data breaches. Retrieved from https://www.hotelnewsnow.com/Articles/50937/Timeline-The-growing-number-of-hotel-data-breaches

Lowson, R. H. (2002). *Strategic operations management: The new competitive advantage*. New York, NY: Routledge.

McDonald's. (2019a). McDelivery. Retrieved from https://www.mcdonalds.com/us/en-us/mcdelivery.html

McDonald's. (2019b). McDonald's China online ordering. Retrieved from https://www.4008-517-517.cn/cn/?locale=en

National Travel and Tourism Office. (2018, October) Fast facts: United States travel and tourism industry 2017. US Department of Commerce. Retrieved from https://travel.trade.gov/outreachpages/download_data_table/Fast_Facts_2017.pdf. Accessed on November 25, 2020.

Schmenner, R. W. (1986). How can service businesses survive and prosper. *Sloan Management Review*, *27*(3), 21–32.

Wroten, B. (2019, April 9). Starwood data breach: Lessons for the hotel industry. Retrieved from https://hotelnewsnow.com/Articles/294646/Starwood-data-breach-Lessons-for-the-hotel-industry

This page intentionally left blank

Chapter 2

Designing Service Experiences

Peter Szende and Alec N. Dalton

Abstract

Hospitality services are among the most robust experiences enjoyed by consumers. To deliver them successfully, careful attention to detail is first needed for the design and development of those experiences. This chapter begins by exploring the array of elements that holistically construct an experience, from process to people to physical environments. Then, the customer experience management framework is used to outline a recommended technique for approaching experience design. Finally, a brief survey of visualization techniques shows how experiences can be modeled for assessment and improvement.

Keywords: Customer experience; guest experience; experience design; service design; branding; theming

Learning Outcomes

After completing this chapter, you should be able to:

1. Identify the operational components of an experience using the service marketing mix.
2. Explain the importance of branding and theming in experience design.
3. Utilize the customer experience management framework to design a guest experience.
4. Document a service experience using a basic service blueprint.

Outline

Operations Management in the Hospitality Industry, 23–43

doi:10.1108/978-1-83867-541-720211002

Getting Started

Imagine the typical guest experience for full-service restaurants. When someone first considers an opportunity to dine out, perhaps they use their phone to search for restaurants, compare the options, and even make a reservation. Once they arrive, either a member of the staff greets them or the guest is instructed to seat themself. Once reaching the table, a menu is made available and the guest's order is eventually taken. Food and beverages are served, eaten, and then any remainder is removed along with the dirty dishes. Some form of bill is presented and then paid, after which the guest leaves. All the while, music probably provided background noise, decorations amplified the concept of the restaurant, and the smell of (hopefully) good food filled the air.

Whether enjoyable or dissatisfying, memorable or forgettable, that dining experience is more than a meal – it is a multisensory, multidimensional journey. Indeed, in all hospitality industries, experiences surround guests as they move through spaces and time. Every aspect can be carefully constructed to deliver seamless, reliable, hospitable service; or, that attention to detail can be discarded at the risk of experiences being inconsistent and unfulfilling. This chapter rejects the latter, lazy approach to service, and argues that careful design can result in guest satisfaction and greater returns for businesses. Readers will apply the service marketing mix to understand the different components of guest experiences, and a framework will be provided for developing customer journeys. In total, this chapter offers a holistic look at the design of great guest experiences.

1. Components of Guest Experiences

According to Gartner, **customer experience management (CEM, or simply CX)** is "the practice of designing and reacting to customer interactions to meet or exceed their expectations, leading to greater customer satisfaction, loyalty, and advocacy" (n.d.). In the case of consumer packaged goods, like toothpaste or a box of crackers, the customer experience is fairly limited to the procurement and usage of the

product. For services, however, the customer experience is vastly more complex and dynamic. As the Getting Started excerpt highlights, hospitality experiences are multisensory, multidimensional journeys.

A framework would prove useful for surveying the spectrum of considerations for hospitality experiences. Fortunately, the **service marketing mix** – also known as the **Seven Ps** – proposed by Booms and Bitner (1981) offers a holistic set of seven elements to consider when evaluating service offerings:

- Product,
- Process,
- People,
- Physical evidence,
- Place,
- Promotion, and
- Price.

The remainder of this section will explore each element not necessarily from a marketing standpoint but from an angle of operations.

1.1. Product

The first component to explore is arguably the most essential. For many businesses, "product" refers to something tangible, like a candy bar or an electronic device. In services, "product" more broadly refers to the outcomes of the guest experience. There are often physical products along the customer journey: consider the food and beverages consumed in a restaurant or souvenirs from a theme park visit. The section on physical evidence will assess these types of products in greater detail. The outcomes of service reach farther beyond the realm of products that guests can hold in their hands, though, and this section will pay attention to those other aspects of service outcomes.

Hospitality experiences also offer "products" – or perhaps better described as outcomes – in the form of the physical transformation of the guest. Consider the rest received from sleeping in a hotel bed, or energy attained from a nourishing meal, or muscle relaxation from a treatment in the spa. Conversely, imagine the unrest created by an uncomfortable mattress, or sickness from contaminated food, or pain caused by an insensitive massage. When designing experiences, hospitality companies should consider the physiological effects on guests and consider ways to maximize comfort and safety.

Even more abstract are the psychological transformations that occur through guest experiences. A tour of a foreign country may offer cultural education and enhance emotional intelligence. A journey through the casinos on the Las Vegas Strip, meanwhile, will surely provide an abundance of entertainment. To consider the emotional engagement of guests as they participate in experiences, Pine and Gilmore (2011) identify four dominant **experience realms**:

1) Education occurs when guests engage in the development of their knowledge. For example, the summer resort Chautauqua Institution, located in Western

New York, offers adult and family education programs that range from music to culinary arts.

2) Escapism happens when guests use an artificial experience to travel – physically or mentally – to somewhere other than their usual reality. The Galactic Starcruiser at Walt Disney World Resort offers a multiday adventure "cruise" in an immersive, Star Wars-themed hotel.
3) Entertainment results from experiences that captivate and amuse the audience. Medieval Times Dinner & Tournament, located in "castles" across North America, delights guests with dinner-theater experiences that features Middle Ages games like sword fights and jousting.
4) Esthetic refers to experiences that provide emotional stimulation of an artistic or philosophical nature. 21c Museum Hotels, a lodging chain under Accor, curates contemporary art in public museums that also serve as design-oriented hotels.

According to Pine and Gilmore,

> While guests partaking of an education experience may want to *learn*, of an escapist experience want to *go* and *do*, of an entertainment experience want to *enjoy*, those partaking of an esthetic experience just want to *be*.

When designing experiences, companies should consider ways to evoke these realms, individually or in some combination.

Examining the accommodation industry, scholars found that Pine and Gilmore's (1998) original model should be supplemented by the notion of hospitableness. Hospitality organizations should attempt to further differentiate their offerings by accentuating human interactions. Thus, their business growth is also fueled by the strengths of human connections (Mody, Suess, & Lehto, 2019). "Aspects of welcoming, kindness, respect, and a genuine desire to go above and beyond … lie at the core of providing true hospitality," are emotionally stimulating, and are key memory-building components. The same authors also suggest that the role of technology is critically important while orchestrating service experiences.

Another outcome of experiences is **mood**, the emotional association guests have when they participate in the journey. Effective experience designs will deliberately evoke certain moods as a byproduct of the experience. The use of bright colors and stimulating textures may create amusement, but too much could produce annoyance. Design elements that allow for discovery, such as an abundance of foliage or various points of interests or pathways, can yield a sense of adventure or – in excess – a feeling of confusion. Lukas (2013) highlights common experiential moods, some of which are depicted in Table 1. Along with physical products and physiological changes, emotion and mood represent key products of hospitality services.

Finally, guests may determine to purchase from (or avoid) certain companies based on **branding**. Branding refers not just to the name, logo, and color palette that identifies the organization but also to the values that the organization espouses.

Table 1. Examples of Moods and Outcomes.

Mood	Design Considerations	Positive Outcomes	Negative Outcomes
Calm	Include soothing colors, scents, and architectural and interior design features	Guests enjoy a place of ease and relaxation	Guests become unstimulated and bored
Adventure	Include spaces that evoke discover, such as with long corridors, multiple rooms, and rich interior decoration	Guests enjoy a journey and the fulfillment of discovery	Guests become overwhelmed by a quest
Romance	Include elegant, charming decorations and spaces that allow couples to intimately connect	Guests appreciate their companion	Guests who are unattached become isolated
Surprise	Include interactive design elements, including unexpected technology or décor	Guests delight in wonder and excitement	Guests become accustomed and develop expectations for continued surprises

Source: Adapted from Lukas (2013, pp. 65–66).

Even though The Ritz-Carlton, Renaissance, and Residence Inn are all operated by Marriott International, each brand clearly has a distinct feel, product, price point, and general appeal to different target markets. Competitors need to find ways to pronounce their brand in the market place, so customers would not generalize a Ritz-Carlton hotel (Marriott) with a Waldorf-Astoria (Hilton) or a Fairmont (Accor). Some brands, especially theme parks and casual full-service restaurants, employ the use of **theming** to accentuate the brand. Hard Rock Café celebrates classic rock music with instruments and memorabilia displayed on the walls, while Rainforest Café uses animatronics and extensive scenery to simulate jungles. Further discussion of branding and theming will continue later in this chapter.

1.2. Process

Products are the outcomes of some process, and in the case of experiences, the process is dominated by the customer journey. For virtually all hospitality experiences, this cycle includes five core stages:

1) The guest **recognizes** a need.
2) The guest **identifies** options of services that can fulfill the need.
3) The guest **evaluates** the service options.
4) The guest **selects** a preferred service option.
5) The guest **experiences** the service and *satisfies* the need.

While the main service encounters occur in the final stage, when the service is actually produced and consumed, companies need to recognize their opportunities to market experiences and position guest expectations in the earlier, competitive stages. The sections of this chapter on promotion and on channel placements will delve more deeply into this matter.

Concerning the fifth stage, the exact process of preparing for, creating, delivering, and dissolving experiences varies widely between businesses. Distilling the SERVQUAL framework Parasuraman, Zeithaml, and Berry (1988) proposed for service evaluation, quality services should foundationally provide guests with assurance that the service will be delivered reliably, with responsiveness and empathy from the service providers, and with the use of appropriate facilities, equipment, and other tangibles. Effort spent designing processes, developing talented employees, and deploying technology should all contribute to service quality from the start.

Along the customer journey, **service encounters** occur when guests interact with employees and technology at **touchpoints** where the service gets designed, produced, and delivered together. **Cues** refer to the clues built into the service process that guide the customer through the journey. For instance, in a restaurant, a sign reading "seat yourself" near the entrance will alert guests to find available seating and wait there for service, instead of lingering and waiting for a hostess to offer directions. **Moments of truth** are the most prominent service encounters: during these moments, guests make decisions about how to proceed with the service (e.g., when deciding which meal to order from a menu) and whether they are satisfied with any part of the service or with the experience altogether. Effective service design considers guest satisfaction during service encounters, especially at moments of truth.

To maintain an efficient operation, hospitality organizations should optimize service flows and processes. **Capacity analysis** is the approach for determining the capacity of a service operation. From an operations management perspective, "capacity analysis involves determining the throughput capacity of workstations in a system and ultimately the capacity of the entire system" (Heizer, Render, & Munson, 2017). In order to analyze service processes, three concepts need to be understood. First, **throughput time** is the total elapsed time needed to complete the service process. The next concept is **throughput rate**: this refers to the number of customers moving through the system during a given unit of time. It is an inverse of the throughput time and can be calculated by using the following equation:

$$\text{Throughput rate} = \frac{1}{\text{Throughput time}}.$$

Finally, a **bottleneck** is the process step with the lowest capacity, that limits the entire operation's output. Otherwise stated, a bottleneck is "the process that has the lowest throughput rate" (Rohlfs, 2013). A bottleneck can be a workstation or task, a person, a physical constraint, or other barriers to throughput. The maximum capacity of the entire service system is determined and limited to the capacity of the bottleneck, and bottlenecks are typically also the source of queues or waiting lines. Bottlenecks are often related to the number of available service

professionals, such as cashiers in a fast-food restaurant or front desk clerks in a hotel. Increasingly, hospitality companies are looking to technology to solve this – both to reduce labor costs through automation and to speed-up service times when technology can produce efficiencies. For example, hotel companies like Marriott and YOTEL are using kiosks or mobile apps to enable self-check-in or deploying apps for keyless guestroom entry: consequently, these hotels can reduce the front office staffing since guests can self-serve. Kiosks are also increasingly common in the restaurant space, with companies like McDonald's and Panera Bread using ordering kiosk, and brands like Chili's Bar & Grill and Olive Garden turning to tabletop ordering and payment devices. Consumers increasingly embrace these technologies and, in turn, develop expectations for their appearance in other hospitality environments.

As a final note about technology and process, a key consideration for companies is the degree to which services can be customized for each guest. While restaurant point-of-sale systems have traditionally been able to accommodate changes to menu items – such as the omission of certain condiments or the substitution of sides – the use of kiosks makes customers acutely aware of the options for constructing their own meals. The use of **customer relationship management (CRM)** technology is also increasingly pervasive, allowing businesses to learn customer history over time and use it to enhance future experiences. For instance, many hotel companies maintain profiles of their frequent guests to ensure travelers receive preferred accommodations, like certain room types or amenities. Investments in CRM platforms can pay dividends when they acknowledge the loyalty of guests and results in continued patronage.

1.3. People

Hospitality is fundamentally a human business, hallmarked by the interactions between guests and service professionals. With respect to this third element of the marketing mix, consider the roles of both guests and employees in service design.

1) **Guests**. Since guests and service organizations create experiences together, **coproduction** refers to the degree to which guests co-create their own experiences. While many restaurants, for instance, handle the full extent of food production, others engage guests in making their own meals: the FiRE+iCE chain allows guests to select raw ingredients from a bar and then take them to a teppanyaki chef for cooking in an open kitchen; certain cultural restaurants, such as those of the Chinese hotpot and Japanese yakiniku styles, provide guests with the raw ingredients and invite them to cook the food directly at their own tables. While coproduction can engage guests and reduce the workload for employees, it may not be suitable for all businesses.

   The socioeconomic, ethnic, and linguistic cultures of guests should also inform service designs. For example, in certain Middle Eastern and Asian countries, the service of alcohol is prohibited due to religious principles in the regions. Regionalizing offerings may also relate to supply chains: while the Four Points by Sheraton hotel brand operates a program called Best Brews in most of the

world, celebrating local craft breweries, the program gets adapted in countries in Asia and Africa where craft brewing is uncommon and beer-drinking culture is less prominent. Obeying guests' cultural norms is both a sign of respect and a practical endeavor to ensure offerings *do* meet guests' needs.

2) **Employees**. Critical to service experiences are the employees that deliver them. Hiring and developing talent is a key component of hospitality management. While details of this complex responsibility will not be presented in this chapter, it is important to recognize that the service culture of an organization plays a key role in the effective performance of the guest experience. Cultures with clear, strong values that are supported by leadership and embraced by employees are necessary. Empowering employees to serve guests, fix problems, and offer surprises and delight is also key.

Service experiences inherently require the coproduction by guests and the service organization – via service employees and service technology.

1.4. Physical Evidence

Within service environments, certain physical evidence helps to conduct service. From a design standpoint, furniture and fixtures can help evoke mood and create an atmosphere. Equipment – ranging from front desk terminals to kitchen grills – are also important for performing service but may also need to be hidden from guest view for both esthetic, functional, and safety reasons. A common acronym in hospitality design is FF&E, for furniture, fixtures, and equipment.

Operating supplies and equipment (OS&E) are also important. They can be distinguished as props and artifacts. **Props** are the items guests or employees use to create the service: these range from irons and steamers that allow guests to press their clothes to the bath amenities provided by most hotel companies; they may also be scenic props that reinforce branding or theming, like antique radios or telephones that are both functional and esthetic. Props can also include the

costumes or uniforms worn by service staff, or the cleaning supplies or kitchenware they use in the course of their work. **Artifacts**, on the other hand, are the remnants of a service having happened: these include receipts, branded pens or matchboxes, or takeaway food. Companies may even sell artifacts in the form of souvenirs or memorabilia.

1.5. Place

In the context of guest experience design, placement relates to two distinct concepts. First, there is the obvious placement of services in physical or digital locations. Second, there is the placement of channels for arranging services in the first place. This section considers both.

1) **Physical environment**. Crucial to the success of hospitality services are the places where they occur. While some service industries, such as banking and finance or telecommunications, can have experiences that exist solely in the virtual realm of websites, mobile apps, and call centers, hospitality necessarily requires some physical locations for services to be performed. At a basic level, the environment in which services are performed is called a **servicescape**. In more elaborate instances, such as in theme parks dominated by immersive experiences, the practice of facilities design is elevated to a level called **worldbuilding**: pronounced examples of this include the Wizarding World of Harry Potter at Universal Orlando Resort and Star Wars: Galaxy's Edge at both Walt Disney World and Disneyland Resorts. However robust, physical environments literally set the scene and serve as the stage for services.

   Location is a principal consideration, and it should account for the geographic proximity of target markets. Ideally, companies will operate facilities near an abundance of potential guests. At the same time, companies should also consider the number of competitors serving the area to ensure the firm can compete viably for market share. Space for parking and access to public transportation should factor into decision-making. Obviously, real estate costs – like the ownership or leasing of land and buildings – play a central role in profitable location selection.
2) **Channel placement**. In a marketing sense, "place" refers not simply to the physical environment where services are enjoyed. "Place" also refers more broadly to the channels in which a service is reserved or sold. From the standpoint of guest experiences, channels therefore help guests research, order, or initiate services.

   Perhaps a traveler wants to arrange for a hotel room. Several options exist for arranging accommodations. The traveler could book a room in advance with the hotel via the establishment's website, app, or hotline. The traveler could book a room in advance via a third-party vendor, like online travel agents Booking.com or Expedia. Or, the guest could take their chances and simply walk into the hotel hoping for availability for their desired length of stay (termed a "walk-in reservation"). Similar options exist when making dinner reservations or getting tickets to cruises or theme parks.

Generally, the channels for hospitality services occur along a few dimensions. First, services can be procured directly from the provider or from a third-party vendor. Second, services can be arranged physically at the service location or digitally through apps, websites, and call centers. Third, services can be reserved in advance or arranged spontaneously (again, a "walk-in"). These dimensions are not mutually exclusive, so firms can arrange a combination of channels.

1.6. Promotion

Promotion concerns the manner in which service experiences are advertised to guests. While much of this occurs from a marketing standpoint, there are two key considerations that businesses should make with respect to promotional activities.

First, promotions necessarily help customers form expectations about the quality and value of the service being advertised. These expectations will affect customers' perceptions as they experience the service and evaluate it after the fact. Expectations that are met or exceeded will result in guest satisfaction, whereas expectations that are unfulfilled have the opposite, undesired consequence. Companies should consider this when developing their advertising campaigns to level-set guest expectations.

Second, certain aspects of the promotional process involve touchpoints along the customer journey. Direct marketing efforts, such as through email or text, and contact through sales representatives should help the guest evaluate a potential future service in tones consistent with the concept and brand of the organization. Similarly, a company's partnerships with other organizations play a critical role in reinforcing the brand identity of the service. The affiliation of The Ritz-Carlton with the luxury retailer Asprey affects the guest experience both (a) via the luxurious Asprey bath amenities that enrich The Ritz-Carlton hotel stays and (b) by the reminder of The Ritz-Carlton when hotel-branded products appear in Asprey's marketplaces. As with the first point, all of these promotional touchpoints reinforce guest expectations.

1.7. Price

The final factor of guest experiences is the most economic: price. While this book will not delve into the setting of price rates, consider the implications of pricing structures on guest experiences. *When* a guest pays (before, during, or after) and *what* they purchase are important considerations in the design of hospitality experiences. Relatedly, what a guest receives as "complimentary" versus what they might be up-charged for is also relevant to experience pricing.

Pine and Gilmore (2011) classify **admission** along two dimensions: admittance determines how long the admission can persist (for a single visit, for an ongoing pass, etc.); measurement reflects when the fee is charged (to start an instance, at the end of a period, etc.). Fig. 1 outlines the six main types of fees, along with examples common in hospitality.

In addition to primary admissions, many experiences also have **incidental fees**. Many hotels offer premium rooms or suites at rates higher than the standard room category. Theme park companies offer special passes to minimize guests' waits, such as Six Flags' FLASH Pass. In a night club, promoters may entice groups to buy a table and enjoy bottle service for an evening. On a flight, there may be surcharges for luggage handling, refreshments, and other amenities. **Bundling** refers to the practice of adding many perks to a single fee, whereas **unbundling** refers to the charging of separate fees for each amenity. As companies consider their pricing structures, they should consider ways to monetize premium offerings and should evaluate when in the service process those experiences get promoted and upsold to guests.

Ultimately, service providers need to recognize a fundamental point that Pine and Gilmore make clear: "[the price] alters the buyer's evaluation of the value of the total offering." The perceived value of an experience can be evaluated by the quality experienced relative to the total cost. Evoking customer satisfaction is therefore not just a matter of delivering services of exceptional quality, meeting (if not exceeding) guest expectations – it is also a matter of doing so for the right price.

2. Designing Guest Experiences

Now that the holistic review of service elements is complete, this chapter will next consider how services and encounters can be developed in the first place. Various methods exist for designing customer experiences, but one of the most straightforward comes from Schmitt (2003). Called the **CEM framework**, Schmitt outlines five steps for constructing customer experiences:

1) Analyze the experiential world of the customer.
2) Build the experiential platform.

Admittance	On start	By occurrence	By period
Specific	***Entry fee*** Cost to enter a theme park	***Per-event fee*** Cost to bet a wager at a casino poker table	***Per-period fee*** Cost to rent a hotel room for a night
Open	***Initiation fee*** Cost to enter affiliation with a group, such as a country club	***Access fee*** Cost for a trial period of club membership	***Membership fee*** Cost for ongoing affiliation with a group, such as annual yacht club dues
	Measurement		

Fig. 1. Forms of Experience Admission. *Source*: Adapted from Pine and Gilmore (2011, p. 102).

3) Design the brand experience.
4) Structure the customer interface.
5) Engage in continuous innovation.

To dissect each stage in greater detail, this chapter will do so using an example of the beverage purveyor Jamba Juice, as Schmitt did.

2.1. Analyzing the Experiential World of the Customer

A successful service is one that meets or exceeds guests' expectations. To accomplish this, it is necessary to have a sense of what those expectations might be. This stage includes identifying target guests and segmenting them based on attributes like culture, price sensitivity, and interests. Consideration should be given to other companies the target guests patron, since experiences with those companies will certainly inform guests' expectations. Market research techniques like surveying, ethnographic studies and observations, panels, and focus groups can be used to gauge the wants and needs of the target market and to test concepts before too much capital is invested to realize an experience.

As the team behind Jamba Juice conceived of their business, a natural starting point was this phase of analysis. To develop a concept for the service, the organization needed to identify and understand the needs of its target guests. What type of beverages did they enjoy? What alternatives did they currently patron to satisfy the need for healthy drinks, or were those needs largely unfulfilled? Where would the customers be willing to go for beverages, and how much would they be willing to pay? The answers – collected through extensive research – helped to form the basis of the rest of the service design process.

2.2. Building the Experiential Platform

After understanding the needs and wants of future guests, an organization needs to define its **experiential platform**: that is, it must express the core concept of the service in a way that includes its positioning, value promise, and implementation strategy. This concept serves as the foundation upon which the service is designed, and it can be used as a test to determine whether certain offerings or policies align with the ultimate experience. Schmitt notes that Jamba Juice is positioned as such: "Every time we take your order, we make our blenders dance, and put the party in your cup …" It is easy for experience designers to know if service components deliver that experience, for employees to assess their fulfillment of that positioning, and for guests to discern if that experience is (a) one they want to enjoy and (b) one that gets delivered if they do partake.

2.3. Designing the Brand Experience

As discussed in the section on product, branding is a key component that helps distinguish experiences from competitors. A core part of branding is the brand identity, which includes logos, consistent fonts and colors, and tone. Theming, as also previously described, can add an additional layer that is often necessary in

experiential spaces. In order to resonate with guests, branding should be tested with marketing research and must align with the experiential positioning. For Jamba Juice, branding included activities like name selection, the development of logos, color schemes, and iconography, and the development of a menu with a beverage mix (and item names) resonant with the overall concept.

2.4. Structuring the Customer Interface

In the fourth stage, a business builds upon its experiential platform and brand to develop the actual service experience. Each of the seven components of the marketing mix comes into play, but one is most central to the design process: process, itself. Organizations need to develop quality customer journeys that serve their guests, while bearing in mind the business costs required to operate that experience. For Jamba Juice, key decisions were made regarding the structure of the service process: Where would restaurants be located? How would they be laid-out? What would the process look like for guests, and how would employees and technology support it from the business' vantage point? The experiential platform and brand become tests of sorts, allowing experience designers to assess whether the operational decisions reinforced the Jamba Juice concept – or, if not, that changes be made.

2.5. Engaging in Continuous Innovation

To stay relevant, service firms should regularly review the guest experience to exploit improvement opportunities. This may take the form of reducing pain points causing friction for guests. It may also involve supplementing the service with different add-ons or alternative journeys that better accommodate guests. Operations management techniques like kaizen, six sigma, and lean can provide structured approaches for continuous improvement.

For Jamba Juice, continuous innovation means many things. It promotes the trial of new beverage and food items to respond to changing guest preferences and to react to an evolving supply chain. It considers technology improvements for inventory management, production, and point-of-sale. There are always opportunities to improve training and development for staff members, too.

3. Modeling and Visualizing Guest Experiences

When creating and evaluating the effectiveness of service experiences, designers often find it helpful to visualize the experience in different ways. Visuals can help identify processes and touchpoints called **pain points**, where guests experience inconvenience, inconsistency, or other causes of dissatisfaction. Noting average service and wait times on maps can help to identify efficiencies or innovations. Visuals may also help to train employees so they understand their roles in the process. Doing all of this is challenging work, because services are dynamic over time: especially in environments with heavy coproduction or personalization, there are lots of different paths that guests can take. Recognizing this, however, it is possible to at least document the core customer journey.

A fundamental visual aid is the **process flow diagram** (or **flowchart**). These diagrams outline the steps in a process using a sequence of shapes, most notably the following:

- Rectangles represent a specific process, where some task is performed;
- Diamonds represent decision points, where a choice determines the path forward from a set of options;
- Triangles depict queues, where waiting occurs before a subsequent task begins; and
- Arrowed lines show the connection and direction of each of the elements described previously.

Process flow diagrams are commonly used to document businesses' internal processes, but they can also be used to show the path taken by guests. These specific types of process flow diagrams are called **customer journey maps**.

In the case of services, a particular visualization technique can be used to show both the business and guest experiences in the same diagram: it is called a **service blueprint** (Szende & Dalton, 2015). On the top half of this flowchart, the guest's journey is depicted horizontally above the work of the business; a line of interaction separates the two. Touchpoints can be identified where workflows cross the line of interaction. Visible onstage actions performed by contact employees are highlighted immediately below this line and above a line of visibility. Backstage activities that are similarly performed by contact employees out of view of customers are recorded beneath the line of visibility. Further below, the line of internal interaction separates additional support processes that keep the business running and might usually be considered overhead activities (e.g., hiring, training, employee payroll management, inventory control, etc.). Fig. 2 provides an example of a restaurant service blueprint; it consequently also serves as an example of process flow diagrams in general and, for the actions above the line of interaction, illustrates a customer journey map.

Discussion Questions

1. Many hospitality companies employ the use of theming to flavor the guest experience. This chapter highlights some prominent examples, including Hard Rock Café, Rainforest Café, and theme parks within Walt Disney World Resort and Universal Orlando Resort. Is theming appropriate for all hospitality businesses? Discuss why or why not.
2. Coproduction is a technique employed by many hospitality companies to involve guests in the creation of the experiences in which they partake. Some degree of coproduction is guaranteed in hospitality, since guests engage directly with service organizations and staff. What are some advantages and disadvantages of heavy coproduction, however?
3. Hospitality companies are constantly seeking ways to transform services from "transactions" into "interactions." How can firms leverage technology to humanize the guest experience?

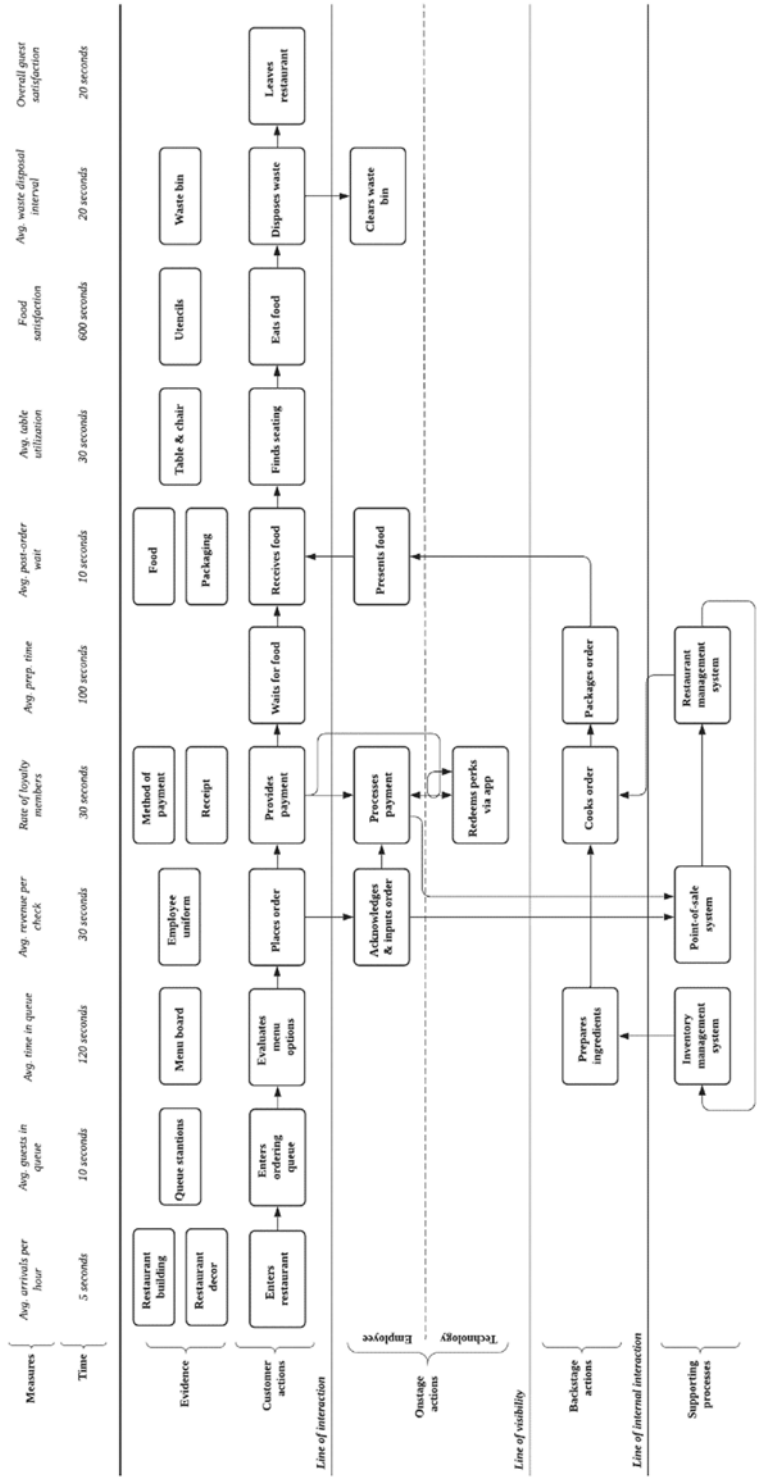


Fig. 2. Sample Service Blueprint for a Fast-Food Restaurant.

Case Exercises

1. Select a hospitality brand. Using each component of the service marketing mix, outline some of the elements in the brand's guest experience. Select two of the seven components and propose ways in which the experience can be improved.
2. Consider this example and use capacity analysis to answer the questions that follow. Table 2 below summarizes the service delivery steps of the fast-paced Mex-Tex Tortilla Shoppe. To assemble orders, six associates are assigned to the six stations on the line; each associate is allocated one or two service steps as follows:
   - Tortilla Person 1: The first associate is responsible for taking the order and operating the tortilla steamer; the entire step takes 10 seconds.
   - Tortilla Person 2: The second associate is responsible for adding rice, protein, and offering bean options.
   - Salsa Person 1: The third associate is offering various salsa options that include mild, medium, and hot ones.
   - Salsa Person 2: The fourth associate is responsible for two major tasks: (a) offerings lettuce and toppings as well as (b) rolling/wrapping the burrito. The first task takes 15 seconds and the second one takes 20 seconds.
   - Expediter: The fifth associate marks the burrito and bags it as necessary.
   - Cashier: The last associate is responsible for two major tasks: (a) taking drink orders as well as (b) ringing up purchases and accepting payment. The first task takes 10 seconds and the second one takes 20 seconds.

   You are the manager of the Shoppe and your priority is that customer orders are processed smoothly and efficiently. The Shoppe's assembly line is constantly hectic, with guests waiting at various stations.
   a. What is the throughput time? What is the current throughput rate per minute and per hour for each service station?
   b. Where is the bottleneck in the process, if any? What is the total capacity of this food service operation per hour?

Table 2. Mex-Tex Tortilla Shoppe Service Delivery Exercise.

Component	**Tortilla Person 1**	**Tortilla Person 2**	**Salsa Person 1**	**Salsa Person 2**	**Expediter**	**Cashier**
Task	Heat tortilla	Add rice, protein, and beans	Add salsa	Add condiments; roll burritos	Mark the burrito with order details	Take drink orders; accept payment
Task length (seconds)	10	10	10	15; 20	5	10; 20
Throughput rate (customers/minute)	_____	_____	_____	_____	_____	_____
Throughput rate (customers/hour)	_____	_____	_____	_____	_____	_____

c. Rearrange the operation by shifting a couple of tasks between service stations, in order to relieve the bottleneck, and achieve a total capacity that is 40% higher than the system was previously.

3. In a team of two or three students, eat out in a restaurant where you have never been before. Then, develop a detailed service blueprint diagram, showing the interaction between different players (see Fig. 2 in this chapter). Please focus on the components above the "line of internal interaction." Analyze the restaurant's service delivery process as it exists and identify ways in which the organization can improve the system.

Managerial Challenge

With home rental businesses like Airbnb and Vrbo on the rise, traditional hotel companies are finding different ways to stay competitive in the broader accommodations industry through the short-term rental of private residences. Marriott International recently entered this tangential industry, for instance, with Homes & Villas by Marriott International (HVMI). Suppose that you are the manager of a regional chain of luxury hotels, Continental Hotels & Resorts. Continental is renowned for providing personalized, high-class service in architecturally distinct properties. You want to expand your market into short-term rental accommodations, and you want to leverage the brand equity (particularly reputation and name recognition) of Continental as you market this extended portfolio of lodging options. At the same time, you want to protect the Continental brand from being diluted with this new foray into the rental of private residences that you do not own outright.

Questions

As you consider expanding Continental into the short-term rental business, how should you treat each component of the service marketing mix in order to represent and respect the Continental parent brand? Where must the experiences between your hotel and residential offerings differ, and where might they align?

Added Insight

Danny Meyer, the well-known restaurateur, recently equipped floor managers and sommeliers of the Union Square Café with Apple Watches. The watches are synced to their reservation and point-of-sales systems. Key employees have access to the profile, preferences, past consumption details, and allergies of every dining member of the parties, and thus, the employees can strengthen their relationship with their guests. Furthermore, management provides dynamic, real-time information, statistics, and key performance indicators. The various stages of the service encounter can also be closely monitored. With the use of internal alert messages, the restaurant can better meet guest expectations and reinforce timing-related service goals that can be a major source of dissatisfaction (Galarza, 2016; Stein, 2016).

Questions

1. To improve customer experiences, the creative use of technology is gaining momentum. Go online and find innovative industry examples.
2. Technology has to solve operational problems and assist customers. Furthermore, hospitality organizations can leverage the dimension of hospitableness by using recent technology. What are the drawbacks of the over-reliance on technology?
3. Can technology completely replace human assistance in the hospitality industry?

Risk and Crisis Management

The hospitality industry is built upon the principle of providing exceptional, personal services to guests. The emergence of COVID-19 signaled a paradigm shift; the pandemic accelerated the use of remote and digital technologies that minimized direct human interactions. Contact-free services are described as "untact" in South Korea, where they embraced an impersonal approach to customer service experiences. Untact services were deployed as a means to fight against the pandemic and to fast track South Korea's economic recovery (Hutt, 2020).

The COVID-19 pandemic had confronted restaurants with unparalleled challenges. Most establishments were mandated to reduce their seating capacity; they had to implement social distancing measures and take other steps to lessen the risk of spreading coronavirus. For some restaurants that were already operating on very thin margins, reopening at such high costs to serve a half-full restaurant was not always feasible.

Controlling the pace of restaurant experiences, thus increasing or reducing the service speed in various dining stages, can influence guest satisfaction. In addition, the focus on the various stages allows the restaurant operator to use numerous duration-based revenue management tactics. See below the six main components of typical full-service dining experiences, as outlined by Sheryl Kimes (2008). Next to the description of each of the six stages, common service delivery-related fail points are noted. At any time, and especially amidst the COVID-19 crisis, restaurant operators are challenged to reduce these fail points and optimize guest satisfaction.

Questions

1. Identify ways to prevent service failures concerning the listed service fail points, under normal circumstances.
2. Research the restaurant industry's response to COVID-19. Explore revised service delivery policies and practices of major restaurant chains and hotel food and beverage departments. How did restaurants minimize the impact of coronavirus in the six stages listed in Table 3?

Table 3. Stages and Common Fail Points of Dining Experiences.

Main Stages	From	To	Common Service Delivery Fail Points
Pre-arrival	Guest chooses to visit a restaurant	Guest arrives at the restaurant	Dealing with the uncertainty of arrivals
Arrival	Guest arrives at the restaurant	Guest is seated at their table	Greeting and seating guests
Pre-process	Guest is seated	Guest receives their first food order	Approaching tables; presenting the menu; taking the order; using suggestive selling techniques
In-process	Guest receives their order	Guest requests their payment	Checking service quality
Post-process	Guest settles their check	Guest leaves the restaurant	Presenting the check
Post-process	Guest leaves	Table is reseated	Resetting tables

Source: Adapted from Kimes (2008, p. 299).

Glossary

Admission: The price paid by a guest to partake in a service experience.
Artifact: A physical trace of a past service, such as a souvenir or memorabilia.
Bottleneck: A point in a service process where demand outpaces capacity, resulting in queuing.
Branding: The association of some specific identity with a product or service.
Bundling: A pricing technique that lumps the fees for multiple services and amenities into a single price.
Capacity analysis: The process of determining the capacity of an operation.
Coproduction: An approach to service experiences where employees and guests create an experience together.
Customer experience management (CEM or CX): According to Gartner (n.d.), the "practice of designing and reacting to customer interactions to meet or exceed their expectations, leading to greater customer satisfaction, loyalty, and advocacy."
Customer journey map: A flowchart that depicts the steps taken by a customer as they consume a product or experience a service.
Customer relationship management (CRM): An organized approach, usually through the use of technology, to recognize guest preferences and past experiences to inform the design of their future experiences.
Cue: A clue in a service process that suggests to the guest what action(s) should be taken in order to proceed.

Experience realms: The classification of experiences in terms of the immersion and activity of guests, specifically resulting in entertainment, escape, esthetics, education, or a combination of the four.

Experiential platform: The core concept of a service, expressed in a way that includes its positioning, value promise, and implementation strategy.

Incidental fee: A price for incremental services on top of a base service, such as in the form of an upgrade or premium offering.

Moment of truth: A service encounter in the customer journey where the guest evaluates the service currently being performed or that has just been performed, in order to assess satisfaction with that part of the experience or the entire experience in total.

Mood: The emotional association guests attribute to the experience as they participate in it.

Pain point: A touchpoint in the customer journey that incites dissatisfaction, often through inconvenience or inconsistency.

Process flow diagram (or flowchart): A tool that allows a sequence of tasks to be visualized with shapes and lines.

Prop: A physical item that helps to fulfill a step in a service process.

Queue: A wait or line that results when production capacity is exceeded by demand.

Service blueprint: A flowchart that depicts both the customer journey and the business process used to create that journey.

Service encounter: Steps in a customer service experience where guests interact with the service provider (either in-person or through technology).

Service marketing mix (or Seven Ps): The seven components critical to both marketing and operating services, being product, process, people, physical evidence, place, promotion, and price.

Servicescape: The setting or environment in which a service occurs.

Theming: The overt use of a brand or unifying concept to flavor an experience.

Throughput rate: The number of customers moving through a service system in some period of time; thus, this is also the inverse of throughput time.

Throughput time: The total elapsed time to complete a service process; thus, this is the inverse of throughput rate.

Touchpoint: The medium, personal or technology, through which service encounters occur.

Unbundling: A pricing technique that separates the fees for multiple services and amenities into several prices, typically with the option to purchase any combination – or all – mutually exclusive offerings.

Worldbuilding: The process of building an elaborately themed servicescape.

References

Booms, B., & Bitner, M. J. (1981). Marketing strategies and organizational structures for service firms. In J. H. Donnelly & W. R. George (Eds.), *Marketing of services* (pp. 47–51). Chicago, IL: American Marketing Association.

Customer Experience Management. (n.d.). In *Gartner's information technology glossary*. Retrieved from https://www.gartner.com/en/information-technology/glossary/customer-experience-management-cem

Galarza, D. (2016, September 28). Danny Meyer just single-handedly made the Apple watch relevant to the hospitality industry. *Eater.com*. Retrieved from https://www.eater.com/2016/9/28/13095780/danny-meyer-apple-watch-resy

Heizer, J., Render, B., & Munson, C. (2017). *Operations management: Sustainability and supply chain management* (12th ed.). Boston, MA: Pearson.

Hutt, R. (2020, August 11). 'Untact': South Korea's plan for a contact-free society. Retrieved from https://www.weforum.org/agenda/2020/08/south-korea-contactless-coronavirus-economy/

Kimes, S. E. (2008). The role of technology in restaurant revenue management. *Cornell Hospitality Quarterly*, *49*(3), 297–309.

Lukas, S. A. (2013). *The immersive worlds handbook: Designing theme parks and consumer spaces*. Burlington, MA: Focal Press.

Mody, M., Seuss, C., & Lehto, X. (2019). Going back to its roots: Can hospitableness provide hotels competitive advantage over the sharing economy? *International Journal of Hospitality Management*, *76*(A), 286–298.

Parasuraman, A., Ziethaml, V., & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, *62*(1), 12–40.

Pine, B. J., II, & Gilmore, J. H. (1998, July). Welcome to the experience economy. *Harvard Business Review, 76*(4), 97-105.

Pine, B. J., Jr., & Gilmore, J. H. (2011). *The experience economy*. Boston, MA: Harvard Business Review Press.

Rohlfs, K. V. (2013). Restaurant revenue management: Basic concepts. In P. Szende (Ed.), *Hospitality management learning modules*. Boston, MA: Pearson Education, Inc.

Schmitt, B. H. (2003). *Customer experience management: A revolutionary approach to connecting with your customers*. Hoboken, NJ: John Wiley & Sons.

Stein, J. D. (2016, October 2). Why a New York restaurateur is arming employees with Apple watches. *TheGuardian.com*. Retrieved from https://www.theguardian.com/technology/2016/oct/02/apple-watches-union-square-cafe-20-new-york-danny-meyer

Szende, P., & Dalton, A. N. (2015). Service blueprinting: From a storyboard to a scorecard. *Journal of Foodservice Business Research*, *18*(3), 207–225. doi:10.1080/15378020.2015.1051429

This page intentionally left blank

Chapter 3

Designing Service Environments

Vanja Bogicevic and Hyeyoon Choi

Abstract

Operations management involves utilizing given resources as efficiently as possible to deliver services to customers and meet business goals. Developing efficient business operations requires a hospitality organization to design efficient service environments, as part of its mission. This chapter articulates the key design and planning strategies for the development of a successful hospitality organization. The first section covers the process of location selection, as the most important factor leading to the success of a hospitality organization. The second section discusses strategies for estimating the number of users (service employees and customers) during peak and idle times to justify a costly financial investment. The third section concerns the readers with the topic of layout planning, with the goal of service optimization for a targeted number of customers. The fourth section deliberates workflow conditions, and finally, the last section addresses the ambience and design of the physical hospitality environment, which is crucial for customer evaluation of a hospitality organization as it creates a first impression.

Keywords: Ambience; layout planning; physical environment; process flow analysis; site selection; space allocation

Learning Outcomes

After completing this chapter, students will be able to:

1. Evaluate criteria for the selection of a location/site for a hospitality organization.
2. Identify the sources and types of data for capacity planning and layout decisions.

Operations Management in the Hospitality Industry, 45–70

doi:10.1108/978-1-83867-541-720211003

3. Analyze strategies for developing an efficient spatial layout for a hospitality organization.
4. Articulate additional workflow considerations for a hospitality organization, such as delivery routes, accessibility, and expansion planning.
5. Describe the components of the physical environment.
6. Articulate the impacts of the physical environment on service design.

Outline

Getting Started

Winston Churchill once said, "We shape our buildings: therefore, they shape us." This quote could not be truer for hospitality buildings, which are shaped to provide enjoyable experiences. However, such a premise does not always hold true. Think about a vacationing family that casually strolls through their resort lobby in summer outfits, en route to a relaxing day by the swimming pool … only to come across conference attendees rushing to meeting rooms for conference breakout sessions. Consider a couple out for a romantic dinner, interrupted by the servers handling take-out orders at a nearby waiter station and passing food like racing batons to hurried delivery drivers. Regardless of the aesthetic appeal of hospitality establishments or the warmth and friendliness of service, poor design decisions can greatly impact the experiences of both customers and hospitality employees. Without a solid foundation to build upon, it is challenging to manage successful hospitality operations. Put simply, when a space does not work, seldom will an operation run smooth. This chapter highlights essential environment and design approaches, from selecting a site for hospitality operations, through

a data-informed approach to layout planning and space allocation, and to accessibility considerations. Lastly, this chapter introduces readers to the psychology behind ambience and design decisions in the built environment.

1. Location Decisions

1.1. Selecting a Location

Ellsworth M. Statler, an American businessman and the founder of the Statler Hotels chain, revolutionized hotel design and development and once said, "There are three things that make a hotel famous – location, location, location" (Cole, 2009).

One of the most important factors leading to the success of a hospitality organization is its location. Thus, the selection of the location is a critical decision that affects the long-term revenue trend of a hospitality organization. This is evidenced in Jain and Mahajan's work (1979) stating that

> *in the development of competition strategy, price can help to cope with, service can help to expand and improve, commodity can be overlapping, promotion can be imitated, however, the benefits from the establishment location to the retailer could hardly be undermined and undervalued.*

Location selection is a macro-decision that takes into consideration which countries, regions, and communities are deemed appropriate for the development of service units (Haksever & Render, 2017). During the location selection process, developers rely on the business goals and insights from target customers. The location not only determines the market share and profitability of the hospitality business, but the convenience of location also determines how attractive the service is to its potential customers. According to Robert McDowell, Choice Hotels' Chief Commercial Officer, 73% of their business travelers report that the location matters the most when selecting a hotel (Jones, 2014). Many factors, such as the property size, the parking capacity, or the convenience of transportation, will also be dependent on the selection of a location.

Location selection follows two steps: finding a location and then choosing a **site** selection criteria for service delivery. There are many reasons why location decisions are extremely important for hospitality organizations. First, it can be extremely challenging (if not impossible) for hospitality firms, especially hotels, to reconfigure and relocate their product offerings; second, the convenience of location will affect the number of visitors visiting the property. Effectively utilizing location optimized for daily operations helps hospitality organizations to better achieve an operational advantage. A hospitality organization that wishes to expand its operations may choose among the three options for location decisions (Haksever & Render, 2017):

- Enlarge an existing facility at the present site;
- Close the present facility and construct one or more new ones on new sites; or
- Open a new site or sites.

Following recent technology advancements and economic growth, identifying an optimal location poses a challenge. According to Tzeng, Teng, Chen, and Opricovic (2002), the restaurant location selection is dependent upon two factors:

1) External factors: External factors include competition, transportation, economic, environment, and commercial area; and
2) Internal factors: Internal factors are more dependent on the operation management of the firm and include the personal background of the manager, decision-making preference, and management system.

In a study investigating potential factors contributing to the hotel location choice, Yang, Wong, and Wang (2012) found four important determinants for location selection, which are as follows:

1) Accessibility: Tourists prefer a location where a variety of different services are available. When hotels choose their locations, proximity to other facilities, such as airports and tourist attractions, is considered;
2) Agglomeration effect: **Agglomeration effect** refers to the benefits a particular hotel can receive from its clustering among other nearby hotels and from its proximity to urban areas. Hotels are often developed in existing or expanding markets, which allows them to gain positive spillover effects from their neighboring hotels and the already-developed local area;
3) Public goods and services: Hotel products along with other tourism-related products are seen as bundles of public and private services. Some examples of public services may include public safety, public infrastructure, and environmental quality; and
4) Urban development: The choice of hotel location gets impacted by urban development, which inevitably changes urban structure.

The section below discusses the site selection criteria to find an optimal location that provides a competitive advantage for hospitality organizations.

1.2. Site Selection Criteria

Location and site selection are strategic decisions because of their long-term effects on demand and profitability. Unlike a macro-decision of location selection, **site selection** is a micro-decision geared toward a specific piece of land or property where the service is established. Site selection can be distinguished into two areas: *community* (within a particular location) and *specific site selection* (Haksever & Render, 2017). Site selection criteria differs depending on the type of business (e.g., a table-service restaurant, full-service hotel, budget hotel) because the site requirements must meet the nature of the service operation.

A study of La Quinta Motor Inns suggests the following site selection dimensions for hotel properties (Bordoloi, Fitzimmons, & Fitzimmons, 2019):

1) Flexibility: Firms are selected in consideration of future economic, demographic, cultural, and competitive changes;
2) Competitive positioning: Firms establish their market awareness and remain competitive among their competitors;
3) Demand management: Firms can control the demand by assessing quality, quantity, and supply and demand; and
4) Focus: Many firms provide the same service focused on their given standard and purpose.

In general, location and site selection are driven by nine dominant factors (Haksever & Render, 2017):

1) Customer-based: The convenience of the location determines customers' decision-making process;
2) Cost-based: The operating cost is their primary concern when selecting a location;
3) Competitor-based: There are clusters of similar businesses where businesses are located near their competitors to observe, share resources, and draw customers to the area;
4) Support systems: Businesses are located where support systems are available;
5) Geographic or environmental factors: The site has geographic or environmental constraints on the location;
6) Business climate: The business climate of a state or city has a major influence on the site location, especially with respect to tax policies, zoning and building codes, public development, etc.;
7) Communication-based: The business requires rapid communication with other companies;
8) Transportation-based: The location decision is dependent on a good transportation network system; and
9) Personal desires of the CEO: The preference or desire of the president or other executives guides the location decision.

As suggested by the evidence from practitioners and researchers, many more factors may influence location selection, such as market labor cost, land availability, weather and climate, to name a few. The sites available for commercial service use typically have strict zoning laws on land usage and ordinances regarding the building appearance (Bordoloi et al., 2019). In urban areas, where land is at a premium, zoning laws typically require that buildings expand upward within a relatively small footprint. On the other hand, suburban and rural areas tend to have fewer constraints on the use of space with larger, more affordable parcels of land. In some places, off-street parking may also be a requirement.

The location also influences the convenience and lifestyles of service to customers and how attractive the business is to those customers. For example, convenience to mass transportation could be determined by the number of bus routes near the location, with more bus routes providing greater convenience. In addition, the size of the commercial area and the extent of completeness of

public facilities influence the location. A restaurant located in a large commercial area may garner greater potential benefit than a restaurant in a rural area. More complete facilities and easier access will attract more customers to the location. These scenarios illustrate how zoning regulations and other factors may guide the design of service facilities that are compatible with their environment and community.

2. Data Requirements for Layout Decisions

The **spatial layout** of a hospitality organization, or the arrangement of the physical elements in space, can greatly impact the operational efficiency. Ideally, the layout enables optimized service delivery to a targeted number of customers at any single moment, in a space that provides physical comfort for both customers and employees. For example, the layout of an event venue should enable smooth admissions procedure with clearly organized waiting lines, streamlined processes for coat check and for ordering of beverages, easy access to a ballroom with sufficient seating/standing capacity, marked exits, as well as adequately designed restroom facilities. To facilitate operations in any hospitality organization and ensure effective performance, planning a layout is based upon balancing the following factors (Haksever & Render, 2017; Muther & Hales, 2015):

1) Estimating capacity of space;
2) Utilizing space to satisfy minimum task requirements;
3) Optimizing the flow of people, inventory, and deliverable products;
4) Enabling convenience for service delivery;
5) Providing safety and comfort for service employees;
6) Possessing a flexible layout for expansion opportunities; and
7) Hosting an attractive appearance of front-of-house area.

When developing a new facility, designers first research the operational needs of the hospitality business and engage in extensive discussion with the business owners and managers. Muther and Hales (2015) suggest that this **systematic layout planning** process starts by gathering data about the six main issues relevant for layout decisions:

1) **Objectives of the business:** Objectives include the business concept, service style, positioning, pricing, operating hours, and future expansion plans. Notice that the design of the physical service space will depend on the business goals, such as to sell rooms per night, menu items, or time for a specific experience.
2) **People/services**: The scope and nature of services delivered to customers is as important as the customers, employees, and their respective roles in the service experience. A hospitality organization can specialize in a single service (e.g., an ice-cream shop) or provide a comprehensive mix of services (e.g., an integrated resort). The number of service employees, their roles, the extent of customer–employee contact, the complexity of the services, as well as service standardization / customization / personalization will impact layout decisions. It is important to predict which services are performed in-house, which are

outsourced over the building life cycle, and how the transition between the two models affects the utilization of spaces.

3) **Quantity demanded:** Designers should consider the volume or output of services delivered, goods produced, and supplies used expressed in the number of customers/visitors per hour/day, or other metrics appropriate for material goods.
4) **Routing**: The process or sequence of users, information, equipment, and participating customers in the service delivery is critical for understanding how people, materials, and equipment must flow through space. The routes are expressed through flowcharts, service blueprints, and customer journey maps. The routes of different actors and inventory impact space capacity, volume of users in customer areas, and vehicles in outdoor spaces.
5) **Space and supporting services**: Designers must consider the required surface area (usually measured in square feet), volume (in cubic feet), and shape of space available or needed to deliver core (e.g., guestroom accommodation, kitchen) and supporting services (e.g., utilities, public restrooms, storages). In some instances, such as aboard cruise ships, supporting services may occupy an extensive floor area; in others, like on airplanes, space available is extremely limited and compact.
6) **Timing**: Last, designers must assess the typical duration of service production and delivery. Time in hospitality services considers how long it takes to process service, how often that service is needed, when and how long the customer consumes the service, and when service times for different groups of customers may overlap (i.e., customers who check-in versus those that check-out, solo activities versus social functions, and visits to dining establishments by the local community). Some tasks in hospitality organizations are performed continuously, such as taking orders from customers or luggage storage and delivery. Others operate on fixed schedules, such as auditing or housekeeping, or periodically, such as maintenance, while some still are affected by seasonality. Because the timing of hospitality services is highly dynamic and not always predictable, the flexibility of layout is imperative for planning.

Sources of data for designers can include business owners, general managers or sales and marketing department members, building engineers, and whoever belongs to the product planning team (e.g., a restaurant chef). The practice of evaluating these issues results in a **spatial program** document that provides detailed information about how the service runs and the physical environment that is best suited for the delivery (Robson & Szende, 2013).

2.1. Capacity Planning

One of the most challenging decisions for a hospitality business is an estimation of the number of users (service employees and customers) during peak and idle times, in order to justify a costly financial investment. Due to the characteristic of perishability in hospitality services, it is difficult to control customer demand and predict **capacity**, or the output per unit of time (Bordoloi et al., 2019). Capacity is typically measured as optimal capacity, meaning that the customers are serviced in a timely manner using the lowest cost of resources, and at maximum capacity

Facility layout has enormous consequences on the capacity of a business, as well as on its ability to serve guests and to enable employees to work efficiently and effectively. While the kitchen in this picture is empty, imagine it buzzing with activity as chefs prepare food and servers whisk dishes away to delight guests. What you see in this empty image, often lost in the busyness, is ample space to move people and store dishware, culinary tools, and ingredients.

when resources are exploited at their maximum levels, which in the long run may negatively affect performance (Wilson, Zeithaml, Bitner, & Gremler, 2018).

A simplified, naïve approach to capacity planning, formulated through **Little's Law,** $L = \lambda W$, calculates the average number of customers (L) as a function of the arrival rate (λ) and the average time that a customer spends on the premises (W). For example, this law can be extended to determine the number of seats needed for a restaurant or the number of employees needed per shift. A pizza place that has a demand of 40 customers during peak hours, where each customer stays 10 minutes on average and it takes 3 minutes for a server to complete the service transaction, would use the formula in the following manner:

$$\begin{aligned}\text{Number of seats needed} &= \text{Demand during peak hours} \\ &\quad \times (\text{Avg. stay per customer} \div 60 \text{ minutes}) \\ &= 40 \text{ customers / hour} \\ &\quad \times \left(10 \text{ minutes per customer} / 60 \text{ minutes}\right) \\ &= 6.67 \text{ seats needed}\end{aligned}$$

The estimated number of employees is:

$$\begin{aligned}\text{Number of servers needed} &= \text{Demand during peak hours} \\ &\quad \times (\text{Avg. transaction time} \div 60 \text{ minutes}) \\ &= 40 \text{ customers / hour} \\ &\quad \times \ (3 \text{ minutes per customer / } 60 \text{ minutes}) \\ &= 2 \text{ employees}\end{aligned}$$

This simplified approach should be exercised with caution because it does not account for the variability of customer arrivals and may underestimate capacity requirements. To address this issue, operations engineers and designers employ more precise **analytical queuing models** based on the Poisson distribution of customer arrival rate or service time. **Queuing theory** posits that for successful performance, "capacity to serve must exceed the demand," otherwise adjustments are bound to happen to either demand or performance (Bordoloi et al., 2019, p. 371). A customer who waits excessively may decide to leave the premises without obtaining the service; employees under pressure to serve more customers may speed up the delivery and decrease service quality. In such cases, service is more prone to failure or inconsistency, and experiential value may be lost along with revenue and profit opportunities.

3. Facility Layout

Aside from capacity constraints, during layout planning, designers determine the size and space allocation of operational units, adjacency requirements among the units, the flow of customers, employees, and goods, and minimize the travel times between the areas to facilitate interaction (Heragu, 2016) which are covered in the following sections.

3.1. Space Allocation Strategies

Many hospitality operations have specific space requirements to comply with city building codes and regulations. Typically, operations with higher complexity and variety of service tasks require more space. Even if guestrooms between two hotel types are of comparable size, a full-service hotel needs more space to house restaurants, spa facilities, concierge desks, and office spaces for employees, compared to a select service hotel. Similarly, quick-service restaurant (QSR) concepts allocate nearly 50% of their space to kitchen and back-of-house, unlike table-service concepts where that number is closer to 30% (Robson & Szende, 2013). Front-of-house space then varies between 50% and 70%. A basic rule of thumb for determining the amount of space is to multiply the baseline space needed (in ft^2 or m^2) with the projected number of units of interest (e.g., seats in a restaurant, visitors in an event venue, hotel guestrooms). While restaurants tend to add an extra 10% to this number for aisles and server stations, the calculation for hotels is more complex.

The North American Association of Food Equipment Manufacturers (NAFEM) provides common guidelines for front-of-house space allocation for different restaurant types, expressed as space needed per single customer seat:

- Banquet facilities: 10–11 ft^2;
- Quick-service restaurants: 10–14 ft^2;
- Counter-service restaurants: 18–20 ft^2;
- Casual full-service restaurants: 12–15 ft^2;
- Club/hotel table-service venues: 15–25 ft^2; and
- Fine dining: 18–25 ft^2.

Following the guidelines, on a modest end, a hotel designing a table-service restaurant for 200 guests should allocate 3,300 ft^2 for its front-of-house area, according to the calculation below.

Minimum front-of-house area needed = Number of guests × Recommended space per seat (in ft^2) × (100% + 10% for aisles/server stations) = 200 guests × 15 ft^2 × 110% = 3,300 ft^2

Table 1 covers space requirements for a standard guestroom module or "bay" for different hotel types. Bay becomes a unit of comparison for other guestroom units in a mix (e.g., standard doubles, kings, junior, and presidential suites). Individual guestrooms, regardless of type, are called "keys." The final spatial program and guestroom mix need to adhere to brand guidelines and follow from the data about rooms in the highest demand. There is a considerable variation in space allocation in hotels depending on the hotel class (Ransley & Ingram, 2004). General guidelines for space allocation for different hotel types are available in Table 2. For example, hotels should predict between 21 ft^2 of meeting space per guestroom for full-service properties and 108 ft^2 for conference hotels. However, developers need to be careful with space allocation, because when hotel physical characteristics such as the number of rooms, food and beverage (F&B) outlets, and the size of meeting space deviate from the norm (i.e., 229 rooms, one F&B outlet, 4,820 ft^2 of meeting space), properties may be discounted in the real estate market (Blal & Graf, 2013).

Hotel service space may include corridors, elevators, stairways, offices, back-of-house employee areas, F&B back-of house, and mechanical and utility rooms.

Table 1. Space Allocation per Guestroom for Different Hotel Types.

Hotel Type	**Guestroom Net Area (ft^2)**
Economy	300–350
Select service midscale	220–300
Extended stay	400–800 (for 1 br/2 br suites)
Upscale (urban)	350–440
Upscale (conference)	340–410
Luxury	410–550
Resort	+10–20% on standard room sizes

Note: Figures are generated based on suggested guestroom sizes for large US brands.

Table 2. Space Allocation for Hotel Spaces for Different Hotel Types.

Hotel Type	Hotel Building Gross Area Summary			
	Guestroom Count in Hotel	Guestrooms (%)	Public Space (%)	Service Space (%)
Economy	<100	90	5	5
Select service midscale	~100–150	65	15	20
Extended stay	~100–150	80	10	10
Upscale (urban)	100–300+	75	15	10
Upscale (conference)	300–1,000+	65	20	15
Luxury	100–200+	60	25	15
Resort	100–500	50	40	10

Note: Guestroom count varies on a selected site and location, as well as brand guidelines. Hotel public space may include lobby, vestibule, F&B outlets front-of-house, meeting space, business center, retail, fitness center, guest laundry, entertainment, and wellness areas.

Millennials and Generation Z are pushing the boundaries of minimum guestroom sizes. Specifically, they ask for more efficient, versatile designs that favor larger public areas and co-working spaces over spacious hotel rooms. While the average hotel guestroom in the United States is around 330 ft^2, guestrooms in some trendy select service hotel concepts are below 200 ft^2. Marriott's Moxy boosts with its "cozy" 183-ft^2 room, CitizenM has tech-savvy 150-ft^2 rooms, while micro-hotel YOTEL in London's Heathrow Airport offers a 75-ft^2 cruise ship-like cabins (Castillo, 2015; Greenfield, 2011). These concepts are certainly the winners in efficient design solutions, although their tight spaces can also have limited guest appeal.

3.2. Process Flow Analysis

Given that a good layout can make or break service operations, one of the phases in the design of service environments is to divide the service process into a sequence of steps or areas that correspond to specific service activities. Such **process flow analysis** helps identify the managerial challenges and highlights the relationship and dependency of service procedures which shape the layout design (Bordoloi et al., 2019). Drawing a diagram of activities and relationships among the identified spaces precedes the adoption of layout strategy and the selection of preliminary schematic drawings, namely floor plans (Muther & Hales, 2015). Those, in turn, serve as a foundation to develop the remaining construction and engineering documents. The two most relevant layout strategies for hospitality organizations are:

1) Product-oriented; and
2) Process-oriented layouts.

Product-oriented layout is a type of layout used to streamline labor into a limited sequence of tasks/activities in a fixed order of performance (Bordoloi et al., 2019; Haksever & Render, 2017). The order of the tasks in this **assembly line** is not flexible. For this layout, it is crucial to maintain a steady flow of operations and customers to equalize the time spent at each activity and avoid **bottlenecks**, or the activities that take the most time to perform and thus reduce efficiency by stalling subsequent activities. Typical examples of product layout in hospitality are QSR kitchens, counter-service "build-your-own" meal restaurants, and cafeterias. To illustrate, imagine a firm is designing a Mexican fast-casual place where customers build their meals, similar to Chipotle Mexican Grill. There are six service sequences to generate one meal (see Table 3).

If each server is assigned a single task, server 6 takes 40 seconds to process payments at the register which limits the number of customers served in one hour to 90 (Fig. 1A). Also, notice how server 3 takes 30 seconds to serve toppings.

Table 3. "Build-Your-Own" Restaurant Process Times.

Sequence	Description	Avg. Service Time (Seconds)
1	Choose an entree	20
2	Choose a protein	5
3	Choose toppings	30
4	Choose extra sides	15
5	Choose a beverage	5
6	Pay and pick up an order	40

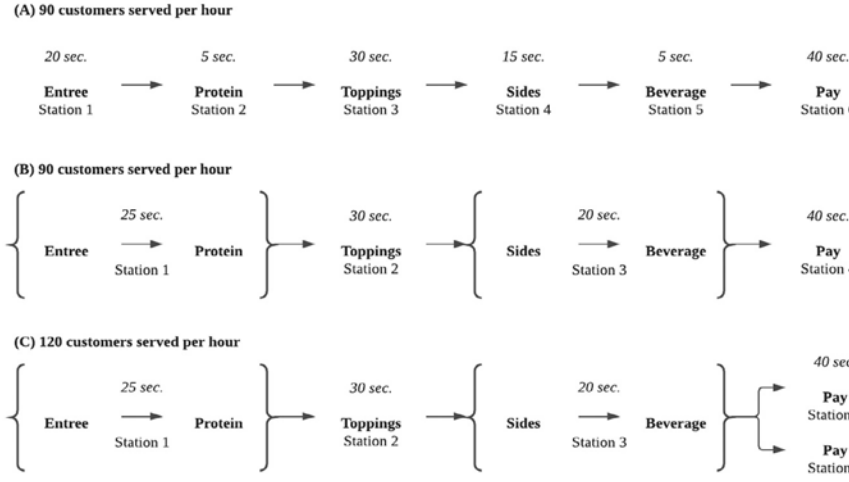


Fig. 1. Balancing Product-Oriented Layout.

Thus, server 3 and server 6 are bottlenecks, and this solution is poorly balanced (compare them to server 2, who takes only five seconds to serve a protein). An alternative solution, depicted in Fig. 1B, could be achieved by merging entree and protein service, and sides and beverage service, and by assigning one server to each new station. This solution reduces costs because only four servers are assigned, but there is still the bottleneck at the cashier station which continues to limit service to 90 customers/hour. If one of the servers is assigned to help at the cash register, it reduces that bottleneck (Fig. 1C). In total, 120 customers can now be served in an hour, and the bottleneck shifts to server 2. As seen in this example, many solutions can be proposed to increase the productivity of the slowest activity.

Process-oriented layout does not have a fixed sequence of service tasks. Instead, tasks are arranged by their similarity to tailor to customers' needs and minimize the distance among related tasks, also known as "critical adjacencies." This is why this layout approach is called a **relative location problem**. Typically, service units that have a large circulation of guests, employees, or goods are placed adjacent to each other. Good examples include casinos, conference hotels, theme parks, and resorts – as illustrated in the next example.

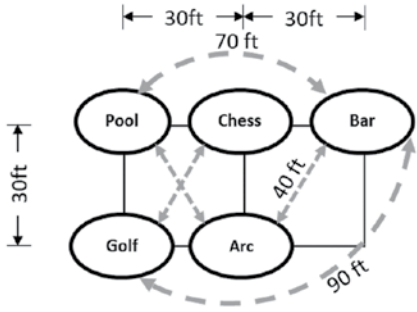
Imagine that the owner of a family-style resort in Florida is redesigning their outdoor swimming pool area to accommodate some new amenities: a mini-golf course, a life-size chess board, a bar, and arcade games. The first step is to predict the number of trips made by resort guests between each amenity in a single day following data from similar resorts (Table 4). Table 4 and the initial solution in Fig. 2A show how the amenities with high flow between them, such as the pool-and-bar and bar-and-arcade combos, should be located next to each other. For this example, assume that the distance between each grid in Fig. 2 is 30 ft. Solution 2a calculates the total flow distance for all guests at 72,800 ft. Upon switching the places of the bar and pool, as in Fig. 2B, the total flow distance is reduced to 54,800 ft.

In complex hospitality services, some processes may require product-oriented layouts, while others necessitate process-oriented layouts, with a combined solution known as **hybrid layout** (Heragu, 2016). The advancement of robots used in service delivery and in the execution of menial, automated tasks often involves the use of hybrid layouts to minimize labor costs and throughput times.

Table 4. Daily Flow of Resort Guests Between Outdoor Amenities.

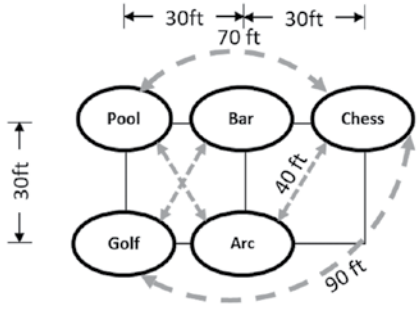
	Pool	**Mini-Golf**	**Chess**	**Bar**	**Arcade**
Pool		200	40	500	100
Mini-golf			50	100	150
Chess				100	50
Bar					300
Arcade					

(A) Initial layout



Pairs	Daily flow × Distance (ft.)
Pool-Golf	200 × 30
Pool-Chess	40 × 30
Pool-Bar	500 × 70
Pool-Arcade	100 × 40
Golf-Chess	50 × 40
Golf-Bar	100 × 90
Golf-Arcade	150 × 30
Chess-Bar	100 × 30
Chess-Arcade	50 × 30
Bar-Arcade	300 × 40
Total Flow Distance	78,200

(B) Move bar closer to pool



Pairs	Daily flow × Distance (ft.)
Pool-Golf	200 × 30
Pool-Chess	40 × 70
Pool-Bar	500 × 30
Pool-Arcade	100 × 40
Golf-Chess	50 × 90
Golf-Bar	100 × 40
Golf-Arcade	150 × 30
Chess-Bar	100 × 30
Chess-Arcade	50 × 40
Bar-Arcade	300 × 30
Total Flow Distance	54,800

Fig. 2. Planning Resort Amenities Using Operations Sequence Analysis.

4. Additional Workflow Considerations

4.1. Customer and Delivery Routes

According to Mintel (2018), 27% of US consumers order delivery through restaurant apps, 13% through third-party apps, and 28% call restaurants to order. While the restaurateurs appreciate the incremental increase in sales from deliveries, such orders may create an unintended burden for kitchen operations and the physical environment (Muller, 2018). The traffic from online orders through UberEats, GrubHub, and DoorDash platforms can come close to dine-in customer traffic in restaurants and inflate demand. Consequently, restaurants need to reconfigure layouts to accommodate additional food prepping, cooking, and packing stations in back-of-house area, pickup areas for storage of completed orders, and the flow of prepared food from kitchens to doors. A potential solution to constrained kitchen spaces are "ghost kitchens," a novel concept of on-demand rental kitchen facilities such as Cloud Kitchens or Kitchen United where delivery-only or virtual restaurant delivery-only brands can share space and resources to overcome the need for kitchen renovations in established restaurants.

4.2. Americans with Disabilities Act and Ergonomics

Although the focus of operations management is on efficiency, hospitality physical environments need to be designed with ergonomics and accessibility in mind. The **Americans with Disabilities Act of 1990** (ADA) is a legal regulation in the United States that ensures all newly built venues – and the majority of renovated spaces – are accessible for customers with disabilities. ADA provides spatial requirements for public use, such as clear space for wheelchair floor maneuvering and maximum counter heights. Fig. 3 illustrates important ADA space clearances. With the rising interest in employees' and customers' wellness, hospitality organizations and design planners are becoming more inclusive and should design ergonomically sound spaces that contribute to the comfort of all customers, regardless of their physical abilities.

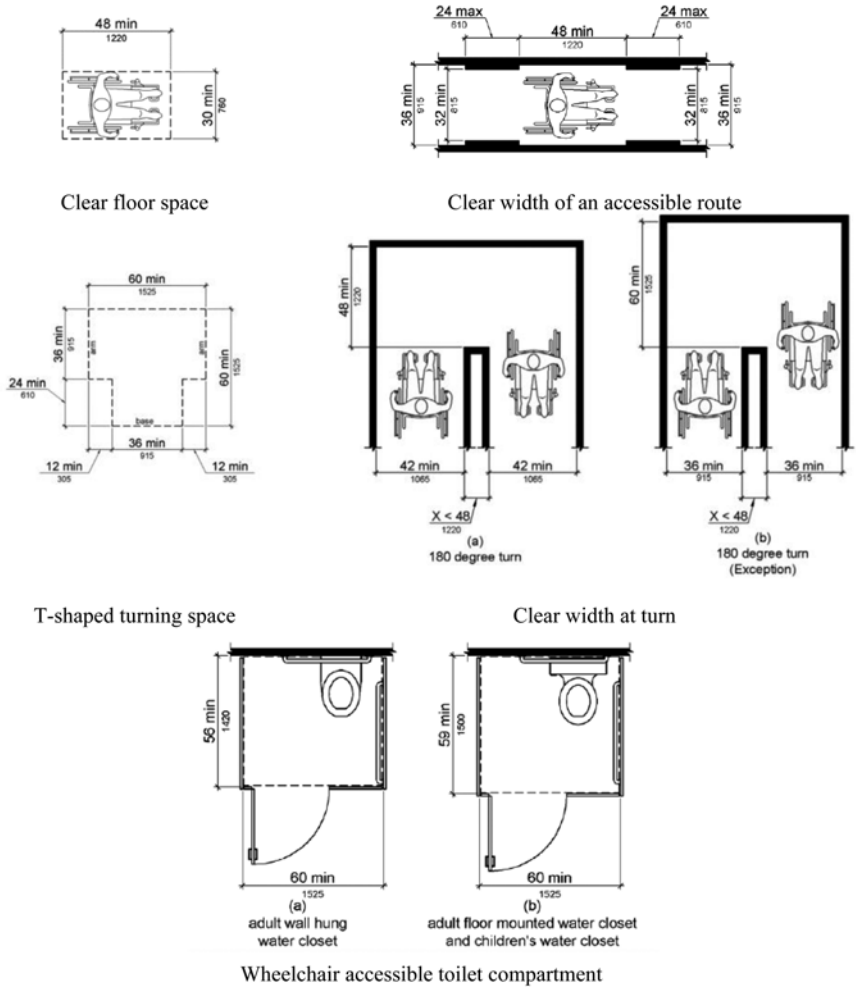


Fig. 3. ADA Space Clearance. *Source*: Adapted from US Department of Justice (2010, September 15).

Physical ergonomics is a science of designing spaces that are easy and comfortable for humans to use and that contributes to operational efficiency and safety (Salvendry, 2012).

4.3. Planning for Expansion

Buildings are designed to meet certain requirements to successfully open. However, designers and developers need to carefully consider how to design a hospitality facility to meet the needs of future operations. It is not uncommon that restaurant or hotel experiences change in volumes, occupancy, and sales over time. For instance, a restaurant kitchen should have an opportunity to add additional pieces of equipment, and dining and banquet rooms should allow for expansion of seating capacity. Hotel facilities such as gyms, spas, business centers, and meeting rooms should be designed to accommodate reuse and expansion. Changing the mix of hotel guestrooms is not particularly doable, though it may be possible – especially if modular design is used. It is recommended to start with a different guestroom mix for different hotel types (Table 5). However, brand guidelines, location, site, and guest demand (as suggested in a market study for a given location) all drive the guestroom mix. Families and leisure travelers visiting resorts demand more double-double, double-queen, and connected guestrooms. Lifestyle brands have very little demand for suites, whereas more upscale and conference hotels have 5%–10% of their mix in suites. Suburban hotels have a higher demand for suites, whereas business travelers and couples staying in urban hotels demand more king guestrooms (Hoisington, 2016). Finally, luxury and ultra-luxury hotels may have very little – to possibly no – demand for double-double or double-queen guestrooms and instead focus on offering king suites, luxury suites, and villas.

Table 5. Guestroom Mix for Different Hotel Types.

Hotel Type	**Guestroom Mix**		
	Double-Double or Queen-Queen (%)	**King (%)**	**Suites (%)**
Economy	80	20	0
Midscale	45	45	10
Select service	40	55	5
Extended stay	0	75	25
Upscale (urban)	35	60	5
Upscale (conference)	60	30	10
Boutique hotels	12	80	8
Luxury	20	60	20
Ultra-luxury	0	65	35
Resort	75	20	5

Note: Expressed as a percentage of total room count.

5. Ambience Design

With the simultaneous production and consumption of hospitality services, the **physical environment** becomes a crucial part of the service. When visiting a hotel or a restaurant, guests observe and process physical environment elements into a set of feelings to a greater extent than service providers often realize. The longer the duration of service, the more important the role of the physical environment for the formation of service experiences.

Physical environments are found to influence individuals' psychological states in such a way that positive internal responses to the physical environment can enhance customer satisfaction and service quality, while negative responses to the environment may degrade them (Bitner, 1992). Hospitality organizations such as hotels, resorts, and conference centers are complex physical environments that depend on well-conceived layout, ambience design, and interior decoration to achieve the firms' intended objectives.

The discipline that studies the effect of the physical environment on human behavior is referred to as **environmental psychology** (Kotler, 1973). The built environment includes human and physical environment stimuli (S) that influence an individual's emotional state (O), which in turn affects their behavioral responses (R) – as suggested by the **stimulus-organism-response (SOR) paradigm** (Mehrabian & Russell, 1974).

Specifically, designers and researchers distinguish among a few types of stimuli. For example, Baker (1986) categorizes the physical environment stimuli into the social, design, and ambient factors. Similarly, Bitner (1992) uses the term "servicescape" to denote three types of physical environment elements, namely ambient cues, layout, functionality, signs, symbols, and artifacts.

Among many physical environment dimensions, interior design features are defined as less permanent aspects of the physical environment. The visual cues to the interior design features include colors, finishes, lighting, furniture, fixtures, and equipment.

5.1. Colors and Finishes

Colors and finishes are among the most discernible visual cues in hospitality interiors (Choi & Stafford, 2013). Utilizing different colors and finishes (e.g., materials, patterns, or textures), it is relatively easy to alter the atmosphere of an environment, and even the moods and emotions of people within the environment. While warm colors are known to evoke feelings of arousal and excitement, cool colors are more associated with calmness, peacefulness, and pleasantness. Colors and finishes are also found to help people navigate their way or convey symbolic meanings. For example, The Reserve at Grand Hyatt Baha Mar, Bahamas is exclusively designed with Asian-inspired décor using red accents with golden fixtures to symbolize good fortune.

5.2. Lighting

Interior lighting can impact customer's perceptions of the environment and communicate esthetic and psychological meanings. Some people associate bright fluorescent lighting with a discounted environment, while soft incandescent lighting

prompts a perception of higher quality. Lighting selection can influence interpersonal communication, comfort, and arousal. EVEN Hotels, a wellness-oriented brand from InterContinental Hotels Group, use LED mood lighting near beds, designed to help guests to relax and mentally reset. Guests can even choose their preferred color using remote controls. Hillstone Restaurant Group creates a dramatic effect in their dimly lit interiors with floor uplighting and pinlight spotlights that illuminate table surfaces and emulate a hearth. Such lighting creates an intimate ambience that brings guests closer together and subconsciously influences the duration of their dining experience.

5.3. Furniture, Fixtures, and Equipment

The quality of furniture, fixtures, and equipment (FF&E) can all play an important part in building a hospitality facility identity and in creating an overall esthetic impression. The selection of FF&E that follow ergonomics principles not only affects the comfort of guests but also facilitates the fulfillment of their functional needs. For instance, the Fairmont Washington, D.C., Georgetown, known for its luxury image, has recently completed a $27 million renovation led by the Wimberly, Allison, Tong, and Goo (Speros, 2017). Their standard king-guestroom now offers a comfortable chaise and a flexible round table that doubles as a dining spot when it is not used as a working space.

With artificial intelligence (AI) growing in increased interest, technology gadgets and equipment are progressively integrated into facility design. In "smart hotels," guests will be able to control lights using voice commands; digital screens will display changing artwork based on their preferences, and bedsprings will be adjusted to fit the guests' body weight for added comfort. Although this may sound futuristic, several hotels have already piloted smart hotel room prototypes. For instance, some Marriott hotels feature integrated tablets in their "smart mirrors" in several locations, and Hilton has a "connected room" platform that allows customers to use their mobile device as the in-room remote to control lighting, temperature, and televisions. As illustrated in these examples, hotels extensively use subtle cues such as the physical environment to add value for guests, often with an added bonus of using energy-efficient technology that reduces utility costs.

Discussion Questions

1. Both Baker (1986) and Bitner (1992) have developed typologies to investigate the role of the physical environment on human behavior. What are the main differences between these two typologies?
2. A hotel developer is interested in building a suburban select service hotel and is looking at potential sites. What is the minimum hotel building gross area (in ft^2) needed for a select service hotel with 100 rooms?
3. The sandwich shop owners are looking to expand to a different location in town that should have the seating capacity of 23 seats. They know that the kitchen and storage space for their concept need to occupy 35% of the total restaurant area. What is the minimum area (in ft^2) needed for the new sandwich shop?

Case Exercises

1. Sometimes expanding an existing hotel at the present site can make more sense than developing a new site; other times, it is exactly the opposite. In some urban cities, a modest new construction project can cost more than $3 million before a shovel is even put in the ground, with the price per key of $100,000+ (Kostuch Media, 2014). Alternatively, you can enlarge an existing facility with definable operating results for under $40,000 a key. When does it make sense to develop a new hotel property, when you can expand an existing facility at a significantly lower cost?
2. Jason is a Banquet Manager at the Winds hotel. The Winds is hosting a conference for 150 guests and Jason was asked to organize the layout of the breakfast buffet with server stations. The order of the server stations is not fixed; however, customers need to pick up their tray and plate before they are served any food or beverages and no server is needed at this station. The process involves the following stations:
   1) In the current sequence, if one server is assigned to each station (except station 1) what is the maximum throughput rate or the number of guests that can be served breakfast in an hour? What is the bottleneck activity?
   2) How many servers should Jason assign to each service station to ensure that all 150 guests can be served breakfast in one hour? You may suggest the relocation of service stations.

Table 6. The Winds hotel breakfast buffet process times.

Service Station	Avg. Service Time (Seconds)
1. Pick up tray and plate	10
2. Serve main dish (e.g., eggs, omelet, or vegan options)	60
3. Serve sides and bread	30
4. Serve fruits and yogurt	20
5. Serve beverage	15

   3) Draw a process flow chart of your final solution.

3. Melissa is the president of the Star Hotel Group hotel development company. Her company recently purchased an old condominium building in a busy downtown area of a major US city. They intend to convert the building into a branded select service hotel. Melissa is working with the design team to develop a guestroom mix for a standard floor that is 9,000 ft^2 in size. She delivers the data to the design team, based on the demand for similar properties in the area and brand design standards (Table 7).

Table 7. Demand data and brand hotel standards for guestroom mix.

Traveler Types	**Percentage of Demand**	
Business travelers	45	
Leisure travelers (couples)	35	
Leisure travelers (families)	20	
Guestroom Types	Brand-Recommended Type Mix (%)	Area (ft^2)
Standard king	67	243
Double-double	27	306
Accessible king	5	366
Accessible double-double	2	367

Note: Service area (corridors, stairs, elevators, storage, etc.) is 17% of total floor area.

Considering the demand data and recommended brand design standards, what would be a balanced guestroom mix per one standard floor for the newly designed hotel? What is the corresponding net guestroom area per floor?

Managerial Challenge

Javier Santos had a challenging task ahead. His team of hotel developers and designers were recently contracted by the Riviera, a 325-room luxury golf resort that attracts a balance of leisure, group, and incentive guest segments who stay 2.5 nights on average. The property features a full-service fine-dining restaurant, a lobby lounge and bar located in the main building premises, along with 75,000 ft^2 of indoor meeting space, and outdoor gardens and courtyards that cater to group events, socials, and weddings. Due to its vast recreational amenities, such as an 18-hole golf course, a tennis court, hiking trails, a swimming pool, and a 15,000 ft^2 spa, the resort is loved by its guests and the locals alike, who patronize the clubhouse steakhouse. However, they have been vocal about several pain points.

The traditional front desk design is inconveniently located in the leftmost part of the lobby, hidden behind massive decorative pillars. After checking-in, guests need to walk back to the main lobby and then turn around the nearby gift shop to get to the guestroom elevators. Likewise, departing guests would get off elevators and retrace their steps back to the main lobby to check out at the front desk. Not only do the two groups run into each other frequently, but the first-time guests would often mistake the front desk for the concierge desk located on the opposite side of the lobby. Guests relaxing in the lounge and sipping cocktails at the bar would overlook the three, ghostly vacant retail spaces that once housed luxury boutiques. Still, the informal living room lobby lounge offered beautiful vistas on the outdoor patios. It was a pity that the patios were underutilized, with seating mostly located indoors. Javier gathered his team around the layout blueprint and started sketching (see Fig. 4).

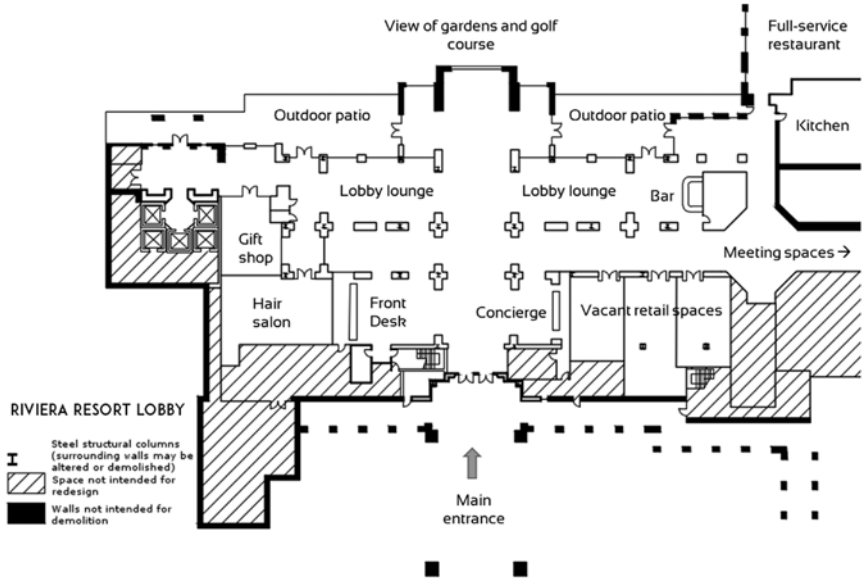


Fig. 4. Floor Plan of the Riviera's Lobby.

Question

Thinking of the guest circulation, the operational needs, the diverse guest segments, and the space characteristics, how would you redesign the lobby? What lobby amenities would you keep versus remove? How would you utilize the empty retail space? Consider the renovation from the standpoint of layout operational efficiency, the ambience, and attraction points.

Added Insight

As learned from this chapter, operational efficiency in hospitality organizations starts with layout planning and design. In line with technological advancements, a data-driven approach to planning is becoming increasingly dependent on the Internet of Things (IoT), or connected devices, and AI. These IoT devices range from personal smartphones and smartwatches and radio-frequency identification (RFID) chips in credit cards to sensors in buildings that track utility usage and energy consumption. IoT sensors in building management are integrated into a cloud-based, collaborative platform for building management. Beacons and motion sensors are used to track occupancy in public and office areas of a hotel, monitor foot traffic of guests and employees and the movement of equipment, and record the activity at different workstations.

The major benefit of IoT-powered data gathering is the real-time insight which helps identify design fallacies and inform immediate actions to optimize capacity or process flow. For example, data from occupancy sensors can be visualized in a three-dimensional building information model (BIM) and indicate crowding points and bottlenecks. In response, the management may decide on how to

manage routing of guests, employees, and inventory or add extra workstations to reduce bottlenecks. In restaurants, managers can track the activities of employees and the exact usage of equipment and compare these with the recorded orders from foot and online traffic to improve operational efficiency.

This abundance of data could become essential in the design process. Designers can utilize past data and AI algorithms to evaluate how technologies fit into the environment and its operational efficiency in the design of the facility (De Keyser, Kocher, Alkire, Verbeeck, & Kandampully, 2019).

Question

Imagine that you are a hotel manager interested in installing occupancy and activity sensors in your full-service hotel property. Identify three areas in the hotel where the data gathered through sensors would help you increase the layout efficiency. Explain why you selected the areas and how you would exploit that data.

Risk and Crisis Management

The hospitality industry has been recovering from the devastation of the COVID-19 pandemic by proving its resilience to the crisis. Disasters, such as the COVID-19 crisis, are sure to change how the hospitality sector delivers services and manages customer experience. For example, in this instance, the American Hotel and Lodging Association (AHLA) convened an industry-wide council consisting of representatives from the world's largest hospitality companies; together, they developed cleaning standards released as a "Safe Stay Guest Checklist." AHLA's Safe Stay initiative focuses on enhancing hotel cleaning practices, social interactions, and workplace protocols. In line with the crisis management readiness initiative, many other hospitality organizations across the world implemented more strict and robust cleanliness protocols.

To reduce the risk of spreading and contracting infectious diseases like COVID-19, customers have high expectations of safety and cleanliness. Safety and cleanliness assurance serve as key competitive advantages for hotels looking to attract customers and to operate successfully. Ever more hospitality cleaning protocols are regularly being developed, demonstrating a continued commitment to maintaining the highest safety and cleanliness standards.

For example, Marriott's Global Cleanliness Council advised that all the surfaces in guestrooms and public spaces are thoroughly cleaned with hospital-grade disinfectants and that disinfecting wipes be made available in each room for guests' personal use. Electrostatic sprayers are also employed to sanitize surfaces throughout the hotel. Amidst the crisis, signage in lobby areas was placed to remind guests to maintain social distancing protocols, along with new floor and furniture plans that accounted for distancing requirements and revised food and beverage experiences (e.g., no buffet dining).

Hyatt Hotels, on the other hand, introduced a cleaning, disinfection, and infectious disease prevention accreditation program as a part of Hyatt's Global Care & Cleanliness Commitment. In collaboration with cross-functional panel

of trusted medical and industry advisors, including Cleveland Clinic and Lysol, Hyatt strove to fine-tune safety protocols and mandate more frequent cleaning of public spaces and certain "high-touch" areas. With their "less contact, more care" initiative, Hyatt offers guests enhanced digital amenities including mobile check-in and check-out, in-room Chromecast, and mobile entry.

Hilton established Hilton CleanStay Initiative in collaboration with Reckitt Benckiser, the parent company of Dettol and Lysol brands, and Mayo Clinic's Infection Prevention and Control team to develop all cleaning and disinfection protocols. For instance, an entirely contactless arrival was developed and activated via Hilton's mobile app.

As observed in the examples above, risk and crisis management empowers hospitality organizations with more flexibility to deliver services while becoming less vulnerable to – or at least mitigating and minimizing exposure to – external risk. Hospitality businesses that are capable of monitoring and staying proactive with health and safety regulations in the design of their facilities can ensure competitive edge during crises by trading more elaborate designs with more personalized and efficient service.

Questions

1. COVID-19 posed challenges that required the entire hospitality industry to rapidly develop new business models to keep both guests and staff safe. New approaches placed more focus on reassuring everyone that the organizations do all they can to maintain safe and hygienic environments. What are some design-oriented best practices from the pandemic that organizations can deploy to enhance cleanliness and put guests at ease?
2. As hotels embrace the "new normal" following a crisis like COVID-19, what changes, in your opinion, would be the most effective for signaling to guests that a hospitality facility is a safe environment for patronage?

Acknowledgement

The authors would like to express their special thanks to Raj Chandnani, Executive Vice President and Chief Development Officer of WATG, and Ronald Lustig, Principal of Earl Swensson Associates, for their invaluable recommendations and contributions to this chapter.

Glossary

Agglomeration effect: The benefits the firm can receive from the clustering.

Americans with Disabilities Act of 1990 (ADA): A legal document that ensures all newly built and majority of renovated spaces are accessible for customers with disabilities.

Bottleneck: A point in a service process where demand outpaces capacity, resulting in queuing. It is the slowest or the longest operation or activity in a sequence that limits the completion of the entire service operation.

Capacity: The output per unit of time.
Environmental psychology: A form of psychology that studies how the physical environment influences human behavior.
Ghost kitchen: An on-demand rental kitchen facility where space and resources are shared, and kitchen tasks can be outsourced by existing or virtual restaurants.
Location selection: A macro-decision that takes into consideration of which countries, regions, and communities within their location are deemed appropriate in building service units.
Physical environment: The environment where the service is being provided.
Physical ergonomics: A science of designing spaces that are easy and comfortable for humans to use and contribute to operational efficiency and safety.
Process flow analysis: The partitioning of the service process into a sequence of steps or areas that correspond to specific service activities.
Process-oriented layout: A type of layout that does not have a fixed sequence of service tasks. Instead, tasks are arranged by their similarity to tailor to customers' needs and minimize the distance among related tasks.
Product-oriented layout: A type of layout used to streamline the labor into a limited sequence of tasks/activities in a fixed order of performance.
Site selection: A micro-decision that takes into consideration of which countries, regions, and communities within their location are deemed appropriate in building service units.
Spatial layout: The arrangement of physical elements in space.
Spatial program: A document that provides detailed information about how the service runs and what physical environment is best suited for the delivery.
Stimulus-organism-response (SOR) paradigm: Explains the influence of the stimuli in a physical environment (S) on an individual's emotional state (O), which in turn affects behavioral responses (R).
Throughput time: The total elapsed time to complete a service process; thus, this is the inverse of throughput rate.

References

Baker, J. (1986). The role of the environment in marketing services: The consumer perspective. In J. Czepeil, C. A. Congram, & J. Shanahan (Eds.), *The services challenge: Integrating for competitive advantage* (pp. 79–84). Chicago, IL: The American Marketing Association.

Bitner, M. J. (1992). Servicescapes: The impact of physical surroundings on customers and employees. *The Journal of Marketing*, *56*(2), 57–71.

Blal, I., & Graf, N. S. (2013). The discount effect of non-normative physical characteristics on the price of lodging properties. *International Journal of Hospitality Management*, *34*, 413–422.

Bordoloi, S., Fitzsimmons, J., & Fitzsimmons, M. (2019). *Service management: Operations, strategy*, information technology (9th ed.). New York, NY: McGraw-Hill Education.

Castillo, M. (2015). Tiny hotels: Check in, then squeeze in. *CNBC*. Retrieved from https://www.cnbc.com/2015/11/03/tiny-hotels-check-in-then-squeeze-in.html

Choi, H., & Stafford, K. (2013). The effect of Servicescapes on consumers' wellness experience. In J. Kandampully (Ed.), *Service management in health & wellness services* (pp. 77–97). Dubuque, IA: Kendell Hunt Publishing.

Cole, R. (2009). A new "location, location, location" for the hotel industry. Retrieved from https://rockcheetah.com/blog/hotel/a-new-location-location-location-for-the-hotel-industry/

De Keyser, A., Köcher, S., Alkire (née Nasr), L., Verbeeck, C. and Kandampully, J. (2019). Frontline Service Technology infusion: conceptual archetypes and future research directions. *Journal of Service Management, 30*(1), 156-183.

Greenfield, B. (2011). The world's tiniest hotel rooms. *Forbes*. Retrieved from https://www.forbes.com/sites/bethgreenfield/2011/08/11/the-worlds-tiniest-hotel-rooms/#19951ddc182a

Haksever, C., & Render, B. (2017). *Service and operations management*. Singapore: World Scientific Publishing Company.

Heragu, S. S. (2016). *Facilities design*. Boca Raton, FL: CRC Press.

Hoisington, A. (2016). King or queens: Choosing a hotel's guestroom makeup. Retrieved from http://www.hotelnewsnow.com/Articles/38240/King-or-queens-Choosing-a-hotels-guestroom-makeup

Jain, A. K., Mahajan, V. (1979). *Evaluating the Competitive Environment in Retailing Using Multiplicative Competitive Interactive Models, Research in Marketing*. Greenwich, CT: JAI Press.

Jones, C. (2014). Business travelers: Hotel location matters most. Retrieved from https://www.usatoday.com/story/money/business/2014/04/27/biz-travel-choice-hotels-survey/8052727/

Kostuch Media. (2014). Investors are re-thinking how they choose hotel locations. Hotelier. Retrieved from https://www.hoteliermagazine.com/investors-are-re-thinking-how-they-choose-hotel-locations/

Kotler, P. (1973). Atmospherics as a marketing tool. *Journal of Retailing*, *49*(4), 48–64.

Mehrabian, A., & Russell, J. A. (1974). *An approach to environment psychology*. Cambridge, MA: MIT Press.

Mintel. (2018). US foodservice online ordering and delivery report-November 2018. Retrieved from https://academic-mintel-com.proxy.library.nyu.edu/display/860851/

Muller, C. (2018). Restaurant delivery: Are the "ODP" the industry's "OTA"? Part I. *Boston Hospitality Review*. Retrieved from http://www.bu.edu/bhr/2018/10/31/restaurant-delivery-are-the-odp-the-industrys-ota-part-i/

Muther, R., & Hales, L. (2015). *Systematic layout planning*. Marietta, GA: Management & Industrial Research Publications.

Ransley, J., & Ingram, H. (2004). *Developing hospitality properties and facilities*. London: Routledge.

Robson, S., & Szende, P. (2013). Front-of-house design for optimal restaurant performance. Hospitality management learning modules. Retrieved from https://www.pearson.com/us/higher-education/series/Hospitality-Management-Learning-Modules/2920057.html

Salvendry, G. (2012). *Handbook of human factors and ergonomics* (4th ed.). Hoboken, NJ: Wiley.

Speros, W. (2017, January 20). Fairmont Washington, DC, Georgetown reveals $27 million renovation. Retrieved from https://www.hospitalitydesign.com/news/hotels-resorts-wellness/fairmont-washington-dc-georgetown-reveals-27-million-renovation/. Accessed on November 25, 2020.

Tzeng, G., Teng, M., Chen, J., & Opricovic, S. (2002). Multicriteria selection for a restaurant location in Taipei. *Hospitality Management*, *21*, 171–187.

US Department of Justice. (2010, September 15). 2010 ADA Standards for Accessible Design. Retrieved from https://www.ada.gov/regs2010/2010ADAStandards/2010ADAStandards.pdf. Accessed on December 10, 2020.

Wilson, A., Zeithaml, V., Bitner, M. J., & Gremler, D. (2018). *Services marketing: Integrating customer focus across the firm* (7th ed.). New York, NY: McGraw-Hill Education.

Yang, Y., Wong, K. K., & Wang, T. (2012). How do hotels choose their location? Evidence from hotels in Beijing. *International Journal of Hospitality Management*, *31*, 675–685.

Chapter 4

Forecasting Demand

Michelle (Myongjee) Yoo and Sybil Yang

Abstract

Forecasting is a vital part of hospitality operations because it allows businesses to make imperative decisions, such as pricing, promotions, distribution, scheduling, and arranging facilities, based on the predicted demand and supply. This chapter covers three main concepts related to forecasting: it provides an understanding of hospitality demand and supply, it introduces several forecasting methods for practical application, and it explains yield management as a function of forecasting. In the first section, characteristics of hospitality demand and supply are described and several techniques for managing demand and supply are addressed. In the second section, several forecasting methods for practical application are explored. In the third section, yield management is covered. Additionally, examples of yield management applications from airlines, hotels, and restaurants are presented.

Keywords: Capacity; demand; forecasting; revenue management; supply; yield management

Learning Outcomes

After completing this chapter, you should be able to:

1. Describe the characteristics of demand and supply for hospitality services.
2. Identify the techniques in managing demand and supply for hospitality services.
3. Identify the appropriate forecasting method for a given situation.
4. Apply quantitative methods to practice forecasting demand.

Operations Management in the Hospitality Industry, 71–94

doi:10.1108/978-1-83867-541-720211004

5. Explain what yield management is and how it can be accomplished.
6. Calculate the basic yield management statistics.

Outline

Getting Started

One of the most distinctive characteristics of hospitality products is that they are perishable experiences. A vacant hotel room on a particular day or an unoccupied airline seat on a particular flight become lost revenue opportunities and can never be recovered for the additional revenue that could have been generated if they were sold. Those unsold hotel rooms and the unoccupied airline seats disappear completely because they cannot be stored. Thus, perishability is the basic reason why hospitality demand and supply are managed and operated differently from manufactured goods.

Often, hospitality managers face challenges on a daily basis of matching the consumer demand to the service supply in a dynamic environment. This is why it is particularly important for hospitality operations to manage demand and supply strategically through **forecasting** the art and science of predicting future events. The operational implications of forecasting most heavily relate to the volume of demand and subsequent occupancy, which ultimately allow hospitality operators to efficiently plan staffing and supplies, arrange facilities to accommodate incoming guests, and apply differential pricing strategies that result in revenue generation. Consequently, hospitality operations management is concerned with properly managing demand and supply and employing useful forecasting methods to predict demand to gain competitive advantages. This chapter intends to explore different methods in forecasting demand by first introducing some key concepts, starting with a foundational understanding of demand and supply.

1. Hospitality Demand and Supply

1.1. Characteristics of Hospitality Demand and Supply

Demand in the hospitality industry is subject to variation, while **supply** is largely fixed. When demand exceeds supply, hospitality products or services cannot be delivered as in manufacturing by taking spare goods from a warehouse. When supply exceeds demand, hospitality products or services disappear and the potential revenue cannot be regained. Notice that supply can also be referred to as **capacity**, since supply in hospitality pertains to the physical or supporting facilities and other resources and assets, such as labor and time. Overall, hospitality businesses can experience several situations depending on the levels of demand and supply, which ultimately influence the service quality (see Fig. 1):

1) **Excess supply (demand < supply):** Supply is underutilized because demand is not sufficient at this level. Customers may receive either poor service due to service deterioration or excellent service because the staff manages only few guests. Excess supply can result in leftover costs and can yield profit loss.
2) **Demand and supply are well balanced (demand = supply):** Also known as the optimum capacity, this is the best level for customers, employees, and the business itself. At this level, service quality remains high, and profitability is generated for the business. The optimum capacity varies for different hospitality operations: for an airline, it ranges from 65% to 75%, while for a restaurant, it ranges from 70% to 90%.
3) **Demand exceeds optimal supply (demand > optimum capacity):** When demand exceeds the optimal supply level, error starts to occur, and the service quality starts to decline. Failure to accommodate irritated customers leads businesses to lose long-term, valued guests.
4) **Excess demand (demand > maximum capacity):** When demand exceeds the maximum available capacity, quality of service deteriorates significantly because staff are stretched to the limit. At this level, mistakes and error are frequent and customers can also become unsatisfied and frustrated. The business may be generating profit at the moment, but ultimately exposes itself to a potential permanent loss.

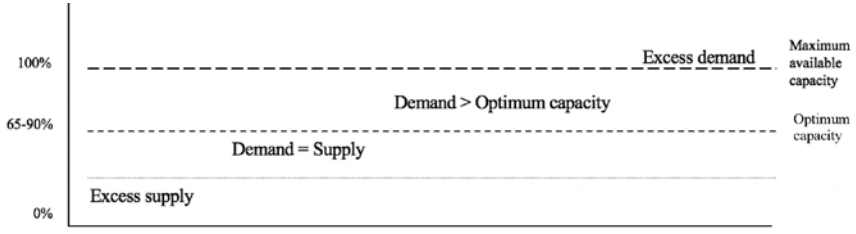


Fig. 1. Demand Relative to Supply.

1.2. Managing Demand

In managing demand, the **level capacity strategy** (altering demand to match a fixed supply) is generally employed where demands are less volatile and more predictable. Hospitality operations may attempt to smooth demand by either stimulating demand when supply is underutilized or shifting demand when demand is in excess. Level capacity strategies, which are usually marketing-oriented tactics, are suggested by Heskett, Sasser, and Hart (1990). While this chapter will not delve extensively into techniques for demand management, consider some notable techniques:

- Offer reduced room rates during off-seasons and offer discounted menus and drinks during happy hours.
- Attract different types of customers during off-peak demand periods. Hotels that mainly target business travelers can design appealing packages that attract leisure customers to increase demand during the weekend.
- Utilize meeting and event space during off-peak demand periods with social events, such as weddings and community parties.
- Use reservation systems to pre-sell potential service and adopt a strategy of **overbooking** in anticipation of customer **no-shows**.

Many more techniques exist, but these are among the mostly commonly used.

1.3. Managing Supply

Service supplies in the hospitality industry are assumed to be fixed. In managing supply, the **chase demand strategy** (adjusting supply to match demand) is a response to demand. It is preferred at service delivery systems where demands are highly seasonal and unpredictable. It works better where employees are unskilled with limited training needs and where turnover rates are higher. While this chapter will not delve extensively into techniques for capacity management, consider some notable techniques:

- Tailor staffing plans and work schedules to ensure sufficient staff are available during periods expected to see peak demand; reduce staff on-duty during off-peak times. Hiring part-time and seasonal work can also help.
- Cross-train staff to ensure many employees can perform critical roles in the service process. As needed, managers can temporarily redeploy staff from their regular roles to those experiencing high demand.
- Reduce setup time and in-process activities to deliver services and consider automations that further deduct from labor needs and waiting.
- Adjust space, such as seating in a restaurant or queue configurations for waiting lines, to moderate the number of customers that can be served at any time.

These are several of the more common techniques, among many others.

2. Forecasting

2.1. What Is Forecasting?

Forecasting is predicting future events. Forecasting enables hospitality operations to make informed business decisions and predict short-term and long-term performance. By forecasting, hospitality operations can make better estimates of what may happen in the future and manage service efficiently because they can be better prepared. For example, hotels may forecast how many rooms will be sold tonight, and restaurants may forecast how much ingredient should be purchased for today. Ultimately, "what" hospitality businesses try to forecast are the opportunities for profit and loss. Forecasting usually involves taking data and analyzing them with some type of quantitative model. It may also be subjective or intuitive and projected qualitatively. Or, it may use a combination of both quantitative and qualitative methods. Conceptually, forecasting can be classified into two ways as follows (Kahn, 1998):

1) **Top-down method:** This method uses summative metrics to forecast the aggregated sales first and then estimates the individual sales for particular products and service. For example, with the top-down method, a hotel will forecast total weekly revenue first and from there, work down to the daily occupancy rates, average daily rates, and average length of stay.
2) **Bottom-up method:** This method forecasts the individual sales of particular products and service first and then calculates the aggregated sales by summing the detailed forecasts. For example, with the bottom-up method, a hotel will forecast the daily occupancy rates, average daily rates, and average length of stay first and work up to estimate the total weekly revenue.

Additionally, forecasting can be classified into the three terms as follows (Heizer & Render, 2014):

1) **Short-term forecasting:** This forecast has a time span of generally less than three months but up to one year.
2) **Medium-term forecasting:** This forecast has a time span of generally three months to three years.
3) **Long-term forecasting:** This forecast has a time span of generally three years or more.

Forecasting methods allow hospitality operations to translate the multitude of data into various strategies that become competitive advantages for businesses. There are a variety of forecasting models and there are many ways managers can forecast. There is seldom one best method, and the one that works well for a hospitality operation depends on a diversity of conditions. Forecasting is an ongoing process of data collection, model building, and data application to modify the forecasting outcomes with appropriate variables and more accurate estimates to retrieve reliable information. Consequently, accurate forecasting is necessary for hospitality operations to keep guests satisfied, maximize revenue, and minimize cost.

2.2. Forecasting Factors

When it comes to forecasting, there are numerous factors that need to be taken into account. Generally, these factors can be classified into internal and external factors. **Internal factors** are those that occur within the organization, and thus, the organization has control on them. On the other hand, **external factors** are those that occur outside of the organization, and thus, the organization has no control over them. Table 1 summarizes some of the most common internal and external factors that affects the outcomes and accuracy of forecasting. Hospitality organizations should consider these factors in their forecasting models.

Table 1. Internal and External Factors for Forecasting.

Internal Factors	External Factors
Corporate culture	Competition
Distribution channels	Consumer demographics
Products	Evolving technology
Physical resources (location, facilities, etc.)	Natural disasters (crises, pandemic, etc.)
Price	Political events
Process (employee programs, software systems, etc.)	Relative state of the economy
Promotions mix	

2.3. Forecasting Methods

The three basic forecasting models that are covered in this chapter are subjective models, causal models, and time series models. The application of these models will be different based on the size, scope, available data, and resources for hospitality operations. Table 2 summarizes the forecasting models that are covered in this chapter.

2.3.1. Subjective Models. **Subjective models** are forecasting methods that are subjective or qualitative in nature. Subjective models incorporate the perception and experiences of individuals so that they can be prescriptive, but they are suitable when sufficient or appropriate data are lacking.

1) **Delphi method:** Delphi method is based on the opinions from a panel of experts. A consensus about a future event results in multiple rounds of questionnaires sent to these experts. The Delphi method is practical for long-term forecasting, but relatively it can be expensive and time-consuming.
2) **Cross-impact analysis:** The cross-impact analysis method assumes that a future event is related to an earlier event. A panel of experts investigates the correlation between a set of events and estimates the probability of a future event occurring.
3) **Historical analogy:** Historical analogy is a judgmental forecasting method that assumes a future event is analogous to a past event. The forecast is based on using the pattern of past available data to estimate future situations. For example, a hotel manager can use the pattern of sales history to predict future sales.

Table 2. A Summary of Forecasting Models.

Method		Data	Forecast Term	Relative Cost
Subjective	Delphi method	Survey results.	Long term	High
	Cross-impact analysis	Correlations between events.	Long term	High
	Historical analogy	Several years of data for similar events or situations.	Medium to long term	High
Causal	Regression models	All past data for all variables.	Medium term	Moderate
	Econometric models	All past data for all variables.	Medium to long term	Moderate to high
Timeseries	Naïve approach	Most recent observations.	Short term	Low
	N-period moving average	*N* most recent observations.	Short term	Low
	Weighted moving average	Weight given to time period and most recent observations.	Short term	Low
	Exponential smoothing	Previous smoothed value and most recent observations.	Short term	Low
	Exponential smoothing with adjustments	Trend adjustments, seasonal adjustments, and most recent observations.	Short term	Low

2.3.2. Causal Models. **Causal models** are useful when there is an identifiable pattern and relationship within the data. Casual models usually consider several variables that are related to the event being predicted and that relate to changes in demand to changes in other variables. Once these variables are identified, a statistical model is developed and used for forecasting.

1) **Regression models:** Regression models examine the relationship between two or more variables. They are one of the most common techniques to predict the relationship between the factor being forecasted (the dependent variable, Y) and the determining factor(s) (the independent variable(s), (X_i)) using the least squares technique. The independent variables are assumed to "cause" the result. Regression models can be classified into linear regression models and

multiple regression models, which are determined by the number of independent variable(s).

Simple linear regression models include one dependent variable and one independent variable. The equation for a linear regression model is expressed as follows:

$$Y = a + bx$$

where

Y = dependent variable,
a = y-axis intercept,
b = slope of the regression line, and
x = independent variable.

Multiple regression models include one dependent variable and more than two independent variables. Generally, there are more than one determining factor for the event being predicted, thus multiple regression models are more common. The equation for a multiple regression model is expressed as follows:

$$Y = a_0 + a_1X_1 + a_2X_2 + \ldots + a_nX_n$$

where

Y = dependent variable,
X_i = independent variables,
a_0 = constant, and
$a_1, a_2, \ldots, a_n$ = coefficient values derived from the statistical model.

In forecasting demand (dependent variable) for a hotel, the room rate, location, holidays, weekday or weekend, month, local or national events, complimentary offers, and promotional offers are some commonly used independent variables. To ensure a relationship, selecting the independent variables is a logical judgment based on extensive experience and data interpretation. The coefficient values represent the positive or negative correlation between each independent variable and the dependent variable. These values are determined by the software program being used. See further examples of a multiple regression model for a 200-room hotel in predicting the average daily number of arrivals for March below (Table 3).

Table 3. Multiple Regression Result Example.

Independent Variable	**Coefficient (*ß*)**	***t* Value**	***p***
Intercept	50	25	0.00*
X_1 (December avg. arrival)	2.5	10	0.00*
X_2 (January avg. arrival)	3.5	20	0.00*
X_3 (February avg. arrival)	−5	15	0.00*

* $p < .05$

Based on the results of a multiple regression analysis using a statistical software, the regression equation can be determined as follow:

$$Y = 50 + 2.5X_1 + 3.5X_2 - 5X_3$$

If X_1 (December avg. arrival) = 100, X_2 (January avg. arrival) = 100, and X_3 (February avg. arrival) = 100, the average daily number of arrivals for March (Y) can be predicted as following: 50 + 2.5(100) + 3.5(100) – 5(100) = 150.

2) **Econometric models:** Econometric models are a version of regression models that involve a system of equations to forecast economic conditions. Econometric models usually require more extensive data to understand an economic phenomenon and are generally used for longer term forecasts.

2.3.3. Time Series Models. **Time series models** are useful in making short-term forecasts when data are presented in an identifiable pattern over time (e.g., weekly, monthly, quarterly, yearly, and so on). Time series models predict future events on the assumption that the future is a function of the past. It looks at what has occurred over a period of time from the past only to make a forecast. Models range from simple naïve approach to a more sophisticated exponential smoothing. An example of forecast of the different methods is compared at the end of this section (see Fig. 2).

1) **Naïve approach:** The naïve approach is the simplest method among the time series models. It assumes that demand in the next period will be equal to that from the most recent period. This method is used when there is not enough data at the beginning when operations start a time series forecasting. For example, if a hotel property sold an average of 100 rooms in January, we can forecast that the hotel will sell 100 rooms in February as well. The naïve formula is expressed as follows:

$$F_{t+1} \text{ (forecast for period } t + 1) = D_t \text{ (actual demand in period } t)$$

See further examples of the naive approach forecast for a 200-room hotel below (Table 4).

Table 4. Naïve Approach Forecast Example.

	Actual	**Prediction**
Month	**Average Number of Rooms Sold**	**Naive Approach Forecast**
January	143	
February	168	143
March	152	168
April		152

2) ***N*-period moving average:** *N*-period moving average method uses an average of the *N* most recent periods of data to forecast the next period. This method is used if there is little or no trend and when demand is stable. For example, a three-month moving average is found by summing the demand during the past three months and dividing by three. The *N*-period moving average formula is expressed as follows:

$$F_{t+1} = \frac{D_t + D_{t-1} + D_{t-2} + \ldots + D_{t-N+1}}{N}$$

where
F_{t+1} = forecast for period $t + 1$,
D_t = actual demand in period t, and
N = total number of periods in the average.
See forecast examples of the *N*-period moving average method for a 200-room hotel below (Table 5).

Table 5. *N*-Period Moving Average Forecast Example.

	Actual	Prediction
Month	**Average Number of Rooms Sold**	**3-Month Moving Average Forecast**
January	143	
February	168	
March	152	
April	170	(143+168+152)/3 = 154.33
May	145	(168+152+170)/3 = 163.33
June		(152+170+145)/3 = 155.67

3) **Weighted moving average:** Unlike the *N*-period moving average where each observation is weighted equally, the weighted moving average method uses unequal weights for each prior time periods. Here, the sum of the weight equals to 1. This forecasting method is preferred when it is beneficial to put more weight on the more recent observations when some trend is present. The weighted moving average formula is expressed as follows:

$$F_{t+1} = W_1 D_t + W_2 D_{t-1} + W_3 D_{t-2} + \ldots + W_N D_{t-N+1}$$

where
F_{t+1} = forecast for period t+1,
D_t = actual demand in period t,
W_N = weight given to time period t, and
N = total number of periods in the average.

Table 6. Weighted Moving Average Forecast Example.

	Actual	Prediction
Month	**Average Number of Rooms Sold**	**Weighted Moving Average Forecast**
January	143	
February	168	
March	152	
April	170	(0.5*152)+(0.3*168)+(0.2*143) = 155.00
May	145	(0.5*170)+(0.3*152)+(0.2*168) = 164.20
June		(0.5*145)+(0.3*170)+(0.2*152) = 153.90

See forecast examples of the weighted moving average method for a 200-room hotel below, when $W_1 = 0.5$, $W_2 = 0.3$, and $W_3 = 0.2$ (Table 6). Note that W_1 should be given to the most recent month.

4) **Exponential smoothing:** Exponential smoothing method uses the weighted sum of past observations: more recent data are given more weight in forecasting than the older data. Exponential smoothing is usually preferred to the moving average method because it considers the forecast error and smooths out glitches in the data. It also considers the time series components of average, trend, and seasonality. The simple exponential smoothing formula is expressed as follows:

$$F_{t+1} = F_t + \alpha (D_t - F_t)$$

where

F_{t+1} = forecast for period $t + 1$,
F_t = forecast for period t,
D_t = actual demand in period t, and
α = a weight, or smoothing constant.

The **smoothing constant** (α) is a value given by the forecaster that ranges between 0 and 1.

This value of the smoothing constant can make a difference in forecasting results. Selecting the α value is a subjective judgment based on the pattern of the historical data. Higher values of α are chosen when the underlying average is likely to change, whereas lower values are chosen when the underlying average is moderately stable. Generally, α ranges from 0.05 to 0.5 for business application. See forecast examples of the exponential smoothing method for a 200-room hotel below (Table 7).

Table 7. Exponential Smoothing Forecast Example.

Week	α	Actual Demand	Forecast	Exponential Smoothing Forecast
1	0.4	1,001	924	
2	0.4	1,176		924 + 0.4(1,001-924) = 954.8
3	0.4	1,064		954.8 + 0.4(1,176-954.8) = 1,043.28
4				1,043.28 + 0.4(1,064-1,043.28) = 1,051.57

5) **Exponential smoothing with trend adjustments and/or seasonal adjustments:** In time series evaluations, a trend is a systematic increase or decrease over a period of time. The trend component shows the general tendency of the data due to the changes of population, demographics, culture, technology, etc. When a trend is present, modifying the exponential smoothing method with trend adjustments can improve the forecast to be more accurate by adding two constants: the smoothed average and the smoothed trend. Seasonal patterns are regularly repeated upward or downward fluctuations due to weather or seasons. Likewise, when seasonal affects are accounted by modifying the exponential smoothing method with seasonal adjustments, forecast results can improve. In the seasonal adjusted exponential smoothing, a seasonality index is used to deseasonalize the data in a given cycle. Finally, both factors can be considered altogether. In some cases, exponential smoothing can be adjusted with both trend and seasonal indices to increase the forecast accuracy.

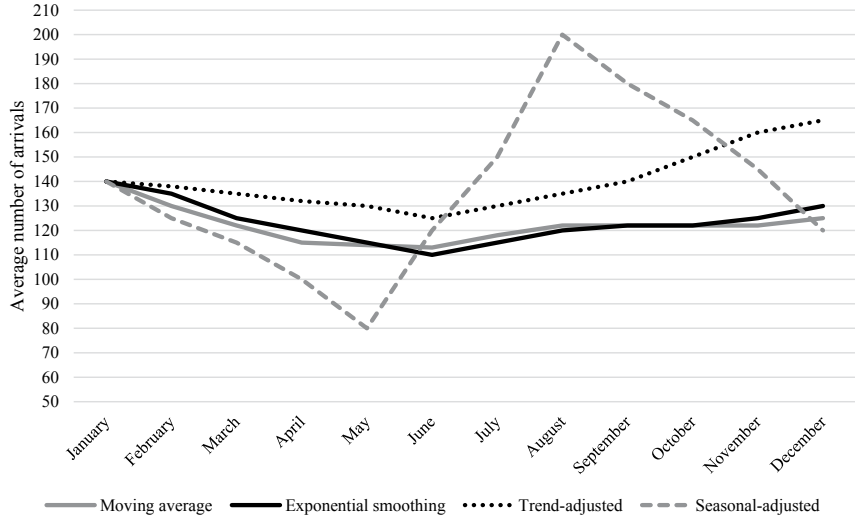


Fig. 2. Comparison of Time Series Forecasting Methods.

2.3.4. Forecast Errors. **Forecast error** is the difference between the actual demand and the forecast, and it often determines the forecast performance. In other words, it is more ideal to select a model with smaller forecast errors. Operations management often compares forecast errors of different models to determine the most accurate method. The forecast error formula is expressed as follows:

$$E_t = A_t - F_t$$

where

E_t = forecast error,
A_t = actual demand,
F_t = forecast demand.

Forecast errors can be calculated using various measures. The most commonly used forecast error measure is the mean absolute deviation (MAD = $|E_t|$), which gives equal weight to each error.

The mean squared error (MSE = E_t^2) is preferred when errors are large as squaring the error will give them more weight. For example, a MAD or MSE of 10 indicates that the average forecast error was 10 units in the absolute value. The mean absolute percent error (MAPE = $(|E_t| \div A_t)(100)$) puts the errors into perspective. For example, an MAPE of 10% implies that the forecast error was 10% of actual demand on average.

2.4. Sample Business Analytics Tools for Forecasting

The following software products are a few samples of business analytical tools that are used to make operational decisions in the hospitality industry. While these tools are designed to perform a variety of key functions, such as channel management, pricing strategies, market intelligence, meetings and events strategy, and group business strategies, they are exclusively known for a revenue management function through optimizing yield management and powerful forecasting.

1) **IDeaS G3 by SAS**: As a division of the global conglomerate SAS, IDeaS serves numerous hotel properties with its software program that optimizes the business mix and enhances productivity. IDeaS G3 is the most advanced business analytical tool offered from IDeaS for forecasting, which further increases opportunities for hotels with increased revenue.
2) **Scorecard and Gamechanger by Duetto**: Duetto's Scoreboard is the world's first hotel revenue intelligence platform. It analyzes and forecasts data and delivers actionable insights in real time. The Gamechanger is a revenue strategy platform, which focuses on pricing decisions through micro-segmentation. The pricing methodology of Gamechanger allows hospitality businesses to yield unlimited segments, channels, and room types in real time.

3) **Factic**: Factic specializes in forecasting and predictive analytics, particularly for the food and beverage industry. Powered by artificial intelligence and machine learning, it combines internal and external data to provide precision sales forecasting, purchase recommendations, product optimization, and automated procurement.

Not all businesses in the hospitality industry utilize multifunctional business analytical products. In addition to the aforementioned business analytical software products, the following are statistical tools that are used to analyze data, which can be utilized for forecasting.

1) **SAS**: As one of the leader in analytics, SAS is a command-driven software package used for statistical analysis and data visualization. Additionally, it provides diverse functions, such as advanced analytics, artificial intelligence solutions, business intelligence, cloud computing, and data management.
2) **Excel and ToolPak**: Developed by Microsoft, Excel is the leading spreadsheet program where powerful data visualization and analysis is also available. The analysis ToolPak is an add-in program that performs more advanced data analysis, such as regression analysis.

In hospitality, forecasts have many operational implications. By projecting future revenue and demand levels, businesses can estimate supply needs and plan capacity accordingly. In a restaurant, forecasts about upcoming reservations trends and events can help a chef plan ingredient orders; both front- and back-of-house managers can also plan staffing levels to support demand.

3. Yield Management

3.1. What Is Yield Management?

Yield management is an approach that emerged to maximize revenue by addressing the challenges of managing demand and supply through forecasting. Yield management is a comprehensive practice that adjusts the price in response to the fluctuating demand. Yield management is not the same as revenue management but is instead a subset aiming to maximize revenues by selling the product or service to the right customer, at the right time, at the right price.

Yield management was first developed in the airline industry as deregulation permitted airlines to set their own prices. Since any seat left unsold is lost revenue for airlines, offering discounted prices to fill flights became advantageous. Yet, selling all seats at a discounted rate would not be ideal as it impedes the possibility of selling seats at full price and decreases profitability. Depending on a variety of factors (e.g., market segment, time of purchasing, peak demand versus non-peak demand), airlines change rates accordingly, and customers pay different prices for the same seat. For example, when there is excess demand, airlines increase the seat prices to maximize revenue. Conversely, when there is excess supply, airlines decrease the seat prices as generating revenue with discounted prices is still better than lost revenue. Yield management has now become a common practice adopted from other hospitality operations. By implementing yield management, hospitality operations attempt to allocate the fixed amount of supply to match the potential demand in the most profitable way.

Yield management is particularly successful in the hospitality industry due to the following characteristics suggested from Kimes (1989):

1) **Fluctuating demand:** The adoption of differential pricing smooths demand by either stimulating or shifting demand to different periods of time. By this approach, total revenue for the constrained service can be maximized.
2) **Relatively fixed supply:** Hospitality firms with substantial investments in facilities are considered capacity constrained. When all the rooms at a hotel are sold out, further demand cannot be met without substantial capital investment. Once all of the seats are sold out on an airline, further demand can be met only through booking passengers on a later flight. Likewise, once all of the seats are sold out at a restaurant, further demand can be met only after earlier customers complete their meals.
3) **Perishable inventory:** Each unit of a room at a hotel and a seat at a restaurant or airline is perishable. This becomes a major constraint because they cannot be stored for future sales. Revenue from an unsold room or an unsold seat becomes lost forever and can never be recovered.
4) **Segmented markets:** Hospitality firms can segment their market based on different criteria. By segmenting the markets into price-sensitive versus time-sensitive customers or economic versus standard versus prestige customers, hospitality businesses can allocate the availability of supply for each segment and discriminate the rates.

5) **Product sold in advance:** Hospitality operations use reservation systems to sell products in advance. The reservation systems allow hospitality firms to better utilize their supply by suggesting an approximate demand.
6) **Low variable to fixed cost ratio:** The cost of selling an additional unit must be low while the marginal cost of capacity additions is large. In other words, the low level of variable cost paired with discretion in pricing means that the revenue expected from selling it is invariably greater than if it was not sold.

3.2. Basic Yield Management Math

The basic yield management statistic is expressed as follows:

$$\text{Yield} = \frac{\text{Actual revenue}}{\text{Potential or maximum revenue}}$$

Note that the potential revenue indicates the revenue that is generated when supply is 100% sold at the maximum price possible. For example, hotel A has 100 rooms available on a specific night with rack rate of $150. Here, the potential maximum revenue is $15,000 (100 × $150). If the hotel is sold out at 100% occupancy rate, the yield is $15,000/$15,000 = 1. However, on that night the hotel sold 70 rooms and achieved an average room rate of $120. Here the actual revenue is $8,400 (70 × $120). Therefore, the yield is $8,400/$15,000 = 0.56.

In more detail, yield is the function of price efficiency and supply sold as follows:

$$\text{Price efficiency} \times \text{Supply sold}$$

where

$$\text{Price efficiency} = \frac{\text{Actual price}}{\text{Maximum price}}, \text{ and}$$

$$\text{Supply sold} = \frac{\text{Units of supply sold}}{\text{Total units of supply}}$$

Therefore, the yield statistic for a hotel can be expressed as follows:

$$\text{Yield} = \frac{\text{Actual average room rate}}{\text{Maximum rate}} \times \frac{\text{Rooms nights sold}}{\text{Rooms nights available for sale}}$$

Going back to the example of hotel A with 100 rooms. Hotel A sells 40 rooms at the maximum rate of $150 on one night and a further 30 rooms at $120. Here, the yield statistic is:

$$\begin{aligned}\text{Yield} &= (150/150) \times (40/100) + (120/150) \times (30/100)\\ &= (1 \times 0.4) + (0.8 \times 0.3)\\ &= 0.4 + 0.24 = 0.64\end{aligned}$$

Maximum yield = 100 × $150 (total number of rooms × maximum rate) = $15,000

Actual yield = $15,000 × 64% = $9,600

Based on this foundation, measures have been established to measure success in yield management. These measures indicate the revenue per available time-based inventory unit and can be described as follows for different hospitality industries:

- Airline: revenue per available seat mile (RevPASM);
- Hotel: revenue per available room night (RevPAR); and
- Restaurant: Revenue per available seat hour (RevPASH).

3.3. Yield Management Benefits

Yield management provides three main benefits for hospitality operations:

1) **Increased revenue:** Revenue increases by utilizing the occupancy at the optimum level. For example, suppose a hotel property has 100 rooms and the room rate is $100. On a given day, if all rooms are sold, the revenue generated is $10,000. However, if the hotel increases the rate to $125 because of the high demand, the total earned revenue increases to $12,500.
2) **Competitive analysis:** Applying yield management enables hospitality operations to stay competitive. Hospitality operations need to always check on their competitors' rates and analyze their pattern when they employ yield management. The competitors' pricing strategy becomes a valuable benchmark in employing dynamic pricing adjustments to generate higher incremental revenue.
3) **Decreased errors:** A successful implementation of yield management is based on precise demand forecasting. Accurate demand forecasting is only available through accurate data and exact details, which further eliminates any miscalculated risks.

3.4. Yield Management Applications

1) **Airlines:** American Airlines uses the Sabre reservation system that uses historical data and current booking behavior to analyze flight requests and provide business solutions. The system allows to increase airline revenue by optimizing the fare and further advances revenue management by resolving passenger reservations problems. It also helps airlines make flight operations decisions based on global demand data. In fact, Sabre is a global distribution system (GDS) among others, like Amadeus and Travelport, and they are used by most airlines, car rentals, travel agencies, and even hotels.
2) **Hotels:** Hotels also have classic demand imbalances due to varying peak and low seasons. Top hotel companies heavily invest on software systems that aid yield management. For example, Marriott International uses the One Yield, and Hilton uses the HiltonGro, which are both proprietary (Smith &

Kaminski, 2016). IDeaS and Duetto are other independent systems that are widely used in the hotel industry. These systems include seasonal occupancy patterns, local events, weekly cycles, and current trends to forecast demand and develop **hurdle prices**, manage discounts, and overbooking.

3) **Restaurants:** Due to its small profit margins, more restaurants are implementing yield management to maximize their profits. For example, large full-service multiunit operators, such as STARR Restaurants, Wolfgang Puck, and Union Square Hospitality Group Restaurants use the system called Avero. Unlike other point-of-sale (POS) systems, it empowers restaurant businesses with unique hospitality intelligence by delivering diverse insights including demand forecasting, food cost management, inventory management, menu engineering, scheduling, automated purchasing, etc.

Discussion Questions

1. Customer arrival variability complicates a hospitality organization's ability to service customers efficiently because different segments of customers desire services at different times. For each of the following industries, think of two examples of customer arrival variability and two tactics that operators have used to try to reduce that variability. Hint: successful mitigation tactics generally result in customers choosing to be serviced during non-peak demand periods. Explore these industries: 1) full-service, casual dining restaurant; 2) fine dining restaurants; 3) ski resorts; and 4) wedding venues.
2. Hotel A is a convention hotel located in Seattle with a total number of 600 rooms. Applying the weighted moving average method, what is the average daily demand forecast for Hotel A for months 4, 5, and 6 in Table 8, where $W_1 = 0.5$, $W_2 = 0.3$, and $W_3 = 0.2$? Make sure to show your calculations for each month. W_1 should be given to the most recent month.

Table 8. Hotel A Weighted Moving Average Forecast.

	Actual	Prediction
Month	**Average Number of Rooms Sold**	**Weighted Moving Average Forecast**
1	548	
2	529	
3	497	
4	470	
5	505	
6		

3. You are the revenue manager for the Max hotel, an iconic 800-room luxury hotel located in downtown Los Angeles. Applying the exponential smoothing method, what is the demand forecast for the Max hotel for weeks 2, 3, and 4 for the month of May in Table 9? Make sure to show your calculations for each week.

Table 9. Max Hotel Exponential Smoothing Forecast.

Week	α	Actual Demand	Forecast	Exponential Smoothing Forecast
1	0.1	4,200	4,000	
2	0.1	4,400		
3	0.1	4,358		
4				

Case Exercises

1. The Kensington is an iconic, 1,325-room luxury hotel located in downtown Toronto. One year of monthly room revenue and occupancy data are provided in Table 10.

Table 10. Kensington Hotel Monthly Data.

Month	Available Room Nights	Occupied Rooms	Occupancy Percent	Room Revenue	Avg. Daily Rate	D_{Jan}	D_{Feb}	D_{Dec}
January	42,317	24,924	58.90	$4,446,201	$178.39	1	0	0
February	38,220	25,640	67.09	$4,117,777	$160.60	0	1	0
March	42,315	31,601	74.68	$5,357,548	$169.54	0	0	0
April	40,950	31,287	76.40	$6,051,625	$193.42	0	0	0
May	42,316	31,022	73.31	$6,459,564	$208.23	0	0	0
June	40,950	34,915	85.26	$7,373,940	$211.20	0	0	0
July	42,315	30,329	71.67	$5,717,146	$188.50	0	0	0
August	42,314	32,157	76.00	$6,106,328	$189.89	0	0	0
September	40,952	25,228	61.60	$4,783,955	$189.63	0	0	0
October	42,315	32,711	77.30	$6,674,721	$204.05	0	0	0
November	40,948	30,560	74.63	$4,853,620	$158.82	0	0	0
December	42,315	18,444	43.59	$2,748,353	$149.01	0	0	1

   1) Assume that the rack rate (the maximum room rate) is $225/night. Calculate the Kensington's yield for each month. Based on your calculations, which months do you think would benefit most from enacting an active yield management strategy? Why?
   2) Break out the monthly yield metric into its price efficiency and supply sold components. First, calculate the price efficiency for each month. Then, calculate the supply sold by dividing yield by price efficiency.

Verify that the supply sold you calculated is equal to the occupancy percent.

a. HINT: Yield = Price efficiency * sell-through efficiency

b. $= \frac{\text{Actual average price}}{\text{Maximum price}} * \frac{\text{Actual quantity sold}}{\text{Maximum available inventory}}$

3) Based on your answers in question 2), a. what types of initiatives would you suggest to improve yields in December? b. What types of initiatives would you recommend for June? c. Are your recommendations for December and June similar? Why or why not?

2. The Kensington is an iconic, 1,325-room luxury hotel located in downtown Toronto. One year of monthly room revenue and occupancy data are provided in Table 10 above.

1) Starting with January, calculate the following moving average forecasts of occupied rooms for each month through to December:

a. Three-month moving average.
b. Six-month moving average.

2) Create a line graph that depicts each of the moving average forecasts along with the actual occupied rooms for the whole year. Visually access what increasing the moving average rolling period does to the resolution of the forecasts made. What do you believe are the strengths and weaknesses of choosing longer versus shorter moving average periods?

3. Continuing with the Kensington Hotel. You have a chat with the hotel's sales department, and the VP of Sales offers up,

> I know that it's tough to get visitors to vacation in Toronto in the dead of winter, but I don't have the numbers to show how much seasonality impacts demand and willingness to pay.

Using occupancy percent as the dependent variable, and the monthly dummy variables as the independent variables (D_{Jan}, D_{Feb}, D_{Dec}) from Table 10, Table 11 shows the results of a regression model run in Excel with the Data Analysis ToolPak Add-in (note: regression analysis cannot be performed on Excel without the ToolPak function; if not already present on your personal computer, search the Internet for instructions on activating this free function).

1) Based on the regression output, determine the regression equation model.
2) Based on the regression output, all other things being equal, on average how are January, February, and December occupancy percentages compared to any other average month of the year?

Table 11. Kensington Hotel Regression.

	Coefficients (%)	Standard Error	*t* Stat	*p*-Value
Intercept	74.54	0.020590558	36.2012741	3.7146E-10
X variable 1 (D_{Jan})	−15.64	0.06511306	−2.4022086	0.04302817
X variable 2 (D_{Feb})	−7.45	0.06511306	−1.1448395	0.28536911
X variable 3 (D_{Dec})	−30.95	0.06511306	−4.7537257	0.00143835

Managerial Challenge

New York City was at a turning point in the early 2000s. The real estate boom of the past decade had pushed up property values, and many family-owned businesses were facing increasing pressure to sell their buildings, potentially close their businesses. One of Manhattan's most iconic Jewish delis wanted to build a 10-year forecast of the restaurant's sales, make recommendations on how to improve the yield of the operations, and give a determination on whether selling the business' real estate to reinvest in the operations would be financially lucrative, and what the growth potential of the restaurant would look like.

The restaurant takes customer orders via little paper tickets and handed guests their orders for pickup at numerous service counters in the store. There was very limited customer seating inside, and the bulk of the store's orders were taken to-go. The operation had changed very little since its inception 120 years ago, and despite the introduction of the computer and Internet age, the restaurant still took orders with physical note pads, with no historical demand or revenue-tracking system to speak of. Though bookkeeping records recorded gross sales dollars and check counts on a daily basis, no reports existed on customer demand or spending patterns.

Question

Whatever information used for the analysis would have to be painstakingly coded and tabulated by hand – there simply would not be enough time to compile all the restaurant's data in time for key deadlines. If you were in charge of this task, what information would you ask for from the restaurant owners? Think about the type of data (for example, sales by item, time of day, day of week), and how far back would you want for these data (for example, one year's worth? Two? Ten? One-hundred?!) What method(s) would you use to forecast revenue for the next 10-year period? What are the strengths and weakness of method(s) that you have chosen? You have to be strategic and selective in the information you request – asking only for the data that would be most helpful in forming a robust demand forecast.

Added Insight

Price discrimination has long been one of the most important tools for revenue managers to engineer a comprehensive yield management strategy. The ability to

charge different prices to different target market segments based on their differing levels of willingness to pay has played a significant role in selling airline tickets, cruise ship packages, and hotel rooms. However, with the growing ubiquity of social media, increased awareness of online privacy, and improving technological tracking, hospitality price discrimination has become more transparent to customers, and many potential customers are none-too-happy about the practice. Watch the following Canadian Broadcasting Channel documentary:

https://youtu.be/NZVpbwz6kPk. Then, think about the following:

1. Do you think it is fair to price discriminate essentially the same product or service?
2. Are two plane tickets on the same flight, or two standard rooms in the same hotel on the same night, identical products? How different must service features be in order to justify differential pricing?
3. Think of an example where you, as a consumer, would be okay with paying a different price than someone else, for exactly the same product/service? What conditions make you comfortable with this type of price discrimination?

Risk and Crisis Management

The most notable external shocks that the US hospitality industry faced during the 2000s are the terrorist attack of September 11, 2001, the financial crisis in 2008, and the most recent COVID-19 pandemic in 2019. These major external shocks significantly affected the hospitality industry, leading to an economic recession. The 9/11 terrorist attack had an immediate and dramatic impact on occupancy and rate decreases. It took a while for travelers to regain confidence to travel, and the hospitality industry did not return to previous levels until July 2004. The 2008 financial crisis affected the industry harshly until at least 2010. Hospitality businesses inevitably had to manage the situation by offering deep discounts and promotions that would have not been offered regularly just to maintain the minimum demand to keep their businesses. The global economy slowly recovered and travel demand started to flow only after households were financially solid again.

In 2020, the COVID-19 pandemic had brought unprecedented impact, where the hospitality industry is among the hardest hit. Due to the global lockdown, hotels and airlines have reached its bottom in occupancy rates and other hospitality businesses have stood empty since early 2020. Although parts of the world have begun to reopen their economies from mid-2020, fear for traveling, dining out, and any type of social events or gatherings still remains high, making the hospitality industry suffer from the greatest, and possibly the longest recession ever in the 2000s. According to industry experts, recovery to pre-COVID-19 levels may take up to three years or longer.

Given the nature of its supply and demand, the hospitality industry is especially sensitive to recessions. Reduced discretionary spending makes it difficult for hospitality businesses to avoid financial hardships. Additionally, dealing with layoffs, furloughs, salary cuts, and temporary closedowns with the uncertain surroundings can be devastating. Nonetheless, the occurrence of external shocks,

usually correlated to recessions, is not likely to disappear as the global economy becomes increasingly interconnected and tourism continues to grow while other natural environment and political complications exist.

Question

Terrorism, economic crises, and natural disasters, pandemics, and other external shocks are difficult to foresee and often impossible to avoid, but hospitality management must make effective preparations to reduce the negative impact as few destinations may be completely exempt. What are some additional internal versus external variables that hospitality operations management must consider in forecasting? And how can hospitality management be better prepared?

Glossary

Bottom-up method: A forecasting method by starting with individual level data and work up to total sales.
Capacity: The maximum level of services output that a given system can produce.
Casual model: A forecasting method used when there is an identifiable relationship within the data.
Chase demand strategy: A strategy that adjusts capacity or supply to match demand.
Cross-impact analysis: A forecasting method that assumes some future event is related to an earlier event with an estimated probability.
Delphi method: A forecasting method that uses a panel of experts to result in a consensus about a future event.
Demand: The amount of service that a consumer is willing to purchase.
Econometric model: A forecasting method that uses computer-processed mathematical equations to predict economic conditions.
Exponential smoothing: A time series forecast method formed by the weighted moving average in which data points are weighted by an exponential function.
External factors: Factors that occur outside of the organization and are not under control by the organization.
Forecast error: The difference between the actual or real value and the predicted or forecast value.
Forecasting: The art and science of predicting future events.
Historical analogy: A judgmental forecasting method that assumes a future event is analogous to a past event.
Hurdle price: The lowest rate for a hotel room to be booked.
Internal factors: Factors that occur within the organization and are under control by the organization.
Level capacity strategy: A strategy that alters demand to match available supply.
Multiple regression model: A regression model that includes one dependent variable and more than two independent variables.
Naïve approach: A forecasting method that assumes the demand in the net period is equal to that from the most recent period.

No-shows: Customers fail to honor their reservations.
***N*-period moving average:** A time series forecast method formed by adding together the most recent data and dividing by the number of observations.
Overbooking: Accepting reservations in excess of available supply in anticipation of customer no-shows.
Regression model: A forecasting method that examines the relationship between two or more variables.
Simple linear regression model: A regression model that includes one dependent variable and one independent variable.
Smoothing constant: The weighting factor that is used in simple exponential smoothing method.
Subjective models: Forecasting models that are subjective or qualitative in nature.
Supply: The amount of service that a service provider is available to sell.
Time series model: A forecasting method that uses a series of past data points to predict the future.
Top-down method: A forecasting method by starting with aggregated level data and work down to individual sales.
Yield management: A strategy to maximize revenue by adjusting the price in response to demand.
Weighted moving average method: A time series model that uses unequal weights for each prior time period.

References

Heizer, J., & Render, B. (2014). *Operations management* (11th ed.). Upper Saddle River, NJ: Pearson.

Heskett, J. L., Sasser, W. E., & Hart, C. W. L. (1990). *Service breakthroughs: Changing the rules of the game*. New York, NY: Free Press.

Kahn, K. B. (1998). Revisiting top-down versus bottom-up forecasting. *Journal of Business Forecasting, Summer*, 14–19.

Kimes, S. E. (1989). The basics of yield management. *The Cornell Hotel and Restaurant Administration Quarterly*, *30*(3), 14–19.

Smith, B. S., & Kaminski, J. (2016, July 22). *An HVS guide to hotel revenue management*. Hospitality net. Retrieved from https://www.hospitalitynet.org/opinion/4077285.html

Chapter 5

Inventory Control

Miguel Bendrao Baltazar and Yuan Li

Abstract

Unlike manufacturing firms where the production of goods can be adjusted according to the demand of customers, hospitality firms do not have the ability to alter the capacity of the changing demand of guests in a short period of time. Given the relatively fixed capacity or supply, maximizing revenue through inventory control is essential for hospitality operations. This chapter covers operations inventory control extracted from the field of revenue management. First, the concept of capacity management and planning is enclosed and various capacity management tactics and inventory control strategies are explored. Next, the management and principles of space inventory through inventory-based restrictions, strategic pricing, displacement analysis, and distribution channel management are addressed. Finally, the respective applications of these principles, strategies, and tactics in several hospitality sectors are discussed.

Keywords: Capacity; displacement analysis; duration; physical inventory; revenue management; rate fences

Learning Outcomes

After completing this chapter, you should be able to:

1. Determine and illustrate capacity in the context of operations and revenue management.
2. Recognize the foundations of capacity planning and capacity management.
3. Explain ways in which optimize capacity usage and allocation.
4. Apply revenue management strategic pricing techniques to inventory management.

Operations Management in the Hospitality Industry, 95–115

doi:10.1108/978-1-83867-541-720211005

5. Perform a displacement analysis and provide sound recommendations.
6. Identify various distribution methods and define the basics of distribution channels management.

Outline

Getting Started

Revenue management (RM) is concerned with demand-management decisions and the methodology and systems required to make them (Talluri & van Ryzin, 2004). RM is specifically about the determination of both the profit-maximizing prices and the optimal allocation of inventory-constrained products to different customer segments. RM offers the potential of increased revenue to any **capacity-**constrained firm. The goal of RM is to optimize revenue by optimizing capacity, rates, prices, and distribution under current and future supply and demand market conditions Smith et al. (1992) and Kimes (2001a,b). In terms of capacity, any manager should focus more on that capacity than on the supply side which is less controllable, not so much as physical but over the time during which a unit of capacity is available or being used to capture and generate revenue. Management control over the demand side is limited to the forecasting and understanding of different demand levers – such as price values and capacity levels – to influence customer behavior.

1. Inventory Control and Space Optimization

More specifically or more holistically, front office managers, sales managers, general managers, and ultimately asset managers and owners all target space optimization. The goal is to maximize the capacity (or space) utilization in terms of rooms, services such as food and beverage outlets, and function space. If demand dictates which inventory pieces want to be booked, it is up to management to decide which reservations are the best fit and most profitable.

In this process, it is critical that the operations management team – especially front office or sales managers – effectively use operating systems (**decision support system or DSS**) dedicated to managing space such as **property management**

system (PMS). Since events can span through multiple days or a fraction of days, hotels, conference centers, and other venue places define function-space utilization time by daypart, often split between morning and evening. However, there is increasing usage of computerized systems tracking this space utilization duration per hour. This duration utilization is critical to understand demand and establish that typical baseline fully. To give an example, if one has a large function room with no windows but a high ceiling and beautiful chandeliers, it is possible that one will perceive mode demand for a p.m. daypart or the evening hours. This way, managers should reflect on these trends and adjust their pricing guidelines accordingly.

Also, if sleeping rooms or function spaces are both spaces, the margins and utilization time and experiences are quite different. It is possible that in taking these decisions, managers end up favoring more a particular piece of business, such as the rooms side, the food and beverage operations, the function, or meeting space. A typical example (Fig. 1) for a conference center hotel, when looking into its reservations booking cycle, establishes that its advanced bookings are mostly group bookings reserved 21 or more days before arrival; the hotel also allocates a percentage of its inventory to be sold online, targeting non-brand-loyal, last-minute bookings through an opaque distribution system such as online travel agencies like Priceline and Hotwire. This strategy targeting unsold travel inventory allows for bigger discounts, without affecting its price positioning.

However, that decision of accepting a certain booking or, in the case of groups, a request for proposal (RFP) is just one more step in under the analytics of PMS. It is possible that a particular booking has started months ago – if not years ago – within the sales and marketing department.

Hospitality space inventory – a room, an airplane or restaurant seat, a car, even tee time on a golf course – falls under capacity-constrained service firms. If an inventory unit is not occupied for a certain period of time, that part of the firm's inventory is lost forever. Companies strive to maximize their **revenue per available time-based inventory unit** (or **RevPATI**). The RevPATI metric translates into the product of capacity utilization (on the supply side) and average revenue per service transaction (on the demand side):

$$\text{RevPATI} = \text{Capacity utilization} \times \text{Average revenue per service transaction}$$

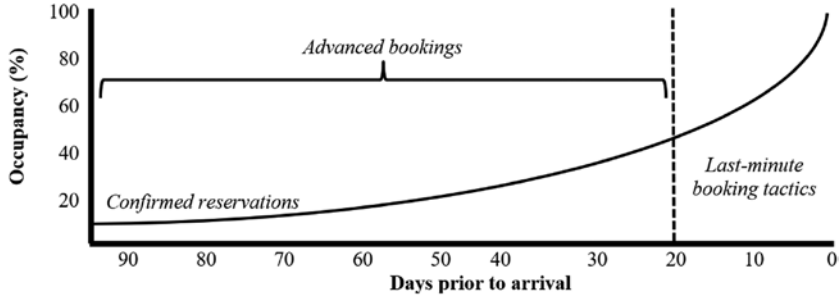


Fig. 1. "Pickup," Pace Report or Reservations Booking Cycle.

RevPATI captures the time factor involved with capacity-constrained service firms. Companies should evaluate management based not only on the average sales per customer or in the case of hotels, the average daily rate, without also paying attention to space inventory utilization or **occupancy**. It allows each individual physical inventory unit to be measured by its yielding over time (e.g., monthly, quarterly, yearly, etc.) and between different units' operations. Total capacity, also known as supply, is the total amount of output that a firm can produce. Table 1 lists RevPATI applications across different hospitality sectors.

2. Inventory Management and Planning

To maximize revenue, managers need to consider how to allocate fixed capacity among different types of guests. The logic is that while it is viable to offer all paying guests a discount rate to sell-out the hotel, doing so would preclude the possibility of selling some rooms at full price. Similarly, while it is ideal to sell all hotel rates at the full, **rack rate**, the demand from customers may not be strong enough to fill the whole hotel. Since hospitality firms cannot easily modify their capacity by changing the number of hotel rooms or airlines seats to match the dynamic demand from guests, and since revenue from an unsold hotel room or airline seat is lost forever, revenue managers face the challenge of how to manage capacity to generate the most revenue for the firm. This section considers different factors regarding inventory management and planning: allocating capacity among different customer groups, distinguishing between main products and ancillary ones, and overbooking.

Table 1. RevPATI Measures for Various Hospitality Industries.

Sector	RevPATI Measure	Calculation
Airlines	RevPASM: revenue per available seat mile	= total operating revenue ÷ number of available seat miles
Hotels	RevPAR: revenue per available room	= total rooms revenue ÷ number of available rooms
Restaurants	RevPASH: revenue per available seat hour	= total revenue ÷ (number of available seats × hours of operation)
Rental cars	RevPAC: revenue per available car day	= total rental fee-related revenue ÷ number of available vehicles
Golf courses	RevPATT: revenue per available tee time	= total greens fee-related revenue ÷ number of available tee times
Spas	RevPATH: revenue per available treatment room hour	= total treatment-related revenue ÷ (number of available treatment rooms × hours of operation)

2.1. Allocating Capacity Among Different Customer Groups

For revenue management to be effective, the hospitality firm must be able to segment its market into different customer classes. A common way of classifying hotel guests is to decide whether a guest belongs to one of the three main market segments: transient, group, and special contract and negotiated rate. Transient guests are individual guests requiring a short stay at the hotel and are not part of a group or contract sale. Within the transient segment, individuals can be further classified as business transient and leisure transient. Group guests are individuals whose reservations are part of a larger, multi-guest reservation. Examples include a banquet, a sports team, and a group of conference attendees staying at the hotel. Special contract and negotiated rates are generated through the negotiation of a contract between businesses and the hotel. For example, hotels can provide rooms for airline crews and corporate employees under a negotiated rate.

Depending on the type of the hotel, the customer mix can vary. For example, a convention hotel may have more group business than transient business, and a freeway hotel may have more transient business than group business. Similarly, depending on the days in the week, month, and year, the customer mix can vary as well. For example, a business hotel tends to have more business travelers than leisure travelers during weekdays, and a hotel in a college town tends to have more business during graduation weekends and football weekends than summer breaks and winter breaks. Revenue managers thus need to decide how much inventory to allocate to different market segments based on their respective booking patterns observed in the past.

In general, group bookings are made months or even years in advance, while individual bookings are made much closer to the arrival day. The inventory available for individual bookings is thus affected by the number of rooms blocked for groups, which are removed from the inventory and reserved for group members to pick up. How much inventory to allocate to group business is therefore an important decision for the hotel and is usually decided in the annual budgeting process. If the number of rooms blocked is greater than the number of rooms picked up and the issue is undetected until the last minute, the hotel may face lost revenue from the excessive rooms that are not sold. To avoid situations like this, hotels need to negotiate with the groups in terms of the number of rooms to be blocked and the **cut-off date** for the unused rooms in the block to be released for sale to others. If a group history is available and shows that the group consistently blocked more rooms than needed, the managers of the hotel can confer with the group leader to determine whether a **wash** is necessary to reduce the block.

2.2. Main Products and Ancillary (or Complementary) Products and Services

One important factor to consider when selecting the optimal mix of business is how much total revenue a customer can generate during his/her stay at the hotel. Suppose there are two guests, A and B. A spends $100 on the hotel room plus $20 on room service, and B spends $110 on the room only. While the room revenue

($110) generated by B is higher than A, the total revenue ($120) generated by A is higher than B. The job of a revenue manager is thus to maximize the total revenue of the hotel instead of room revenue alone, even though hotel rooms are the main product and meals and drinks are ancillary products. Table 2 presents a list of examples of ancillary products and services in various service industries ordered by their importance to the particular industries (Phillips, 2005, pp. 138–139).

2.3. Overbooking

Experienced lodging managers know that the uncertainty of demand is worsened by the constant dynamics of customer behavior. So an often inevitable issue in hospitality firms has to do with no-shows, or customers who fail to honor their reservations by not showing up at check-in due to reasons like last minute change of plans. Since unused hospitality products such as hotel rooms and airline seats cannot be stored and resold on the next flight or next day, no-shows result in lost revenue for hospitality firms, especially when guests are not held financially liable for missing their reservations. Faced with the problem of no-shows, in order to maximize revenue by maximizing occupancy on a given day, many hospitality firms adopt a strategy of **overbooking** by accepting more "virtual" reservations than the total "physical" capacity of the firms (e.g., seats or rooms available). The expected no-shows for a night are estimated (or forecasted) mostly using historical data. A simple formula to calculate the expected number of no-shows is by multiplying the number of no-shows n by their respective probability as following:

$$\text{Expected number of no-shows} = \sum n \times P(n)$$

Table 2. Ancillary Products and Services in Some Revenue Management Industries.

Industry	**Ancillary Products and Services**	**Importance**
Passenger airlines	Duty-free sales, beverages sales, baggage fees	Low
Hotels	Food and beverage, minibars, telephone fees	Medium to low
Rental cars	Insurance, gasoline, on the road assistance	Medium
Cruise lines	Gambling, onboard sales, security personnel	Medium to high
Freight transportation	Sorting, call before delivery, special handling	Medium
Sporting events, theater	Food and beverage, merchandise sales, staging and lighting upgrades	High

Source: Adapted from Phillips (2005).

For example, if the probability of zero no-shows is 0.2, 1 no-show is 0.3, and 2 no-shows is 0.3, the expected number of no-shows is calculated as 0(0.2) + 1(0.3) + 2(0.3) = 0.9. Since the number of overbooked rooms will always be an integer, in this case, the hotel should overbook one room instead of 0.9 room.

Overbooking levels are also influenced by external and internal factors. External factors being demand period or day of the week, supply and demand, city-wide conferencing, or events. Internal factors – often given as an excuse to guests or customers – are human error or unexpected circumstances. Ideally, the number of overbooked hotel rooms or airline seats will match the number of no-shows for that night or flight. However, this is not always the case. When the number of overbooked airline seats is greater than no-shows, the airline is by law required to reimburse overbooked passengers and will assist overbooked passengers to find a seat in the next available flight. Although not required by law, when the number of overbooked hotel rooms is greater than non-shows, many hotels will also make arrangements for displaced guests to be walked to stay at a nearby hotel of equal quality either at no costs to the guests, or at a minimum, with courtesy transportation to the hotel. In other words, when the demand is greater than the capacity and some customers are turned away because the hotel or flight is overbooked, the hotel or airline incurs financial costs associated with displacement. This is referred to as **cost of walk (COW)**. The cost of walk often

Revenue management is a multidisciplinary science that is used in many industries, but its application and implementation can vary from sector. While many aspects of modern inventory management are coordinated through dedicated revenue managers, the hotel operations of inventory management are typically operated by front-of-house staff in hospitality businesses. It requires a team approach and weekly meetings. The team directly involved in its practice must understand economics, forecasting, pricing, distribution and strategy in order to maximize the hotel's revenue potential.

includes transportation, lodging, breakfast, customer "ill will" (i.e., potential loss of a customer to the competition as he/she might not return, or negative word of mouth on social media deterring other potential guests), and occasionally discounts as compensation for future stays.

Perhaps more importantly than the financial costs is the goodwill damage to hospitality firms caused by overbooking. There is an ongoing debate whether intentional overbooking is ethical or not. While the ultimate outcome of overbooking seems to be beneficial to the majority, some question the inherent rightness of the act itself as the company that accepts a booking makes a promise to the customer with an expectation that it may break it later (Hayes, 2011). Some may also consider that an overbooked hotel that denies a room to a guest with a guaranteed reservation breaches the contract by failing to fulfill its obligations. Nevertheless, despite its drawbacks, overbooking remains a popular practice in the hospitality industry. When making a decision of who gets walked, an arrivals list should be reviewed on a case-by-case basis. Firms should always try to avoid walking high-lifetime-value guests and lean toward prioritizing unknown guests.

3. Management and Principles of Space Inventory

3.1. Inventory-based Restrictions

Most service companies experience variable demand for their products. Typically, there are seasonal demand patterns (e.g., a resort hotel might see an increase of demand for the weekend contrasting with a city business-oriented hotel where demand falls). In such cases, companies will have several different options in determining how to meet demand. Generally, these options fall into two capacity management strategies – a **chase demand strategy** and a **constant level strategy**. Within a chase strategy, production is varied as demand varies. For example, a restaurant can use a shared space or shared equipment to increase or decrease capacity. Among these are the trendy concepts of "restaurant coworking spaces," "shared-use kitchens," "ghost kitchens," or "cloud kitchens." With the level strategy, production remains at a constant level in spite of any demand variations. In this strategy, there is no synchronization of demand with supply, although over the entire capacity, the planner will achieve a match.

However, within hotels or restaurants to a lesser degree (i.e., as a seat or table can often be added), this capacity is significantly fixed, perishable (e.g., one can't sell today last night's room stay), and costly to increase. Companies still have to try to adapt and optimize its output level according to the anticipated capacity fill levels.

A variety of inventory controls exist to help managers match supply to demand in order to maximize revenue. The inventory is said to be **open** when there is no restriction to sell, whereas it is said to be **closed** when no new reservations can be taken, and no guests can stay-through that day. A closed to arrival (CTA) inventory control does not allow guests to check in on that date but allows in-house guests to stay-through that day, which is less restrictive than closed to sell. A **minimum length of stay** (MinLOS) restriction requires guests making the

reservation to stay for at least a certain number of days, whereas a **maximum length of stay** (MaxLOS) restriction requires guests to stay no more than a certain number of days. For example, if a hotel is sold out on the first night of a major two-day event but not the second night, the hotel can put a minimum of stay of two nights restriction in place to ensure high occupancy for both nights. To ensure there are rooms available for sale at a high rate for the event, the hotel may also require guests paying discounted rates who arrive the night before the event to stay for only one night. A hotel can also impose a **full-pattern length of stay** restriction to reservations with a specific arrival date. For example, only reservations for one, three, or five nights can be taken but not reservations for two, four, or six nights. Additionally, inventory controls can be applied to specific room types. For example, a hotel can allocate four out of five available suites to be sold to allow for potential VIP upgrades. **Sell-through** (also named as stay-through) is a stay control usually used for group bookings that enables a booking request for an extended stay reservation to be booked through sold-outs nights. This tactic is used to capture extended stay business and increase occupancy on shoulder dates. It includes the number of rooms a hotel has to sell-through, the close-out date and the minimum number of nights it will accept (e.g., a 10/5 sell-through means that the property is selling 10 rooms *through* the close-out date for guests staying a minimum of 5 nights). Frequently, this is also referred to as sales made directly or direct sales. **Stop-sell** (also known as a close-out or block) is a restriction that signals that a property has put a "stop" on bookings for a specific rate, room, and date combination for a set number (or block) of rooms; this can be done for all **distribution channels**, or for individual channels in particular, even if the hotel is not sold out.

3.2. Strategic Pricing

Via strategic pricing, revenue managers perform a detailed analysis of how current and historical prices have performed for the same or similar products and times. Pricing strategy should start by identifying what are the unit (either a hotel, resort, extended stay, etc.), peak periods, and market segments priorities and then use that information to establish pricing guidelines.

Strategic pricing is a process of optimizing profits by segmenting the market using **rate fences** – rules or requirements attached to a certain rate, product, or package – based on different product requirements (time, price, service level) using dynamic pricing (different prices for products and clients). By forecasting **unconstrained demand** for each product/price point, one can determine in advance what demand to reject and to accept to optimize revenues across the network.

For years, companies have operated changing prices on an annual basis, often during the previous year's last quarter establishment of the budget. Its inventory was most sold in a first-come, first-served manner. RM, with its strategic approach, came to break the demand and supply market's first-come, first-served nature. Based on its market position and conditions, it predicts (forecasts) consumer behavior and effectively prices highly perishable products to optimize revenue. For example, in the case hotels not properly applying rooms displacement

strategic analysis, routinely turn away a customer willing to pay a higher price for a room because available inventory had been previously sold to another guest at a lower price. Obviously that tactic lacks a strategic view and has negative revenue consequences. There is an increased need to both understand customer preferences, current and future demands. For example, a transient leisure segment, such as families, might be looking to stay at a downtown hotel during weekend nights (Friday and Saturday), while business transients prefer weekdays, Tuesday through Thursday. By knowing this in advance, one can set a fence in the family's transient rate which limits the rate, product, or package availability for only those days. Additionally, by looking into the trend at the "pickup," pace report, or reservations booking cycle (Fig. 1), one can apply different last-minute bookings tactics such as distributing unsold rooms through opaque online distribution channels or using inventory availability controls.

Hotels can also apply long-term pricing strategies like rate fences. There are two types of fences, physical and non-physical rate fences. The non-physical subdivides into: (a) transaction characteristics, (b) consumption characteristics, and (c) buyer characteristics. Table 3 shows a few examples of each category across the hospitality industry.

3.3. Strategic Capacity Inventory with Displacement Analysis

Strategic capacity inventory decides how to make the best usage of that capacity in the medium and long terms. To anticipate future demand fluctuations, service companies use forecasting as the basic statistical technique to predict a future demand and based on those calculations, achieve optimum capacity utilization and business performance.

As discussed earlier in the chapter, a salient characteristic of the hospitality industry is its relatively fixed supply. Managers cannot adjust the capacity of the hotel or the airplane to meet the changing demand of guests on a given day. This is not an issue when the total demand from all potential guests for a hotel on a given night is less than or equal to the capacity of the hotel. In this case, the hotel maximizes revenue by accepting all reservations. However, when the total **unrestricted demand** (i.e., the total demand from all potential guests) is greater than the capacity of the hotel, managers need to decide which reservations to accept

Table 3. Rate Fence Examples in the Hospitality Industry.

	Rate Fence Categories	**Examples**
Physical fences (product related)	Basic product	- Class of travel (business/economy class). - Size and furnishing of a hotel room.
	Amenities	- Free breakfast at a hotel, airport pickup, complementary parking, etc. - Free golf cart at a golf course.
	Service level	- Priority wait listing. - Increase in baggage allowances.

Table 3. (*Continued*)

	Rate Fence Categories	**Examples**
Non-physical fences	**a) Transaction characteristics**	
	Time of booking or reservation	- Advance purchase requirements. - Must pay full fare two weeks before departure.
	Location of booking or reservation	- Passengers booking air tickets for an identical route in different countries are charged different prices. - Using the CRS booking website visitors' IP address to allocate different web pages content, products, and pricing.
	Flexibility of ticket usage	- Fees/penalties for canceling or changing a reservation (up to loss of entire ticket price). - Non-refundable reservation fees.
	b) Consumption characteristics	
	Time or duration of use	- Early bird special in restaurant before 6 p.m. - Must stay over on Saturday for airline, hotel.
	Point of sale	- Mail physical delivery and confirmations versus confirmations by email or SMS. - The client is offsite, onsite at the bar or at the room.
	Location of consumption	- Price depends on departure location. - Prices vary by location (between cities, city center versus edges of city).
	c) Buyer characteristics	
	Frequency or volume of consumption	- Members of certain loyalty-tier with the firm get priority pricing, discounts or loyalty benefits. Guests are rewarded loyalty privileges either as free services or free stay vouchers.
	Group membership	- Child, student, senior citizen discounts. - Affiliation with certain groups (e.g., AAA, Rotary, Alumni, etc.).
	Size of customer group	- Group discounts based on size of group. - State employees with per diem rates/ rooms.

as accepting one reservation means displacing another. Typically, groups reserve with more anticipation than transients, often competing for the same rooms. During high demand periods, situations may arise in which transient and group guests compete for a hotel's remaining rooms.

A **displacement analysis** – also called as cost–benefit analysis – compares the total value of those different pieces of business (e.g., a group versus another or more often a group versus transients booking at the last minute) to determine which piece of business should be selected because it brings the most value to the hotel. It's an alternative to the old way of allocating inventory without much strategic considerations, the first-come, first-served approach (or monkey management, no capacity control). Powerful computer systems collect data, analyze the data, and are able to make recommendations using sophisticated algorithms (rate recommendations, forecasting, displacement analysis, etc.) Choi & Kimes (2002). Systems such as an automated RM solution, integrate algorithms with accept or reject rules and demand forecast.

As discussed earlier in the chapter, managers need to consider the total revenue a customer can generate during his/her stay at the hotel when selecting the optimal mix of business. In addition to the revenue resulting from the primary purchase of the hotel room night, the ancillary purchases on food, beverage, entertainment, room function rental, parking, etc. should also be considered. Recall the example about guests A and B. The total spending of A is $120 ($100 on room + $20 on room service) and the total spending of B is $110 (on room). When considering the total customer worth to an organization, A is preferred to B. Nevertheless, there is more to the determination of the total customer worth than the sum of primary revenue and ancillary revenue (Tranter, Stuart-Hill, & Parker, 2009).

The acquisition cost of acquiring a particular customer such as marketing costs, reservation costs, and service costs should be taken into consideration, as such costs reduce the total worth of the customer. An important goal of hoteliers is to retain existing customers as customer acquisition can be more costly than customer retainment. Using the example above, A spends more money than B for one stay. However, A may be a one-time customer whereas B is a repeat customer that on average stays 10 nights at the hotel every year. With this knowledge, managers of the hotel are likely to select B instead of A given the high propensity of B to return to the hotel to generate future revenue. However, there are also costs associated with retaining guests, especially loyalty members. For example, loyalty members may receive free room nights or other perks for their repeat business. Therefore, managers should also reduce the costs of retaining the guest from the total worth of the guest.

3.4. Principles of Distribution Channels Management

An important question in inventory management is the determination of where the reservations are coming from. For example, a chain-affiliated hotel may receive over half of its business from the **central reservation system (CRS)** run by the hotel chain, and the rest from business generated by the in-house sales department, **online travel agencies (OTAs)**, social media promotions, etc. For an independent boutique hotel, its business may mainly come from the hotel website, social media promotions, or OTAs. Depending on the brand affiliation, consumer

awareness, management quality, marketing effort, amenities and condition, the optimal distribution channel for a hotel's products and services may vary. The objective of distribution channel management is therefore to compare the costs and benefits of various channels to come up with an optimal mix that will help the hotel to reach its target market and deliver the right price/value proposition.

There are a large and increasing number of different channels available for the consumer to book. It is key that management fully understands the marketing and reservation fees that constitute the cost of distribution so that the most appropriate controls can be established and sales focus on the most profitable channels. Marketing and reservation fees include labor costs (highest in voice bookings), direct marketing, discount or commission, loyalty programs, credit card fees, and transaction channel fees.

The most important channels of distribution are three types:

1) Electronic channels that include the CRS, global distribution system (GDS), GDS-powered sites, third parties, and proprietary websites connected via a CRS.
2) Manual and most time-consuming extranets or third-party sites such as Expedia.
3) Voice (on-property and off-property) reservation centers, central (in increasing number) or on-property reservation departments, using either CRS or PMS rate and inventory information.

Proprietary hotel websites are the lowest cost channel for hotels to distribute their products and services. However, not all businesses can easily conduct online bookings. While individual bookings can be conveniently reserved online, group bookings that require negotiation and customization are best conducted through the hotel – central or on-property – sales department. It costs the hotels more to sell rooms through OTAs and GDSs as these companies charge a high fee. To shift third-party bookings to direct bookings, major hotels are encouraging guests to book directly from their own websites. One way to do so is by charging a lower rate for the hotel on the hotel website than the OTAs' website. However, this is not always viable given the requirement of rate parity in some countries. **Rate parity** is a legal agreement between the hotel and OTAs that both parties will charge the same price for the same room in order to prevent one party from undercutting the room prices that the other party charges for the hotel. To adapt to rate parity, some hotels offer free Wi-Fi or breakfast to guests who book directly with the hotel, promote private rates to members of the hotel loyalty programs, advertise certain room types exclusively on their own websites, and award loyalty points to stays booked directly with the hotel. To compete with hotels, some OTAs also created their own loyalty programs to encourage bookings on their sites.

Although OTAs can be a direct competitor to hotel proprietary websites, they play an integral role in hotel bookings and can help hotels increase sales. To maximize sales, hotel managers need to optimize the use of various distribution channels. To do so, managers need to analyze the contribution of each distribution channel to the hotel's business, the patterns of third-party bookings, the type of guests that use third-party bookings sites, and the costs associated with each

distribution channel, which usually ranges between 15% and 30% of the room price (Clampet, 2016).

Discussion Questions

1. Overbooking is an important strategy for hospitality firms to prevent loss of revenue due to guest no-shows. To determine the number of overbooked rooms, revenue managers need to rely on historical data. The historical data on the number of no-shows and its corresponding probability for a small 100-room hotel are presented below. Read section 2.3 Overbooking in this chapter and calculate the expected number of no-shows on a given night. Supposing the hotel has one room left to sell for that night, how many rooms should the hotel overbook?

No-shows	0	1	2	3	4
Probability	0.22	0.26	0.15	0.08	0.01

2. The hotel "The Burg" is a 120-room and independent, limited service, mid-scale property located in the suburbs of a city. The Burg has an agreement with a nearby hotel, The Ville, to accept each other's walks at $80 per night when there is availability. In addition to the room rate, The Burg also pays an average of $10 walk-related costs for each overbooked room. Tonight, The Burg is sold out at an average rate of $130, whereas The Ville has 20 rooms left to sell. Lisa, the General Manager of the Burg, expects 10 no-shows tonight. Since the hotel does not charge any no-show fee, Lisa decided to overbook 10 rooms to offset the potential loss of revenue.

    1) Suppose there were 11 no-shows at The Burg tonight, how much extra room revenue will the overbooked room generate?
    2) Suppose there were only five no-shows at The Burg tonight, how much extra room revenue will the overbooked rooms generate?

3. Unlike leisure travelers, many conference attendees do not pay for their stays at a hotel as they are often sponsored by their companies to attend large conferences. This type of group guests prefers to stay at conference hotels due to the hotels' proximity to the meeting locations and are relatively insensitive to the room rate charged by the hotel. Additionally, many of them like to make hotel reservations using mobile apps, which are a less costly distribution channel for hotels to sell their rooms. Despite the many advantages associated with conference attendees for a hotel, this particular type of group guests only tends to stay at the hotel for the first few days of the conference. For example, for a three-day conference, the attendees usually only stay for the first two days. Supposing you are the revenue management of the conference hotel, what would make sense for you to proactively do?

Case Exercises

1. In Table 4, the hotel correctly decides to put an overbooking limit on Friday and Saturday in order to capture extra demand for both days. The hotel also decides to put a CTA on Saturday in an effort to stimulate activity for Friday.

    1) What is a problem with instituting a CTA in this or in other situations?
    2) What other inventory control strategy may be better for this situation?
    3) What is a creative way of influencing demand into Friday while also maximizing revenue across both days?

2. In Table 5, the 200-room hotel has availability each day. However, if a guest looks for a Friday arrival for two or three nights, they are met with no availability as there isn't any room type that has rooms for the two consecutive days. Also consider the same situation if the presidential suite were available. A Friday two-night arrival would only show a guest availability for the presidential suite – likely a very high price which the guest may not want and ultimately that would only allow the hotel to capture just one more room of demand.

    To remedy the lack of sell-through, hotels overbook their standard room type or another room type in an effort to capture any demand that exists

Table 4. Overall Booking for a 500-Room Hotel.

Day of Week	**Friday**	**Saturday**
Price for the day ($)	200	300
Rooms sold (before overbooking)	350	500
Overbooking (%)	3	3
Total rooms available for sale	515	515

Table 5. Rooms Left to Sell for a 200-Room Hotel.

Room Type (No. of Rooms)	**Rooms Left to Sell**		
	Friday	**Saturday**	**Sunday**
Presidential suite (1)	1	0	1
Executive suite (20)	0	10	15
Double queens (79)	20	0	15
Deluxe king (30)	0	10	20
Standard king (70)	20	0	40
Total rooms available for sale	41	20	91

Table 6. Rooms Left to Sell for a 200-Room Hotel With Room-Type Overbooking.

Room Type (No. of Rooms)	**Rooms Left to Sell (With Room-Type Overbooking)**		
	Friday	**Saturday**	**Sunday**
Presidential suite (1)	1	0	1
Executive suite (20)	0	10	15
Double queens (79)	20	0	15
Deluxe king (30)	0	5	20
Standard king (70)	20	5	40
Total rooms available for sale	41	20	91

Note. Five rooms have been reduced from the deluxe king room type, while five rooms of overbooking have been added into the standard king room type.

for multiple nights. In the example below (Table 6), the revenue manager cured the issue of no availability for Friday two-night and three-night arrivals by overbooking the standard king room type and reducing the room-type authorization on the deluxe king room type.

What would be some of the issues in the above table with overbooking the standard king room type?

3. The conditions described below challenge the capability to generate revenues and maintain profitability. How can hospitality businesses maintain profitability given their reduced capacity? Use your critical thinking to provide at least three different alternatives, in the lodging, F&B, or any other sectors.

In terms of inventory-based restrictions, post-COVID-19, the hospitality industry was being forced to:

A. Stop or slow hospitality operations either by government mandate or by the lack of demand.
B. Implement new occupancy rules
C. Reduce its capacity

Today, capacity management is under tremendous and unprecedented pressure. Think about the various government policies that are constraining capacity right now. Whether it be:

- A restaurant that can operate at a maximum of 50% capacity and maintain certain distances between parties.
- Golf courses that have to increase their tee time interval from 8 to 18 minutes or meetings that can have a maximum of 50 people.

- Hotels may be subject to a maximum occupancy percentage, use only alternate rooms or have at least 24 hours between guests.
- Restaurants may have restrictions on the maximum number of guests, a maximum capacity percentage or a maximum party size.
- Casinos have to operate with a maximum of 25% capacity, hotels with a maximum of 50% occupancy and 24 hours between customers.
- Even elevators with a maximum of four people.

(Sources: https://www.linkedin.com/pulse/new-world-capacity-constrained-demand-sherri-kimes and https://www.hotelnewsresource.com/article110704.html)

Managerial Challenge

Mr. Cruz. is the General Manager (GM) of a 210-room five stars luxury resort in Algarve (southern coast of Portugal). He was dealing with post-COVID-19 inventory-based restrictions imposed by the government to contain the spread of the virus. For the room department, the average length of stay is of four nights but that's shortened with a new policy from the corporate office to have an effective capacity of 50%, leaving each room empty in between guests for rigorous cleaning and disinfection. In his hotel restaurant, management needs to implement new social-distancing guidelines which include a drastic reduction into its capacity which makes it close to unfeasible to operate. His restaurant has a capacity of 160 seats, but it is now under the new rules and regulation limited to 40% maximum occupancy. The same restaurant kitchen is used for catering.

Questions

1. Today, capacity management is under tremendous and unprecedented pressure. Based on these inventory-based restrictions outlined above and what you have learned before, elaborate on the specific tactics to maximize occupancy or at certain times, to decrease its clientele processing time. Explain at least two different approaches and calculate the hotel new "sellable capacity."
2. What are the implications which reduced capacity brings in terms of kitchen, staffing levels, equipment, or restaurant space (e.g., reduced number of tables)? Explain a couple of these aspects.
3. Limits on dine-in capacity are also bringing opportunities. What are different and alternative ways you would find to generate ancillary revenue for your hotel restaurant during or post pandemic? More specifically, research and suggest at least three different ways how has the pandemic changed the way restaurant hotels look at its relatively fixed capacity?

Added Insight

COVID-19 wrought unprecedented change to demand and capacity management across hospitality businesses in 2020. The full scope of the pandemic's effects was not clear at the time of this book's publication, but it knowingly caused many

hospitality businesses to face financial distress, including bankruptcies, foreclosures, mergers, and acquisitions.

In a reactive way, hotels adapted and used the crisis to reinvent themselves by finding new ways to utilize inventory. Some hotels used rooms to house emergency workers, college students, and even the homeless. Some converted into makeshift hospitals to add capacity to health-care system that needed rooms for patients. Many properties partnered with local businesses to create remote-working arrangements. An example of a new product was the emergence of ultra-luxury micro-weddings, targeting leisure-sized groups since traditional groups and special corporate travelers were practically nonexistent.

The severity of this crisis complicated the task of managers determining effective capacity and, as it was mentioned, threatened the profitability (and even the existence) of several businesses. Consider a very specific capacity-constraint: elevators. While elevators are obviously not revenue generating (instead being cost centers), new operating rules set by governments and company policies mandated maximum elevator capacities of two, three, or four people. In certain cases, hotels were retrofitting elevators to not only include innovations such as touchless operation or self-cleaning button covers but also to increase its capacity or convert service-exclusive elevators for guest use.

Question

Discuss your understanding of the RM condition of "relatively fixed capacity" under the COVID-19 pandemic conditions. Consider how other hospitality businesses coped with these constraints. How would you have handled the crisis? State at least three different approaches.

Risk and Crisis Management

Despite the COVID-19 pandemic emerging in and dominating the year 2020, the pandemic's economic and social consequences imposed long-standing consequences for hospitality firms' capacity and inventory. Following the sudden recession of global demand in Winter of that year, efforts quickly pivoted toward the utilization of revenue and customer relationship management databases to optimize marketing and find creative uses to safely sell space and services. Certain promotions to attract mass demand or foot traffic were not necessary or appropriate given social-distancing limitations and capacity constraints, so the costs of such programs were eliminated. The adoption of online services, such as food orders or bill-paying, became increasingly normal business practices that not only increased service capacity but also utilized IT efficiencies to combat reduced labor budgets. Consumers became ever-more comfortable and even appreciative of the opportunity for contactless, convenient, technology-based services in the forms of improved websites, apps, and other interfaces for booking, receiving, and paying for hospitality services.

Questions

1. In what ways did food and beverage operations adapt to cope with the COVID-19 capacity constraints?
2. Suppose you were the general manager of a hotel during the COVID-19 pandemic. After the initial lockdown period ended, what challenges were you likely to face? How would you maintain or generate revenue post-COVID-19?
3. Suppose the COVID-19 pandemic is over. What actions would you take to prepare your hotel for future unforeseeable crises using lessons learned during the COVID-19 pandemic?

Glossary

Capacity: The maximum amount of output a service system can produce, or the maximum potential customers it can serve, over a given length of time.

Central reservation system (CRS): A firm's system for coordinating reservations, which may include a direct sales channel.

Chase demand strategy: A supply-side approach to capacity management in which capacity is changed dynamically to "chase" demand (unlike the constant level strategy).

Closed inventory: A status of inventory control when no new reservations are allowable for a given date, either across all distribution channels or for a particular channel.

Constant level strategy: A supply-side approach to capacity management in which capacity is fixed regardless of demand changes (unlike the chase demand strategy).

Cost of walk (COW): The cost of turning away a guest when the hotel is unable to provide the promised accommodation or the airline is unable to provide transportation for a specific booked flight, which may include the cost of a hotel room, transportation, meals, and probable lost future business.

Cut-off date: The date a hotel group's unsold inventory is returned to the hotel's general sellable inventory.

Decision support system (DSS): Technology that accounts for a variety of data and helps management make informed decisions based on established criteria and constraints.

Displacement analysis: In periods of high demand, such analysis compares the value of different pieces of business to identify the one that brings the most value to the hotel.

Distribution channel: A marketing platform by which an entity sells available capacity to potential customers. Examples include hotel websites, online travel agencies, reservation hotlines, etc.

Full-pattern length of stay: A restriction to sell only specific lengths of stay beginning on a given arrival date.

Global distribution system (GDS):The first internet-based computerized reservation networks, through which hospitality business partners (travel agents, meeting planners, airline employees, and travelers) can view a wide range of

travel services data, including air, hotel, auto rental, and other travel services. Among the biggest players are Amadeus, Cendant's Galileo International, Sabre, and Worldspan.

Minimum length of stay (MinLOS): A room inventory control function indicating that a reservation with arrival on a particular date must stay for two or more nights at a minimum.

Maximum length of stay (MaxLOS): A room inventory control function indicating that a reservation with arrival on a particular date may not extend past a certain date or number of days.

Overbooking: A strategy that involves accepting more bookings than the business has physical capacity to serve. In lodging, this means accepting more room reservations than the hotel has rooms available to accommodate, done with anticipation that there will be at least a few cancelations and no-shows. In restaurants, this means accepting more reservations for a certain time than the restaurant can typically accommodate, also with anticipation for cancelations and no-shows, as well as faster diners or late arrivals.

Occupancy: The amount of available inventory sold for a given period of time, typically expressed as a percentage rate.

Online travel agent (OTA): Entities, such as Booking.com and Priceline, that sell hotel rooms, flights, rental cars, and the like on behalf of a firm, typically in exchange for a cut or commission on revenue.

Open inventory: A status of inventory control new reservations are allowable for a given date, either across all distribution channels or for a particular channel. Typically, this status is also configured without any requirements or restrictions on sellable inventory.

Physical inventory: The tangible resource required to deliver service, such as hotel rooms, airplane seats, and restaurant tables.

Property management system (PMS): The dominant operating system in a hotel that coordinates reservations and sales management with rooms control, housekeeping, and other operating activities.

Rack rate: The full, maximum nightly rate chargeable per a hotel room.

Rate fence: Physical and non-physical rules and regulations that are set for each product priced. Examples include non-refundable reservations in lodging and "early bird" specials in restaurants.

Rate parity: The practice of ensuring consistent rates appear across distribution channels.

Revenue management (RM): First known as yield management, this is the science that maximizes revenues by selling the right product, to the right customer, at the right time, for the right price within the constraints of available capacity and unconstrained demand. The goal is to optimize prices and occupancy/demand to achieve the highest possible revenue per available capacity.

Revenue per available time-based inventory unit (RevPATI): The average revenue a business receives as a factor of capacity utilization (e.g., hotel occupancy) and prices paid (e.g., hotel average daily rates). Industry examples include hotels' revenue per available room (RevPAR), restaurants' revenue per available seat hour (RevPASH), spas' revenue per available treatment room hour

(RevPATH), airlines' revenue per available seat mile (RevPASM), and golf courses' revenue per available tee time (RevPATT).

Revenue manager: The person or team responsible for daily tactics and aligned strategic long-term decisions for revenue maximization, with an emphasis on demand generation, market positioning, and strategic pricing.

Revenue per available room (RevPAR): The average revenue generated by each guest room available during a specific time period. RevPAR is a product of average daily room rates multiplied by hotel occupancy rates.

Sell-through (or stay-through): A status of inventory control in which reservations that begin before or end after a sold-out period are allowable.

Stop-sell: A status of inventory control in which restrictions are placed on booking specific combinations of rates, rooms, and dates for a set number of rooms.

Unconstrained demand: Total demand in a segment or overall, regardless of any constraints or capacity limitations (e.g., hotel's capacity or bookings restrictions). It is also known as "true demand."

Unrestricted demand: This refers to the total demand from all potential guests.

Yieldable capacity: This refers to the total capacity available to sell at any given time.

Wash: The differences between the total group block and the number of rooms in the block that the hotel expects it will actually pick up (or have booked).

References

Choi, S., & Kimes, S. E. (2002). Electronic distribution channels' effect on hotel revenue management. *Cornell Hotel and Restaurant Administration Quarterly*, *34*(5), 23–31.

Clampet, J. (2016, April 25). Everything you wanted to know about the hotel industry's gripes against OTAs. *Skift*. Retrieved from https://skift.com/2016/04/25/everything-you-ever-wanted-to-know-about-hotel-industrys-complaints-against-otas/

Hayes, D. K., & Allisha, A. M. (2011). *Revenue Managemen for the Hospitality Industry*. Hoboken, NJ: Wiley.

Kimes, S. E. (2001a). A strategic approach to yield management. In A. Ingold, U. McMahon-Beattie, & I. Yeoman (eds.), *Yield Management: Strategies for the Service Industries*, (2d ed, pp. 3-14). London: International Thomson Business Press.

Kimes, S. E. (2001b). *Yield management. The center for hospitality research at Cornell University*. CHR Reports. Ithaca, NY: Cornell University.

Phillips, R. (2005). *Pricing and revenue optimization*. Stanford, CA: Stanford University Press.

Smith, B. C., Leimkuhler, J. E., & Darrow, R. M. (1992). Yield management at American airlines. *Interfaces*, *22*(1), 8–31.

Talluri, K., & van Ryzin, G. J. (2004). *Theory and practice of revenue management* (p. 178). Dordrecht: Kluwer Academic Publishers.

Tranter, K. A., Stuart-Hill, T., & Parker, J. (2009). *An introduction to revenue management for the hospitality industry: Principles and practices for the real world*. Upper Saddle River, NJ: Prentice Hall.

This page intentionally left blank

Chapter 6

Managing Supply Chains

John Bancroft and Di Li

Abstract

This chapter covers three main concepts: it provides an overview of supply chain management (SCM), introduces the concepts of procurement and what is entailed within this function, and explains how inventory is managed. In the first section, SCM is considered broadly but also in the context of hospitality. The key roles and objectives of SCM as well as the significance of supply chain risk and disruption are considered. In the second section, the concept of sourcing is discussed. Sourcing is a critical function in any organization: without this, an organization would cease to operate. The importance of supplier selection is explored, with methods to make the most appropriate selection and for subsequently managing suppliers. Finally, the third section focuses on how inventory management can be optimized. Concepts such as economic order quantity (EOQ) and ABC analysis are explored, along with alternatives to traditional inventory management methods.

Keywords: Inventory management; inventory optimization; procurement; sourcing; supply chain management; supplier selection

Learning Outcomes

After completing this chapter, you should be able to:

1. Describe the key components and activities within supply chain management.
2. Discuss mitigation plans against supply chain risk and disruption.
3. Explain the role, scope, and importance of procurement.
4. Identify and apply approaches for supplier selection.
5. Calculate and evaluate optimum orders by using economic order quantities and ABC analysis.
6. Optimize inventory management by using digital tools.

Operations Management in the Hospitality Industry, 117–142

doi:10.1108/978-1-83867-541-720211006

Outline

Getting Started

Supply chain management as a concept is a relatively straightforward one to understand: regardless of the industry, context, and output, the ultimate goals are the same. Supply chain management ultimately enables an organization to provide its products or services to its customers. In order to do this, cooperation is required across a number of specialist organizations, who all carry out value-adding operations; this coordination ultimately leads to a complete product or service offering. Supply chain management is all about managing the relationships between these organizations – ensuring the smooth and efficient flow of goods, information, and finance – to deliver these goods to the end customers. There are various activities along the way, including procurement, manufacturing, storage, and logistics. Collaboration is essential, from raw materials through various operations, until a finished product is ready for consumption. In order to do this well, there needs to be systems in place to share data and information, and goals, objectives, requirements, and expectations must be clear. When there is a lack of alignment in a supply chain, problems are likely to arise.

1. Hospitality Supply Chain Management

1.1. Overview of Hospitality Supply Chain Management

Typically, the first thoughts of supply chain management are on the **downstream** flows, which are "things" moving toward the consumer. However, it is important to realize that "things" can also move **upstream**, back toward suppliers (Slack & Brandon-Jones, 2018). This could entail the return of unwanted or defective items or pertain to the recycling or reuse of packaging or used products. An example of a fresh produce supply chain can be seen in Fig. 1.

The issue with such representations is that they provide only a simplistic overview of a supply chain that, in reality, is more likely to involve multiple organizations and varied flows of activities. Consequently, the complexity experienced

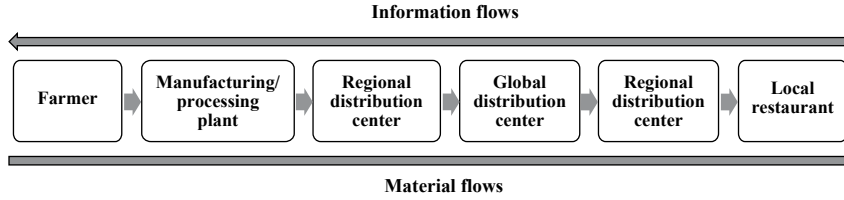


Fig. 1. Fresh Produce Supply Chain.

when coordinating this is significant. Consider this with an example of fine green beans, possibly farmed in Tanzania and then destined for wholesalers, restaurants, and hotels in the United States. The job of coordinating supply is immensely complicated, considering it must happen via multiple organizations, despite language and cultural barriers, between legal and regulatory environments, amid packaging requirements, across multiple modes of transportation – all while maintaining consumable quality at a reasonable cost!

Without supply chain management trying to coordinate all of these aspects, chaos and inefficiency abound. The objectives sought around quality, speed, dependability, flexibility, and cost would be unachievable. The hospitality sector is no exception here. For restaurants, produce would be missing, rotten, or in the wrong quantities. Bars would be without drinks, and hotels without bedding, cleaning products, and consumables (Jenkins, Cameron, & Crompton, 2015). With hospitality being so global in its nature, an extra dimension of complexity is typically present: items are produced internationally, from many manufacturers, and then must be carefully supplied to locations worldwide. The complexity and length of global supply chains means the risk of delays and general disruptions are more common.

1.2. Supply Chain Risk and Disruption

Risk management is an essential topic in supply chain management, as risks are present throughout (Christopher & Peck, 2004). Risk cannot be avoided, but they can be controlled and mitigated. However, many companies do not dedicate adequate time and resources in risk management and continuity of operations, which leaves supply chains fragile and easily disrupted.

The COVID-19 pandemic provided a clear example of this. As the coronavirus spread around the globe, industries suffered significant financial and operational challenges. Many companies saw sudden, massive reductions in business and faced subsequent closure – in some cases temporary, in others permanent. Many organizations experienced shortages of supplies and were thus unable to fulfill the demands of customers. The shortages of personal protective equipment (PPE), chemical cleaners, etc. serve as prime, unfortunate examples (Rowan & Laffey, 2020). Behind these shortages are broken supply chains. For most products, there is likely a large and complex supply network, in which countless businesses may be interconnected. As COVID-19 spread, the demand from customers for PPE

and chemical cleaners increased dramatically, while production remained flat or decreased due to local lockdowns, the illness of manufacturing and distribution employees, and other reasons. As many activities within the supply networks were outsourced to countries far away, the supply networks proved difficult to control. Even one producer stopping or delaying supply could disrupt or halt the whole network. Due to additional transportation disruptions, the delay of production or distribution became even greater. COVID-19 increased public awareness of supply chain management and especially placed focus on the importance of risk management related to business continuity and supply chain contingency planning. The concept of **supply chain resilience**, being the ability of a chain to survive, adapt, and grow during difficult times, increased in popularity.

Companies can revise their inventory strategies to improve flexibility by increasing **safety stock**, especially on raw materials which can be used across different products. It is also prudent to work with multiple suppliers rather than one for each item, as this dilutes the risks of supplier dependency and thus increases resilience. A review of the current supply networks may also unearth weaknesses and lead to improved resilience. To reduce supply network complexity, the reshoring trend had grown, and then received even more attention due to COVID-19 (Li, Godsell, & Karatzas, 2016). **Reshoring** – the opposite of **offshoring** – refers to bringing supply harvesting or manufacturing back to home or nearby countries, in turn reducing supply chain distances and developing local and regional supply circles to enhance resilience. Finally, the adoption of new technologies, such as 3D printing, robots, and artificial intelligence (AI), can help improve resilience. With more implementation of these digital tools, higher degrees of process automation and refinement will be achieved in productions and daily operations. A practical example has been seen already, with some companies in China using AI robots and cars to deliver goods to customers (Arthur & Shuhui, 2020).

2. Sourcing

While the hospitality industry is thought of as a serviceorientated sector; perhaps because of the visibility of their staff and operations, and therefore their ability to influence the positivity, or negativity of the consumer's experience. In reality, this service element is just a part of the puzzle, as without certain materials and goods, it would be impossible to provide any level of service for most.

Most operations can be considered a hybrid of services and goods, with few meeting the classification of pure product services (see Fig. 2). Restaurants, hotels, and others are no exception to this. While a service is provided; take the atmosphere of a restaurant and the service of food and drinks, there is a "manufacturing" process behind the scenes, where chefs and other staff prepare meals and drinks, which of course require materials.

2.1. What Is Procurement and Sourcing?

Procurement is focused on the upstream part of the supply chain, specifically on the interaction with suppliers to source and receive goods and services (Harrison,

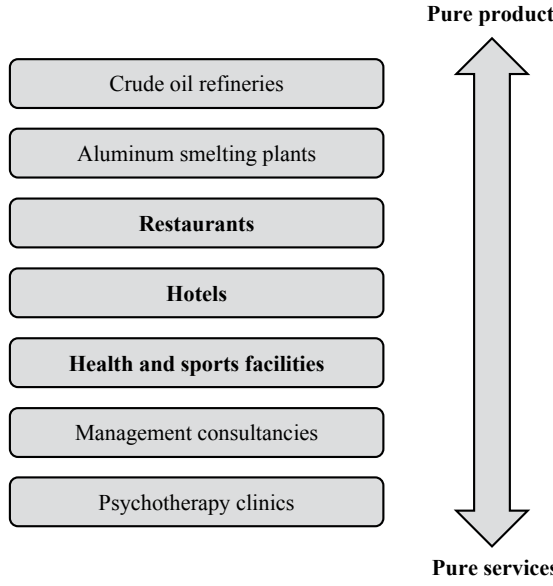


Fig. 2. Pure Products Versus Pure Services. *Source*: Adapted from Slack, Brandon-Jones, and Johnston (2016).

van Hoek, & Skipworth, 2014). This process is often thought of as just a transaction, to order and pay for goods, but much more is involved. The procurement process should start with the identification of needs. Consider: What foods should a restaurant order to serve the items on its menu? What quantity should be ordered? What is the acceptable quality of ingredients? Suppliers can be evaluated with additional questions: Who are possible vendors serving the desired products within the restaurant's area? Should the restaurant rely on one or multiple suppliers? How flexible are they? Then, once a set of suppliers is narrowed, negotiation addresses some final questions: How much can the restaurant afford to pay, and how low can it negotiate pricing – especially using promotions, quantity discounts, and other means? What are order fulfillment and payment terms? How will quality be managed? What is the timing for deliveries?

The function of procurement also advises on supply matters: Over time, should a firm foresee any price trends that may make certain goods and services more expensive, or cheaper better yet? Do alternative products or services exist to help achieve the same end results? What are the risks associated with these offerings? While the procurement function has a lot to contribute to an organization, it ultimately exists to ensure the effective, efficient arrival of supplies.

There are many examples of supply chain failures in hospitality. In 2013, the United Kingdom experienced such issues within its hospitality sector. One of the United Kingdom's largest hotel and restaurant operators, Whitbread, discovered horsemeat in some of its "beef" products. While in this instance there was no harm to consumers, it nonetheless posed an ethical controversy. Consider the

In a restaurant, the delivery of food to a hungry guest marks the end of a supply chain in many respects. The food not only needed to be cooked by the restaurants and served by staff, but the ingredients needed to be sourced. Between the restaurant and the farmers and fishermen, there may have been several distributors, wholesalers, and other middlemen responsible for the growing, gathering, refinement, and transportation of food and beverage products. Supply chain management considers all aspects of this process.

additional example of an *E. coli* outbreak across Chipotle Mexican Grill units in the United States in 2015: not only was there an ethical dilemma, but a very real public health crisis resulting from a lapse in quality control across the restaurant brand's supply chain.

2.2. Selecting Suppliers

One of the most important roles of the procurement function is to identify, assess, and select suppliers. The ability of the selected suppliers and the goods that they provide will ultimately influence an organization's success. A first step is the identification of possible suppliers. Suppliers can be found through a variety of sources, but the internet has made this process quicker and easier than ever. Offline alternatives, such as exhibitions and trade shows, also exist. Word of mouth is also a common means by which operators receive referrals from peers in the same or comparable firms.

Once suppliers have been identified, they can then be assessed. The process of assessing suppliers can be a time-consuming and costly, particularly when large contracts are involved. For a large hotel chain, this will likely be a lengthy process due to corporate bureaucracy; for an independent hotelier, it will be

quicker and cheaper with less "red tape" resulting from fewer decision-makers and other organizational complexities. Three broad categories of **supplier assessment** include:

1) Supplier questionnaires: these can be administered by the buyer or can be self-assessed by suppliers;
2) Visiting supplier premises: a visual check can reveal a lot about a supplier's capability and may raise red flags if certain observations are made, such as clear safety violations, visibly poor working conditions, etc.;
3) Evaluation scoring and weighting models using **decision matrices** (see Table 1): these give the supplier a score for a given criteria but also provide a weighting to signify the importance of given criteria for the buyer.

Evaluation scoring and weighting models are useful tools as they can be easily tailored and applied to buyers' requirements. A list of the main criteria must first be created, with factors likely including:

1) Price: this includes not only the price paid per unit, but the total costs of ownership such as delivery, maintenance, storage, and disposal costs;
2) Financial stability: a robust financial appraisal of suppliers' cash flow and debt could be undertaken to reduce the risk of engaging with a supplier that may bust;
3) Quality: account for the quality of goods and services using inspections and testing, guarantees and warranties, evaluations of total quality management policies, and third-party certifications such as those provided by the International Standards Organization (ISO);
4) Delivery flexibility and reliability: deliveries should have flexibility to meet buyers' requirements, and there should be an evaluation of the supplier's record for on-time delivery;
5) Environmental management: from a **sustainability** standpoint, criteria might assess suppliers' attitudes and approaches toward environmental stewardship, as well as the reusability and recyclability of supplies;

Table 1. Sample Evaluation Scoring and Weighting Model Using a Decision Matrix.

Selection Criteria	**Weight**	**Supplier A**		**Supplier B**		**Supplier C**	
		Score	**Total**	**Score**	**Total**	**Score**	**Total**
Quality	22	5	110	8	176	7	154
Environmental	17	5	85	9	153	6	102
Price	34	9	306	3	102	6	204
Brand appeal	27	4	108	8	216	5	135
Grand total	100		609		647		595

6) Warranty conditions: warranty policies can offer advantages for the repair or replacement of faulty offerings;
7) Technical capability: the sophistication of suppliers' technology and the technical specifications of their products may be relevant to business needs (this is especially true when procuring software, in which case integration with existing software and considerations for information security are enormously critical);
8) Capacity: looking at suppliers' maximum capacity, how much is used by other clients, and plans for expansion can help anticipate future fulfillment issues;
9) Aftersales service: maintenance and ongoing customer service can be big differentiators and play important roles in total quality management; and
10) Location: last – but certainly not least – information about the distance between clients and suppliers, and the number of supplier distribution locations, can help anticipate supply risks.

Once the criteria have been established, it is then important to assign a degree of importance to each criterion. It is important that cross-functional teams are created to discuss and assign these weightings. This is particularly important because different departments and functions have different priorities, and their successes may be measured using different metrics; therefore, cross-functional teams should produce a balanced view on evaluation criteria.

The evaluation process may be surprisingly simple. Imagine that a hotel chain is searching for a new supplier for shampoo amenities. It has explored the supply market and has decided there are three suppliers – A, B, and C – that it would like to assess. These suppliers have multiple distribution centers in every continent that the hotel chain operates within, and the suppliers can therefore reach all properties with reasonable ease. The hotel group has selected four factors to assess: quality, environmental management, price, and brand appeal. For each of these factors, a weighting must be determined by distributing 100 points between the criteria to determine relative importance. The allocations in this example can be observed in the second column of Table 1. Next, for each of the four criteria, each supplier gets scored on a scale from 1 to 10 based on information gathered about their respective competencies. Then, multiply each supplier's scores by the criterion weightings, to receive totals that get summed into a grand total per supplier. The supplier with the highest grand total best matches the firms' needs. In this case, supplier B wins with a score of 647. To confirm this outcome, the team can then discuss the results and decide whether supplier B is indeed the most suitable supplier, or if another supplier is more appropriate; discussion is a helpful sanity check and may reveal that criteria were missing or that weightings were lopsided.

2.3. Managing Suppliers

Even once a supplier has been selected, it is important to recognize that the role of the procurement function is not complete. Supplier performance is unlikely to remain consistent without careful monitoring and communication, which must be driven by the procurement function. Supplier performance measurements

should not be set for purely financial reasons, nor should they be set to control a supplier. These performance measurements should be carefully formulated so that they support the business objectives. The business objectives should consider two groups: the business' stakeholders and the business' customers (Baily, Farmer, Crocker, Jessop, & Jones, 2015).

Any supplier performance metrics should be considered in the context of existing internal measures to understand how the supplier's behavior and performance may influence these. Common performance measurements for suppliers often revolve around price, quality, delivery timeliness and accuracy, product or service innovation, and sustainability. By monitoring supplier performance and engaging with suppliers in a collaborative setting, the potential for improvement is greater. Chasing price alone will likely mean that relationships become antagonistic, and other performance measures will likely suffer as a result.

3. Managing Inventory

3.1. The Role and Scope of Inventory Management

Inventory is a term used to describe the accumulation of resources as they flow through processes, operations, or supply networks. These resources may include materials, customers, and information. The most common consideration is **physical inventory**, which often entails components, parts, finished goods, or physical (paper) information records (Slack & Brandon-Jones, 2019). In addition, there are three main subtypes of the physical inventories: raw materials, work in progress (WIP), and finished goods (Capkun, Hameri, & Weiss, 2009; Hill & Hill, 2012).

Inventory exists in all processes, operations, and supply networks and helps maintain the smooth running of an organization (Muller, 2019). For the hospitality industry, common physical inventories include food items, drinks, toiletries, linens, and cleaning items. The role of inventory in the hospitality industry is an important foundation that provides the ability to service customers (Song, 2012). For example, if a restaurant runs out of food and beverage stock, customers may go to competing restaurants. Therefore, the value of inventory is undisputable. Inventory can bring many benefits for companies, generally as recognized below (Hill & Hill, 2018; Slack & Brandon-Jones, 2019; Wild, 2017):

- Inventory mitigates uncertainty in operations: inventory can act as a buffer against fluctuations in supply and demand, such as transportation delays in the supply network, or **supply shocks** due to natural disasters.
- Inventory can enhance operational flexibility: operations may not be able to make all products or deliver all services simultaneously. By holding inventory of a product, companies can fulfill customer demand while making other products. This allows different stages of processing to operate at different speeds and schedules. Meanwhile, inventory can help maximize customization, especially when holding more raw materials which are easier to be transferred to different products according to customer needs. While this is seemingly irrelevant in the

service-focused hospitality industry, where guest experiences are instantaneous and heterogeneous, consider the straightforward example of a fast-food restaurant: at McDonald's, Burger King, and the like, it's entirely common – if not expected – that commonly ordered, standardized, and sometimes mass-produced menu items will be pre-made and ready before guests place orders, ensuring quick service.

- Inventory can be used for demand forecasting and to support operational planning: based on the fluctuations in previous years' inventories data (inventory levels, consumption speeds, holding patterns, etc.), companies can predict demand and make plans for future capacity and inventory levels.
- Inventory can reduce costs: via **economies of scale**, holding relatively large inventories may bring savings (lower prices, cheaper order costs, etc.) that are greater than the **holding costs**.
- Inventory can increase in value: products such as fine wines, specialty cheeses, and the like can actually appreciate in value over time. This is not always true, however: most food, for example, will depreciate rapidly unless proper steps are taken to refrigerate and freeze products (and even then, depreciation will still occur).
- Inventory can help to maintain service quality and customer satisfaction: in the hospitality industry, many services can only be provided when there is adequate inventory. Housekeeping offers a classic example of the predicaments of poor inventory management: hotels typically keep several **pars** (or sets for the full hotel) of linen; if par levels are too low, the hotel risks not having sufficient linen inventories to make beds and stock bathrooms with towels, and rooms might then be left unsellable.

While there are advantages associated with holding inventory, there are also numerous challenges with inventory holding. Usually, these revolve around cost, space, quality, and operations (Muller, 2019; Slack & Brandon-Jones, 2019):

- Cost: inventory ties up working capital and resources. Costs incurred may include the cost of placing orders, purchasing, storage, overhead required for handling and maintenance, obsolescence, insurance, etc. Back on the linen example, hotels should avoid investing in too many pars because they will spend more cash than necessary to building excessive inventory that also takes a lot of space to store – space that could be more productively utilized in other ways.
- Space: to the last point above, inventory requires storage space and may require special storage conditions (such as temperature or full climate control).
- Quality: holding inventory increases the risk of damage, loss, deterioration, and obsolescence. Think again of the food in a restaurant: excessive fresh produce held too long will go to waste; having to throw bad food away is virtually the same as throwing away money.
- Operations: excess inventory may create extra work from an operational perspective, which may make operations more complicated and hide other problems. This is especially true of the transportation of supplies between storage areas and from storage to final points of use.

Therefore, companies need to find a good balance in between the benefits and disadvantages of holding inventory, to be strategic and to manage proper stock levels for each product. In turn, this helps to achieve more optimal inventory management and performance.

3.2. Optimizing Inventory Management

3.2.1. The Economic Order Quantity Formula. In inventory management, one of the most important activities is making decisions based on order quantities. If companies purchase high volumes, the cost of holding inventory may be very high. Conversely, when companies purchase lower volumes, frequent purchasing is required, which may result in higher cumulative ordering costs for such factors as shipping and handling. Therefore, organizations need to find an optimal order quantity to balance these costs and achieve the lowest **total relative cost** (relative, in that the costs of ordering and holding are relative to the *additional* costs of the goods themselves (i.e., the purchase price)). This amount is called the **economic order quantity (EOQ)**. The EOQ formula helps to decide how much of a particular item to order at a time, while minimizing total inventory cost. It was initially developed by Ford Whitman Harris (1913), and now it has become the most common approach used in the supply chain practice (Slack & Brandon-Jones, 2019).

The EOQ approach requires understanding inventory profiles and related concepts. An **inventory profile** is a visual representation of inventory levels over time. Fig. 3 depicts a simplified inventory profile for one particular stock item. Q represents the order volume and D is the annual demand of an item. This assumes that the demand for the item is stable across the year. When demand has depleted the stock of the items entirely, the cycle should be repeated.

Under these circumstances:

$$\text{The average inventory} = \frac{Q}{2}$$

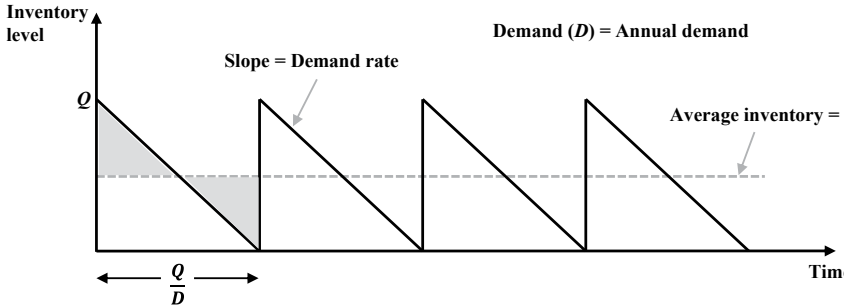


Fig. 3. Inventory Profile. *Source*: Adapted from Slack and Brandon-Jones (2019).

$$\text{The time interval between deliveries} = \frac{Q}{D}$$

$$\text{The frequency of deliveries} = \frac{D}{Q}$$

Generally, **holding costs** include working capital, storage, and obsolescence (such as disposal costs). **Ordering costs** are calculated by considering the cost of placing the order (including transportation of items from suppliers if relevant) and price discount costs. Suppose C_h refers to the annual cost of holding per unit of inventory, and C_o represents the single ordering cost to place an order. Thus, one can calculate total holding costs and ordering costs for any particular order as follows:

$$\text{Holding costs} = \text{Holding cost per unit} \times \text{Average inventory}$$

$$= C_h \times \frac{Q}{2}$$

$$\text{Ordering costs} = \text{Single ordering cost} \times \text{Number of orders per period}$$

$$= C_o \times \frac{D}{Q}$$

$$\text{So, Total relative cost} = \text{Holding costs} + \text{Ordering costs}$$

$$C_t = C_h \times \frac{Q}{2} + C_o \times \frac{D}{Q}$$

For example, as shown in Fig. 4, the demand for a product is 1,000 per year, with regular consumption every day. The ordering cost C_o is \$50, and the holding cost per item C_h is \$2 per year.

Suppose plan A is an order quantity $Q = 400$, and plan B is $Q = 100$. Then, the total annual inventory cost for them will be:

$$\text{For plan A}: C_t = 2 \times \frac{400}{2} + 50 \times \frac{1{,}000}{400} = \$525$$

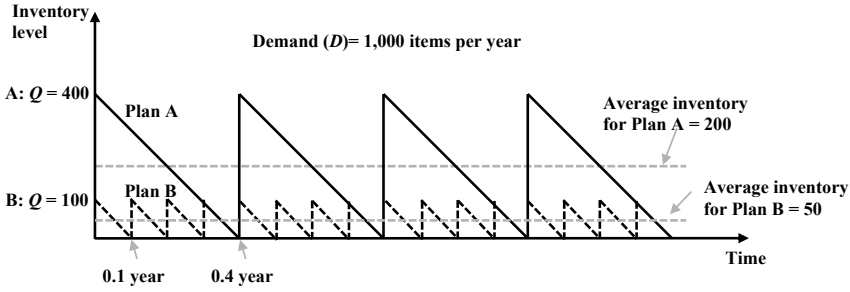


Fig. 4. Comparison of Order Plans. *Source*: Adapted from Slack and Brandon-Jones (2019).

$$\text{For plan B}: C_t = 2 \times \frac{100}{2} + 50 \times \frac{1{,}000}{100} = \$600.$$

Therefore, it can be seen for different order quantities that the total relative cost varies when plotting the formula, holding costs, ordering costs, and total relative cost, respectively, Fig. 5 can be produced (Bendis, 2020). As expected, while Q increases, the holding costs increase; however, the ordering costs decrease significantly at the beginning and slow down when Q increases. Initially, the decrease in ordering costs is greater than the increase in holding costs, and the total relative cost falls. After a certain point, the decrease in ordering costs slows, whereas the increase in holding costs remains constant and the total relative cost starts to increase. The total relative cost is a curve that shows that the lowest point occurs at the cross-point of the holding costs line and ordering costs curve. The order quantity associated with this lowest point is the "optimum" order quantity – the EOQ – which minimizes the sum of holding and ordering costs.

In general terms, the lowest point of the total relative cost curve occurs when the slope of the curve is 0. A more elegant method of finding the EOQ is to derive its general expression. This can be done using simple differential calculus as follows:

$$\text{Total relative cost} = \text{Holding cost} + \text{Order cost}$$

$$C_t = C_h \times \frac{Q}{2} + C_o \times \frac{D}{Q}$$

The rate of change of total relative cost is given by the first differential of C_t with respect to Q:

$$\frac{dC_t}{dQ} = \frac{C_h}{2} - \frac{C_o D}{Q^2}$$

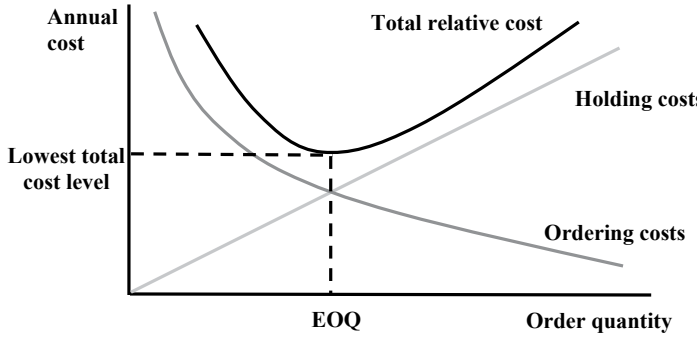


Fig. 5. Plot of EOQ.

The lowest cost will occur when $\frac{dC_t}{dQ} = 0$, that is:

$$0 = \frac{C_h}{2} - \frac{C_o D}{EOQ^2}$$

Rearranging this expression gives:

$$EOQ = \sqrt{\frac{2C_o D}{C_h}}$$

When using the EOQ:

$$\text{Time between orders} = \frac{EOQ}{D}$$

$$\text{Order frequency} = \frac{D}{EOQ} \text{ per period}$$

Back to the example above, it can thus be seen that neither plan A nor B are optimal, and that the EOQ is 250 units with the minimum total relative cost of C_t = \$450 per year.

To calculate the **total annual inventory cost** T, simply add the **purchasing cost** to the total relative cost. Purchasing costs are simply the price per unit C_u multiplied by the annual demand D. Consider the calculations that follows:

$$\text{Total annual inventory cost} = \text{Purchasing costs} + \text{Holding costs} + \text{Ordering costs}$$

$$C_t = C_u \times D + C_h \times \frac{Q}{2} + C_o \times \frac{D}{Q}$$

Note that the order quantity Q is not a factor in determining purchasing costs. As such, the EOQ is not affected by the purchasing costs, assuming that the price per unit is the same for all units purchased. This is to restate that the total relative cost (holding costs plus ordering costs) are *relative* to the total annual inventory cost.

3.2.2. ABC Analysis for Ordering and Prioritizing. In addition to how much to order for an item, inventory managers also need to decide what to order and prioritize among different products. With limited resources (including capital, human resources, and time), it is difficult to treat each item in exactly the same way. Therefore, inventory managers need to apply a degree of control to each item relative to its importance and thus achieve the optimal inventory management performance overall. Now the question comes to this: How should managers identify which item is more important? ABC analysis can help in this case.

ABC analysis is an analytic tool that can help inventory managers to have a clear picture of the whole range of their items and identify importance levels for different items in order to concentrate their efforts on those more significant ones. ABC analysis is based on the theory of the **Pareto principle**, also known as the

80/20 rule, which can be summarized as 20% of the inputs accounting for 80% of the outputs in a given process (Day, 2002; Flores & Whybark, 1986, 1987). The principle can be used in different industries and activities. Applying to inventory management, one common way is to use the value an item contributed as the measure for importance: therefore, 80% of sales value is contributed by only 20% of all stocked item types, as shown in Fig. 6 (Slack & Brandon-Jones, 2019). In practice, it may be difficult to get this information – especially if the stock type is raw materials or work in process. Therefore, in inventory management, managers could use the usage value (their usage rate multiplied by their individual value) to represent the final sale value as they are always correlated to each other.

Table 2 shows the usage information of the raw materials of a local snack shop. According to the usage value of each item, the manager can rank these from high value to low, discriminating between different stock items as shown in the usage value column. According to the ABC analysis principle shown in Fig. 6, the high-value items (usually the top 20%), which contribute to around 80% of the total usage value, are classified as "A Class" inventory (e.g., the first two items A1 and B2 in Table 2). "Class B" items are those of moderate usage value, usually the next 30% of total items and often accounting for around 10%–15% of the total usage value (e.g., the next three items C3, D4, and E5 in Table 2). "Class C" items are those low usage value which, although comprising around 50% of the total types of items stocked, probably only account for around 5%–10% of the total usage value (e.g., the next five items F6, G7, H8, I9, and J10 in Table 2). Items with a particularly high usage value are deemed to warrant the most careful control, whereas those with low usage values need not be controlled quite so rigorously. Therefore, A class items will deserve more frequent attention in terms of stock level, product quality, etc. than B or C class items. Also, if there is a limitation on cash, then the priority of orders will be given to A class items as they will bring majority value for companies as "star" products (Slack & Brandon-Jones, 2019).

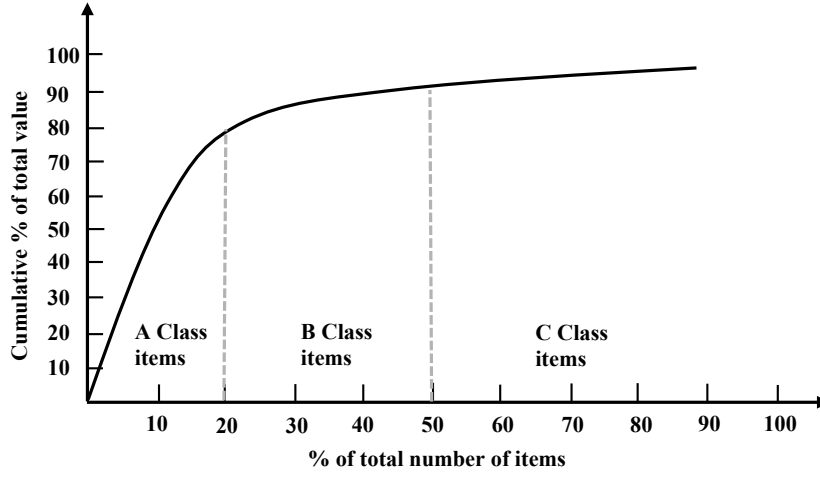


Fig. 6. ABC Analysis Curve.

Table 2. Food Shop Inventories Information.

Stock No.	Usage (Items/Year)	Cost ($/Item)	Usage Value ($/Year)	% of Total Value	Cumulative % of Total Value
A1	700	19.41	13,587.00	52.50	52.50
B2	3,600	2.03	7,298.16	28.20	80.70
C3	140	9.43	1,319.88	5.10	85.80
D4	1,450	0.54	776.40	3.00	88.80
E5	60	11.65	698.76	2.70	91.50
F6	500	1.29	647.00	2.50	94.00
G7	1,800	0.29	517.60	2.00	96.00
H8	8,000	0.05	439.96	1.70	97.70
I9	250	1.45	362.32	1.40	99.10
J10	380	0.61	232.92	0.90	100.00
Total			25,880.00	100.00	

In addition to sale value or usage value, other criteria can also be used to define importance: consider customer satisfaction, operational efficiency, obsolescence risk, and the like, depending on an organization's needs (Ravinder & Misra, 2014; Slack & Brandon-Jones, 2019).

Last but not least, when conducting ABC analyses in practice, the actual ABC curve based on a company's inventory data may be above or below the standard curve (as I and II show in Fig. 7). This means that the current inventory status may not be very healthy and requires further improvements. When

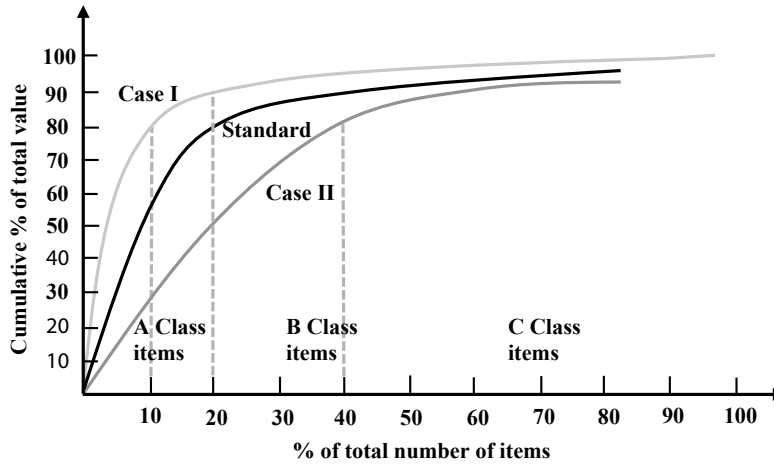


Fig. 7. ABC Analysis Curves Comparison.

the actual curve is above the standard curve, as in case I, it means 20% of the total stock items have contributed more than 80% of the total usage value; in other words, 80% of the total value has been achieved already with less than 20% of the inventory item types. For example, in case I, 10% of the items have already achieved 80% value. This means these 10% of the items have overplayed their roles, and high-value contributed "star" items are too limited. This could be a potential risk to the company, because if one of the 10% items stocks-out, the company may suffer a huge loss of the total value without opportunities to use other products as buffers. The company should have higher control over A class items (the top 10%), while certain emphasis is placed on the next 10% of items to try to push these into A class and move the I curve toward the standard curve. When the actual curve is below the standard curve, it means 20% of the total stock items have not yet contributed 80% of the total usage value; in other words, the 80% total value has been contributed by much more than 20% of the inventory item types. For example, in case II, 40% of the items can achieve 80% of the total value. This means that the top 20% of items have been lower performing than they were supposed to. This results in a company having too many items in class A, and that some are not the real "star" products. In other words, the company lacks the real high-value items. This could be a potential risk for the company, as it seems not to have products with unique competitive advantages that are distinguished from competitors; this could be due to its product range being too broad, with many items consuming resources but not really generating good value. Therefore, the company still needs to have greater control over the A class items – the top 40% in case II. Meanwhile, it needs to refine its offerings to true star products to move the curve toward the standard one.

3.3. Alternative Methods for Managing Inventory

When it comes to managing inventory, as mentioned previously, a company may have thousands of items in inventories – coming from different suppliers and being used for different purposes or activities. Therefore, managing the data on these items is a complicated affair. For data input and tracking, there are technologies available such as barcode, QR codes, radio-frequency identification (RFID), and near-field communication (NFC). The price increases from barcodes to NFC, but the storage capacity is also increased. Depending on the different types of products and companies' needs, different tools below can be adopted.

After gathering data, companies need computer systems to help manage these data and use them for analysis, decision making, and inventory optimization. Different generations of computer systems have been developed for use in managing inventories, as shown in Fig. 8. The original version is the simple inventory control packages developed in the 1960s, with very basic digital recording functions (Muller, 2019; Omniaccounts, 2019). Later in the 1970s, the first formal inventory management system – called a **material requirements planning (MRP) system** – was introduced and became popular; such systems help operations managers track the status of inventory and make some calculations for ordering and

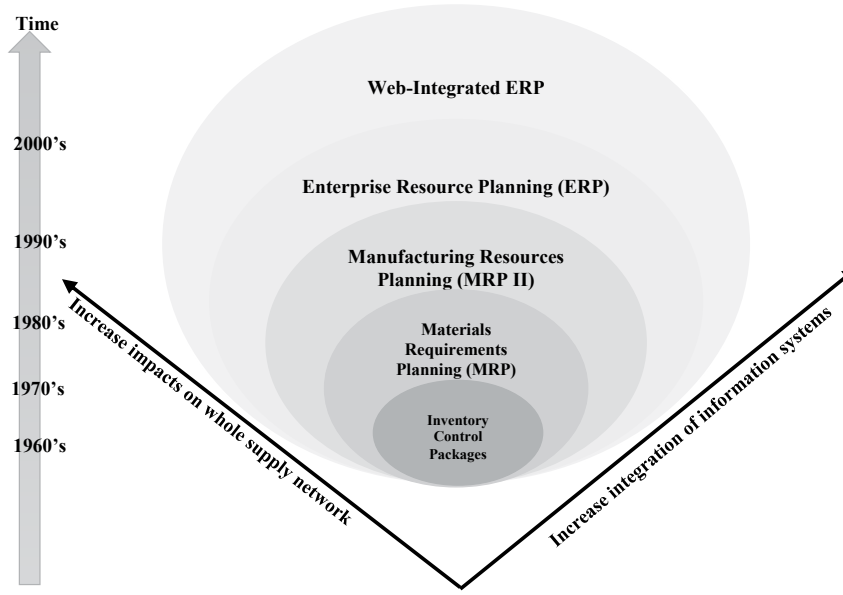


Fig. 8. Development of ERP System.

production scheduling. However, the functions of MRPs are relatively basic in that they could not forecast demand or integrate data from other departments (such as accounting; Hill & Hill, 2018; Omniaccounts, 2019). Therefore, with further development in the 1980s, an advanced alternative arose in the form of **manufacturing resource planning (MRP II) systems**, which offer greater integration of information from other parts of an organization and often greater sophistication for scheduling calculations. MRP II systems not only pertain to materials planning but also help increase communication between business functions and support "what-if" modeling for future business scenarios (Slack & Brandon-Jones, 2019). However, such systems still not able to fully link to all other departments and that can have an impact on resource planning.

Some organizations desired even greater integration between departments, from operations to marketing and from finance to human resources. Therefore, **enterprise resource planning (ERP) systems** were developed in the 1990s. They achieve the integration of all significant resource planning systems in an organization and finally integrated planning and control with the other functions of the business (Slack & Brandon-Jones, 2019). ERP is the equivalent of the organization's central nervous system, sensing information about the condition of different parts of the business and relaying the information to other parts of the business that need it (Feinstein, Hertzman, & Stefanelli, 2017). The information is updated in near-real time. Companies like SAP and Oracle are most notable for offering reliable, popular ERP system. The functions of ERP have continued extending since the 2000s, with continued improvements focusing on web-based communication, cloud-based data storage, and

advanced analytics via machine learning and other forms of AI (Wild, 2017). As an example, IBM's Watson technology offers incredible processing power (IBM, 2020) that allows it to operate across multiple languages, conduct verbal communication with between operators and the computer itself, provide different scenarios for the supply delivery routes, foresee risks, suggest solutions, and guide managers through decision making. In these ways – and more! – technology is vastly improving the capabilities of supply chain management.

Discussion Questions

1. Consider two hotel chains, one that strives to provide a luxurious offering and another that aims to compete on cost. How might their general procurement and sourcing activities and approaches differ? Discuss the similarities and differences between their likely approaches and priorities.
2. Table 3 contains information regarding the price and sales volume of the wine selling in a restaurant. Conduct an ABC analysis on the stock based on the total sales value:
   1) Calculate the sales value for each type of wine and the percentage of each wine's value accounted out of the total sales value.
   2) Identify which products belong to A, B, and C categories, respectively?
3. Considering the scenario in question 2 above, assume each product comes from a different supplier.
   1) Draw the ABC curve and critically discuss the current product structure in terms of value distribution (consider whether they follow the standard Pareto principle, and if any further improvement is warranted).
   2) Discuss how the restaurant can manage its relationships with different suppliers. Consider the priority of each product.

Table 3. Wine Selling Price and Sale Volume.

Stock No.	Volume (Items/Year)	Price ($/Item)
E30	40	300.00
H10	450	156.00
H22	150	189.00
H70	80	210.00
L01	40	20.00
L17	400	35.00
L24	300	60.00
M01	600	80.00
M15	500	135.00
M21	200	110.00

Case Exercises

1. The global COVID-19 pandemic necessitated that many hospitality organizations take additional steps to ensure cleanliness and hygiene. These changes and others cascaded new operating needs – and thus new procurement needs – for such resources as PPE for hotel staff, enhanced cleaning products for housekeeping, and additional hygiene products like hand sanitizer for guests.
   1) Create a list of selection criteria you would use when assessing potential suppliers for these new products and then short-list the five you consider most important.
   2) For the critical five criteria, assign weightings. You have 100 points you can distribute among the criteria. During this process, note justification for the weighting assignment, indicating why are some more important than others.
   3) Recreate Table 4 and input your criteria and weightings. Then, using the scores already populated in Table 4, assess each supplier. Which supplier is the most appropriate according to this method? Can you think of any possible limitations of using such a method for supplier selection?
2. Considering the scenario in the last question, it is recommended that a cross-functional team be used to select new suppliers, with members from different hotel departments that may have interaction with the selected supplier or who will have some responsibility for the use of the new goods.
   1) Which departments do you think should be involved in this supplier selection process?
   2) Justify the inclusion of each department listed. What are the possible consequences should they be omitted from this exercise?
3. A hotel with around 154 guest rooms obtains one of its key toiletries – shampoo (30 ml per bottle) – from a famous supplier of luxury goods. The hotel's demand is reasonably constant throughout the year, and last year, the hotel

Table 4. Supplier Selection Tool.

Selection Criteria	**Weight**	**Supplier A**		**Supplier B**		**Supplier C**	
		Score	**Total**	**Score**	**Total**	**Score**	**Total**
1.		5		8		7	
2.		5		9		6	
3.		9		3		6	
4.		4		8		5	
5.		10		7		2	
Grand total	100						

consumed 105,300 bottles of this product. When orders are made, they come in packs of 300. The estimated cost of placing an order is around $25 each time an order is placed, and the hotel calculates that the annual cost of holding inventory for each pack is 25% of the purchase cost. The hotel purchases the shampoo at $72 per pack.

1) What is the EOQ for ordering this product?
2) What is the total relative cost for an order at the EOQ level?
3) How many packs should the company order at a time, in practice? Consider the total cost difference if not ordering EOQ.

Managerial Challenge

Jack works as the purchasing officer in the procurement department of a five-star hotel in Chicago. The hotel operates a loyalty membership system which categorizes its customers in different status tiers from the entry level (silver) to the most loyal level (platinum).

Based on the type of room booked and guests' membership statuses, the hotel will provide different welcome boxes to guests. For example, if a guest booked the presidential suite and is a platinum member, the hotel will provide the welcome box "A," which is valued at $100. There are 11 types of welcome boxes ("A" to "K"). Each classification of welcome box is sourced from different suppliers, so there are 11 different suppliers to manage. The price of these boxes increases in reverse alphabetical order, from box "K" to "A." Therefore, the inventory cost of these also varies, with the details shown in Table 5.

Table 5. Information on Welcome Boxes.

Welcome Sleep Kit Box	Inventory Cost (Ratio) (%)	Supplier ID Code	Supplier Location
A	22	001	France
B	36	002	US
C	18	003	Mexico
D	8	004	Spain
E	5	005	China
F	4	006	UK
G	2.5	007	Italy
H	2	008	Canada
I	1	009	US
J	1	010	US
K	0.5	011	Mexico

Currently, there is very limited stock of the welcome box "A" (two left), and an order for two new packs has been placed with supplier 001, located in France. This order was placed one month ago via the ERP system shared between the hotel and its supplier. Each pack contains 80 boxes of the welcome kit. The order is due to arrive by Monday.

Based on current bookings, the hotel expects a group of five eligible guests will be staying at the hotel starting on Friday. Welcome box "A" is required for their visit. However, an email has been received from the supplier stating that they cannot deliver the order on time. The hotel is very concerned when seeing this email, because the failure to provide the required service to customers will not only affect the image of the hotel but also Jack's performance and bonus based on supply fulfillment. Jack can avoid this if a formal report is raised about the case to explain why this foreseen failure cannot be avoided. However, it is still likely to affect Jack's reputation and his manager will be unhappy that this issue has occurred. Therefore, such formal reports and escalations are usually avoided and seen as a last resort.

Jack does not have the authority to find and purchase similar items from another supplier, so he cannot solve the issue this way. The supplier selection and monitoring roles are conducted by another department called Quality Control. He could report the supplier to this department; however, changing suppliers is still a long process and may not produce a feasible alternative with only a few days' notice.

From Jack's perspective, consider the following questions:

1. What is the best strategy to manage the relationship with these 11 suppliers? Consider ABC analysis, as well as the fact that suppliers may operate in different time zones and possess cultural differences.
2. How is Jack going to deal with the problem of this delayed order, while trying to minimize the impact on the hotel and its image, as well as on his performance? How can Jack manage the relationship with the supplier in question?

Added Insight

Technology and innovation abound in modern times, and the hospitality sector is no stranger to adopting innovative new processes and technologies in order to enhance guests' experience. In the hotel business, this can be seen from the reservation process, perhaps using a hotel chain's smartphone app, through the end of the experience, checking-in and out via the app and even using your smartphone as your room key. Watch the following short clip for several examples: https://www.youtube.com/watch?v=QsJRYHxEc8s

With the following questions, consider how this technology may influence procurement and inventory decisions.

1. How can the use of smartphone apps help with managing inventory levels and ensuring the right goods and right quantities are available?

2. Other than helping to manage inventory levels and sourcing decisions, what other benefits may such innovations bring to hotel groups and their supply chains?
3. As a consumer, would you be concerned about how your data may be used? How should this be managed by the organization?

Risk and Crisis Management

The emergence of COVID-19 dramatically affected the entire hospitality industry and the restaurant sector in particular. Guidelines from governments at all levels, and from public health institutions like the World Health Organization, necessitated changes in operating procedures to reduce the risk of infection and disease transference between and among employees and guests.

Often among these guidelines were requirements on the use of PPE such as face coverings and gloves, in addition to the available supply of hand sanitizer and the placement of sanitizing kiosks. Consequently, with the global spike of COVID-19 infections in early 2020, demand for these products skyrocketed worldwide. This demand exceeded the capacity of supply chains, which were doubly affected when production facilities had to reduce production or close entirely because workers became ill from the disease or because plants were subject to social distancing regulations on the number of employees permitted to work at any time. Thus, there was a universal supply shock that sharply reduced the availability of health and safety products.

Supply shocks are not unheard of in business. They often result in times of natural disaster, humanitarian crisis, economic collapse, and public health concern. They result when the capacity of suppliers to produce goods is suddenly depleted, and/or when demand rises drastically and far exceeds production capacity. The impact of shocks is typically limited to the region or industry directly affected by the crisis, but the COVID-19 pandemic highlighted a rare instance in which a supply chain (for PPE) affected nearly every industry around the world. Such shocks have obvious impacts on the abilities of a business to deliver experiences to their guests and take care of their employees. While rare, companies should nonetheless consider how to combat supply shocks when managing supplies and inventory.

Questions

1. Conduct research and find examples of ways restaurants combatted the sudden supply shock during COVID-19.
2. While it can be hard – if not impossible – to predict supply shocks, what techniques might a hospitality business use to mitigate against such risks?

Glossary

ABC analysis: An approach for classifying and prioritizing inventory based on the value items return.

Downstream: The demand side of the supply chain.

Decision matrix: A rubric with weighted criteria that is used to compare the relative merits of multiple options, such as supplier or supply chain configurations, with the goal of quantifying the choices and identifying an optimal option.

Economic order quantity (EOQ): The amount of inventory to be ordered at one time toward minimizing total annual inventory cost.

Economies of scale: The addition of benefits (such as lower cost per item) when increasing order quantities; vice versa, the loss of benefits (such as fewer discounts) when placing smaller orders.

Enterprise resource planning (ERP) system: The integration of all significant resource planning systems in an organization that, in an operations context, integrates planning and control with the other functions of the business.

Evaluation scoring and weighting models: A quantitative method used to assess prospective suppliers, considering the level of importance (weighting) of a set of criterion in the process.

Holding costs: Costs associated with holding inventory, such as the tie-up of working capital and the usage of storage facilities.

Inventory: The accumulations of resources as they flow through processes, operations, or supply networks.

Inventory profile: A visual representation of inventory levels over time.

Material requirements planning (MRP) system: A operations management system with elementary data on inventory needs.

Manufacturing resource planning (MRP II) system: An advanced operations management system with strong inventory planning capabilities and some integration with other operating system.

Offshoring: The movement of businesses from a "home" country to others – often far away – due usually to cheaper production in those areas.

Ordering cost: A cost associated with placing an order, such as shipping and handling, and potentially factoring any price discounts.

Par: A level of stock held in reserve, typically proportionate to the overall capacity of an organization as a means of safety stock.

Pareto principle: Also known as the "80/20 rule," which refers to 20% of a process' input accounting for 80% of the output.

Physical inventory: Also called "stock," the accumulation of physical materials such as raw materials, components, finished goods, or physical (paper) information records.

Procurement: The organizational function that is responsible for identifying and acquiring goods and materials to ensure that a business can operate without disruption and serve its customers.

Purchasing cost: The annual demand for a product multiplied by the per-unit purchase price (excluding ordering and holding costs).

Reshoring: The return of businesses to a "home" country after having been operated in far-away nations, usually due to remediated production costs and a desire to improve local supply capabilities.

Safety stock: Extra inventory held in case of emergency.

Supplier assessment: The process by which the procurement function evaluates prospective suppliers' ability and fit for providing required goods and materials.

Supplier chain management: The efficient management and coordination of relationships between organizations that collaborate to produce a product or service.

Supply chain resilience: A supply chain's strength, in terms of mitigation and control of risks that might otherwise disrupt the supply chain.

Supplier management: The process of measuring and collaborating with current suppliers to maintain and improve performance.

Supply chain resilience: The capacity for an enterprise to survive, adapt, and grow in the face of turbulent change.

Supply shock: A sudden change in the availability of supplies, typically involving a supply shortage caused by a natural disaster, an economic crisis, or a humanitarian issue in some or all parts of a region or the whole world.

Sustainability: The ability to meet the needs of current generations without impacting future generations.

Total annual inventory cost: The cumulative cost of ordering, purchasing, and holding inventory.

Total relative cost: The costs of ordering and holding inventory, relative to – but not including – the additional costs of the goods themselves (i.e., purchasing costs).

Upstream: The supply side of the supply chain.

References

Arthur, C., & Shuhui, R. (2020, April 1). *In China, robot delivery vehicles deployed to help with COVID-19 emergency*. Retrieved from https://www.unido.org/stories/china-robot-delivery-vehicles-deployed-help-covid-19-emergency

Baily, P., Farmer, D., Crocker, B., Jessop, D., & Jones, D. (2015). *Procurement principles and management* (11th ed.). Harlow: Pearson.

Bendis, M. (2020, March 20). *Using the economic order quantity formula in inventory management*. Retrieved from https://www.eazystock.com/uk/blog-uk/calculating-economic-order-quantity-formula/

Capkun, V., Hameri, A. P., & Weiss, L. A. (2009). On the relationship between inventory and financial performance in manufacturing companies. *International Journal of Operations & Production Management*, *102*(4), 197–202.

Christopher, M., & Peck, H. (2004). Building the resilient supply chain. *International Journal of Logistics Management*, *15*(2), 1–13.

Day, M. (Ed.). (2002). *Gower handbook of purchasing management*. Aldershot: Gower Publishing, Ltd.

Feinstein, A. H., Hertzman, J. L., & Stefanelli, J. M. (2017). *Purchasing: Selection and procurement for the hospitality industry*. Hoboken, NJ: John Wiley & Sons, Inc.

Flores, B. E., & Whybark, D. C. (1986). Multiple criteria ABC analysis. *International Journal of Operations & Production Management*, *6*(3), 38–46.

Flores, B. E., & Whybark, D. C. (1987). Implementing multiple criteria ABC analysis. *Journal of Operations Management*, *7*(1–2), 79–85.

Harris, F. W. (1913). How many parts to make at once. *Operations Research*, *38*(6), 947–950.

Harrison, A., van Hoek, R., & Skipworth, H. (2014). *Logistics management and strategy: Competing through the supply chain* (5th ed.). Harlow: Pearson.

Hill, A., & Hill, T. (2012). *Operations management* (3rd ed.). New York, NY: Palgrave Macmillan.

Hill, A., & Hill, T. (2018). *Essential operations management* (2nd ed.). London: Palgrave.

IBM. (2020). *Watson anywhere*. Retrieved from https://www.ibm.com/uk-en/watson. Accessed on August 2, 2020.

Jenkins, A., Cameron, D., & Crompton, R. (2015). Supply chain management in the hospitality industry: A research agenda. In *Proceedings from the 13th Asia Pacific CHRIE conference*, Auckland, New Zealand.

Li, D., Godsell, J., & Karatzas, A. (2016). Clarifying the role of reshoring in global manufacturing strategy. In *Proceedings from POMS 28th annual conference*, Seattle, USA.

Muller, M. (2019). *Essentials of inventory management* (3rd ed.). New York, NY: HarperCollins Leadership.

Omniaccounts. (2019, November 6). The history of enterprise resource planning (ERP). Retrieved from https://www.omniaccounts.co.za/articles/history-of-enterprise-resource-planning

Ravinder, H., & Misra, R. B. (2014). ABC analysis for inventory management: Bridging the gap between research and classroom. *American Journal of Business Education*, *7*(3), 257–264.

Rowan, N. J., & Laffey, J. G. (2020). Challenges and solutions for addressing critical shortage of supply chain for personal and protective equipment (PPE) arising from coronavirus disease (COVID19) pandemic – Case study from the Republic of Ireland. *Science of the Total Environment*. doi:10.1016/j.scitotenv.2020.138532

Slack, N., & Brandon-Jones, A. (2018). *Essentials of operations management* (2nd ed.). Harlow: Pearson.

Slack, N., & Brandon-Jones, A. (2019). *Operations management* (9th ed.). Harlow: Pearson.

Slack, N., Brandon-Jones, A., & Johnston, R. (2016). *Operations management* (8th ed.). Harlow: Pearson.

Song, H. (2012). *Tourism supply chain management*. New York, NY: Routledge.

Wild, T. (2017). *Best practice in inventory management* (3rd ed.). New York, NY: Routledge.

Chapter 7

Organizing Staff

Suzanne Markham Bagnera and Peter Szende

Abstract

This chapter discusses techniques for scheduling and organizing staff to meet guest demands and financial obligations. Key building blocks relevant to labor management are explained, such as productivity, fixed and variable labor hours, and the development of realistic performance standards to help organizations optimize productivity. As a next step, this chapter illuminates the importance of providing management labor standards and staffing models, which are key management tools. Lodging and food and beverage labor strategies are presented. Finally, effective planning of labor scheduling is also discussed.

Keywords: Flexible scheduling techniques; labor hours; labor scheduling; labor standards; productivity standards; staffing models

Learning Outcomes

After completing this chapter, you should be able to:

1. Identify key metrics and concepts that impact labor productivity.
2. Explain the importance of setting achievable productivity standards.
3. Utilize effective labor standards to maximize productivity and guest satisfaction.
4. Document and critically evaluate flexible scheduling techniques.

Outline

Operations Management in the Hospitality Industry, 143–166

doi:10.1108/978-1-83867-541-720211007

Getting Started

Hospitality operations intrinsically require human resources. This chapter specifically focuses on labor planning and operations, which requires coverage due to the fact that labor is one of the largest operating expenses in the industry. It is expected that by 2028, in the leisure and hospitality sector, jobs will increase by 1.1 million to an estimated 17.7 million (US Bureau of Labor Statistics (BLS), 2019). In 2019, total labor costs in the lodging industry reached $70 billion dollars, with expenses are outpacing revenue growth (Baker, 2019).

The hourly wages for nonsupervisory workers in the accommodation business were up 3.2% at the end of 2018 compared to the year before, according to the US BLS. But even those higher wages were not enough to attract all the workers needed at hotels. There were more than 900,000 open positions in the accommodations and food services business at the end of 2018, according to the BLS.

1. Labor Productivity

1.1. Understanding Productivity

Productivity can be considered as "the relationship between the output of goods and services and the input of sources" (Mill, 1989, p. 1). Labor productivity is the ability of an organization to obtain maximum outputs from a given set of labor inputs or to minimize the labor inputs to reach an expected level of outputs (Gu, 2004; Szende, 2013b). An input is defined as the resources used in producing a project or service (e.g., time, money, materials). Inputs can be reduced by making an operation more efficient or by reducing operations outputs, for example, by cutting back on the time spent doing a task or by not doing the task at all. Outputs are the products or services that are produced (e.g., meals served, guests housed, rooms cleaned) (Mill, 2006).

Management's measurement of productivity is an important part of overseeing and monitoring expenses (Krajewski, Malhotra, & Ritzman, 2016). The output

of labor productivity is significantly lower in the hospitality industry compared to manufacturing. By using BLS data, Szende (2013b) contrasted four service-providing sectors and found that "traveler accommodation" is considered more productive than typical restaurant-related activities. Within the food and beverage division, "drinking places" were the most productive, followed by "limited-service eating places"; "full-service restaurants" were the least productive.

In summary, productivity can be increased in a number of ways such as:

- Maintaining input but increasing output;
- Increasing input and increasing output; and
- Decreasing input but increasing output.

Once deficiencies in productivity are uncovered, it becomes imperative to correct. Consider ways to improve the output of employees on both the qualitative and quantitative approaches. When examining employee productivity, it is important to look at the various factors which can affect productivity performance: employee selection, training, supervision, scheduling, breaks, morale, equipment/tools, service level desired, and brand expectation. Once an employee has been hired and trained, it is important to monitor the productivity in order to ensure that the performance level is achieved. Coaching and supervision will assist in overseeing the performance.

In the delivery of service experiences, there is no more important part of the operation than talented human resources. Managing staff to work productively is a key responsibility for hospitality leaders.

1.2. Payroll Expenses

Total payroll costs not only include the actual amount of the wage or salary that is paid directly to the employee but also the added expenses of providing employee

benefits, the mandated federal and state payroll taxes, insurance premiums, retirement plan premiums, and unemployment insurance premiums (Dopson & Hayes, 2011).

Payroll costs in the hospitality industry typically are 50% of total operating expenses (Mandelbaum, 2017); this has risen significantly from records dating back to 1999 where it was calculated at 30% or 35% (Davis & Heineke, 2005). The rise in costs is of significant concern, as the rate of revenue growth is not in line with the expense. As labor rates increase and the expected minimum wages increase over the coming years, the efficient management of labor productivity for payroll control will become even more critical for a successful operation. When labor is not in control, even small unnecessary increases can have a significant impact on profits.

Fixed payroll costs include the periodic payments that salaried managers receive. These are labor requirements which are static over a given time period and do not fluctuate in conjunction with the level of business. That means it remains a fixed amount regardless of the number of guests that are served in the business. Comparing the amount of fixed labor to sales, the ratio can be lower when sales are higher, and in turn, it can be higher when sales are lower.

The **variable payroll costs** are paid to the employees based on a changing schedule in relation to the expected business level. Variable payroll is the amount paid by an operation in the form of dollars to hourly employees. This amount will vary based on the changes in the sales volume. Typically, when the sales volume is expected to increase, the need for an increase in staff will be required. Since this is a variable amount, control of the costs is 100% in the hands of management.

1.3. Labor Hours

Fixed labor hours are the minimum staff level as in the least number of employees, or payroll dollars, required to operate a facility or department. A skeleton crew, the basic number of staff needed, regardless of numbers, to open the doors; it's fixed.

Variable labor hours are the number of hours that are added above the fixed labor hours adjusted according to the business volume. It is essential that management documents specify what is the maximum number of hours or employees a department can schedule on the busiest day of the year.

2. Standards

2.1 Service Standards

Service standards are distinctive attributes that define customers' expectations. Standardization helps hospitality organizations to execute service in a consistent and uniform manner (Szende, 2013a). Regardless of the time of day, a service standard provides guidance for a consistent level of customer service delivery. In a world where traveler reviews are critical to a hospitality organization's ability to capture market share, service standards are a key tool to delivering a predictable, reliable, and satisfactory level of service. In the case of a hotel, brand core service standards are usually defined by the franchisor and then expanded based upon the management philosophy. For an organization to be efficient, it is essential

for alignment to occur between service standards and productivity standards (Szende, 2013b).

2.2. Productivity and Economic Standards

A **productivity standard** can be explained as the amount of work an employee performs in a fixed period of time. In order to establish effective standards, the first step is to collect performance data. One method is to conduct a job analysis; evaluate all aspects to the tasks and sequences required to perform the job. Identify an employee who is efficient with their work performance and then observe them closely, carefully noting the job tasks to determine what is expected in the position. Establishing realistic productivity standards is critical to the successful operation of the service business. Employees must understand what is expected of them during their employment. Productivity standards serve as the easiest way to translate demand forecasts into employee requirements. Figs. 1 and 2 depict a sample of hotel productivity standards. A business should seek to deliver service in the most economical way possible. In most cases, that would mean a better level of service would be delivered during a high-demand time compared to a low-demand time. Since more customers experience the service when the demand is high, it translates to better service which is more cost-effective.

Some companies incorporate **economic standards** into their labor hour requirements. These are profitability metrics, for example, cost per occupied room (CPOR) in a room division of a hotel, by taking the room revenue and occupancy percentage to achieve a targeted cost. CPOR is useful to monitor the outcome measurement of overall labor costs. Economic standards, such as

	Role	**Productivity Standard**
Front office	Front desk manager or supervisor	1 per shift
	Front desk agent	1 per 100 expected guests (arrivals or departures)
	Bellperson	1 per 120 occupied rooms
	Doorperson	1 per shift
	Concierge	1 per shift
	Telephone (PBX) operator	1 per 220 occupied rooms
Housekeeping	Room attendant	1 per 15 rooms per shift
	Houseperson	1 per 130 occupied rooms
	Floor supervisor	1 per 130 occupied rooms
	Turndown supervisor	1 per night
	Turndown attendant	1 per 130 occupied rooms

Fig. 1. Sample Brand Hotel Productivity Standards for Rooms Division.

	Role	Productivity Standard
Outlet	Host/hostess	100 covers per breakfast shift
		100 covers per lunch shift
		100 covers per dinner shift
	Server	25 covers per breakfast shift
		25 covers per lunch shift
		20 covers per dinner shift
	Service assistant	40 covers per breakfast shift
		40 covers per lunch shift
		40 covers per dinner shift
	Food runner	80 covers per breakfast shift
		80 covers per lunch shift
		60 covers per dinner shift
Room service	Order taker	80 covers per meal period
	Room service server	20 covers per meal period
Bar	Bartender	$200 per hour
	Cocktail server	$150 per hour
Kitchen	Lead cook	75 covers per breakfast shift
		75 covers per lunch shift
		60 covers per dinner shift
	Line cook	50 covers per breakfast shift
		50 covers per lunch shift
		35 covers per dinner shift
	Dishwasher	75 covers per B/L/D shift

Fig. 2. Sample Brand Hotel Productivity Standards for Food and Beverage Division.

CPOR, are commonly used by management companies and owners to assess operation cost-efficiency.

2.3. Labor Standards and Staffing Models

Labor standards are set rules that "determine how many labor hours are needed for each position based on operational metrics, such as occupancy, minute per room (MPR), or food and beverage cover and revenue" (Hotel Effectiveness, 2015). Labor standards are essentially a recipe for how to staff every position in a hotel.

When creating (or improving) a hotel's labor standards, think about what drives the workload of each position. For housekeepers, it is normally measured in minutes per room (MPR); for front desk, it might be a combination of

occupancy plus arrivals and departures. For food and beverage positions, it is typically either number of covers or revenue. The key is that it must directly correlate with what drives the work for that position. Labor standards are the foundation of effective scheduling. When a manager does not scheduling employees to a solid set of labor standards, labor costs will almost definitely become too high.

Service standards are often the basis for labor standards. Although service standards do not always quantify the time required for each task or function, a well-written service standard requires a predictable amount of time and effort to be delivered. For example, a service standard for cleaning a guest room will describe the items to be cleaned, the methods and tools to be used for cleaning, and the observable outcomes when the room cleaning is completed (so that it can be inspected).

Staffing models or staffing plans integrate labor standards, thereby directing supervisors to identify the number of labor hours required for each job class based on the volume of the business forecasted. Essentially, the staffing model translates the labor standard into specific staff requirements. To illustrate the difference between labor standards and staffing models, labor standards determine the amount of labor needed according to the operational driver (for example, occupancy) by using a mathematical function. The model is the driver multiplied by the labor standard which calculates the number of people to perform the job.

The labor force is comprised of both full-time and part-time employees. In a staffing model, the way employees are commonly referred to is as **full-time equivalents (FTEs)**. To calculate the FTEs that are needed for the schedule, the total labor hours per week is divided by the number of weekly hours (defined by the operation for what full-time means, in most cases it will be 32–40 hours).

Fig. 3 depicts a sample staffing model for the Bistro, showing the labor hours per position per meal period. This sample tool can help managers calculate the number of employees (FTE) allowed as well as the labor hours permitted. For example, at breakfast, the standard is one host/hostess per 100 expected guests. On Monday, the Bistro anticipates 160 breakfast guests: accordingly, the operation is allowed to use 1.6 FTEs. The equation of FTE is expressed as follows:

$$\text{FTE} = \text{Expected number of covers/Productivity standard}$$
$$\text{FTE} = \text{Expected breakfast guests/Standard host(ess) per shift}$$
$$160/100 = 1.60 \text{ FTEs}$$

The number of labor hours permitted in this example is calculated by multiplying the number of FTE times eight (as eight hours make up a typical workday).

$$\text{Labor hours} = \text{FTE} \times \text{Number of hours in work day}$$
$$1.60 \times 8 = 12.8 \text{ labor hours}$$

2.4. Attrition

Attrition should be incorporated into the labor standards for budgetary purposes; this is the frequency that the position will not be staffed due to lack of personnel, or sickness, or due to employee turnover, and etc. This is typically calculated on a

Avg. expected covers	Breakfast			Lunch			Dinner		
	160			100			180		
	Standard	FTEs	Labor hours	Standard	FTEs	Labor hours	Standard	FTEs	Labor hours
Host/hostess	1 for 100	1.6	12.8	1 for 100	1	8.0	1 for 100	1.8	14.4
Server	1 for 25	6.4	51.2	1 for 25	4	32.0	1 for 20	9	72.0
Server assistant	1 for 40	4	32.0	1 for 40	2.5	20.0	1 for 40	4.5	36.0
Food runner	1 for 80	2	16.0	1 for 80	1.25	10.0	1 for 60	3	24.0
Bartender	—	—	—	1 for 100	1	8.0	1 for 100	1.8	14.4
Lead cook	1 for 75	2.1	17.1	1 for 75	1.3	10.7	1 for 60	3.0	24.0
Line cook	1 for 50	3.2	25.6	1 for 50	2.0	16.0	1 for 35	5.1	41.1
Dishwasher	1 for 75	2.1	17.1	1 for 75	1.3	10.7	1 for 75	2.4	19.2

Fig. 3. Staffing Model at the Bistro. *Notes*: Full-time equivalent (FTE) is eight hours. Labor hours formula is calculated by taking the FTE number divided by the standard cover amount.

percentage basis. A typical attrition rate of 2%–6% might be used by management when scheduling to account for the reduction in staff.

3. Labor Strategies

3.1. Lodging Labor Strategies

Hotel operations require a vast variety of tasks and skills as the industry is a people-to-people interaction driven. The industry is a very labor-intensive business, whereby there is a balancing act between the substitution of people with technology. When service is tied to people, it places a greater burden on a manager to operate an efficient productive business.

In order to hold an executive housekeeper accountable for productivity, they must have control over the measures used for calculation. For example, if one were to use a measure of room revenue divided by housekeeping labor cost, the executive housekeeper can only control the labor cost, they have no control over the cost of rooms or occupancy rate. There are two metrics available for labor productivity control which can be used to hold the manager accountable: 1) the minutes per room (MPR) and 2) the man-hours per occupied room (MHPOR).

1) The MPR is a more common method used to schedule with labor productivity in mind, based on the brand standards to complete the guestroom cleaning within a set amount of MPR. There should not be one set of MPR standards for all room types. Even further, a clear MPR standard should be set based on room status (e.g., stayover room – requires a light clean, checkout rooms – requires a full clean).

The time it takes to clean a room will vary upon the size of a room as well as the service type according to Mill (2006):

- Motel 6: 20 minutes per room
- Radisson: 22 minutes per suite
- Marriott: 27 minutes per corporate guest room.

In order to calculate the number of room attendants needed during a work shift based on the number of rooms to be cleaned, the use of the MPR in relation to the total number of minutes available during the shift needs to be determined. Keep in mind that on a daily basis there are breaks from work (e.g., a 30-minute meal breaks and two 15-minute breaks) as well as set up and breakdown time for each shift.

As an example, as seen in Fig. 4, the Belleview Motel is similar to a Motel 6 concept. In an 8-hour shift, there are 480 minutes (8 hours × 60 minutes). Reduce this number of minutes by the breaks to be taken (e.g., one 30-minute meal break and two 15-minute breaks) and the time to set up and break down the room attendant cart (e.g., 10 minutes for each set of tasks). Combined, there is now 80 minutes subtracted from the available 480 minutes, resulting in 400 minutes available to clean rooms. In order to determine the number of rooms that an attendant can clean, take the 400 minutes divided by the standard MPR of 20 minutes, and this results in 20 rooms cleaned per shift per room attendant.

2) Unlike the MPR which uses a bottom-up method to scheduling the MPHOR uses is a top-down approach. The MHPOR labor productivity metric

Table 1. MPR Calculation Example.

Formula	Example	Calculation
Time per shift in minutes	8-hour shift × 60 minutes per hour	480 minutes per shift
– Breaks in minutes	Two 15-minute breaks + one 30-minute meal	- 30 minutes- 30 minutes
– Shift setup and breakdown in minutes	10-minute setup + 10-minute breakdown	- 20 minutes
= Minutes available per shift	Minutes available per shift	480 − 80 = 400 minutes available
÷ the MPR hotel standard	÷ 20 MPR	400 ÷ 20 MPR
= Number of rooms to be cleaned per shift per room attendant		= 20 rooms cleaned per shift per room attendant

helps manage the greatest expense in the room division and many hotels control their labor this way. It is calculated by taking the hours worked divided by the number of rooms sold as follows:

MHPOR = Hours worked/Number of rooms sold

Take for example, eight room attendants working an eight-hour shift (thus 64 hours) divided by 120 rooms to be cleaned, would equal 0.4 hours (which is equivalent to 24 minutes to clean a room).

64 hours/120 rooms = 0.4 MHPOR
60 minutes × 0.4 MHPOR = 24 minutes to clean a room

3.2. Food and Beverage Labor Strategies

Productivity in food and beverage is best measured by dividing hours worked by customers served. Operation managers have no control over wages or pricing, but they do have control over schedules, and this is where they should focus.

Measures in food service, productivity, can be calculated in terms of labor cost percentage, labor dollars per guest service, guests served per labor dollar, guests served per labor hour, and revenue per available seat hour (RevPASH). Food and beverage labor optimization is better controlled when managers have a system that integrates with other platforms so they can make real-time decisions; technology systems push messages to mobile devices for real-time decision making.

4. Effective Planning of Labor Scheduling

Unlike the manufacturing industry where scheduling is designed around machines and materials, in the service industry, schedules are based around staffing levels (Heizer, Render, & Munson, 2017). In the service industry one of the challenging aspects to scheduling is that customers directly impact the experience based on their arrival rate. As demand is examined, seek to understand the variations in demand based on days (possibly within hours), weeks, months, and seasonality. Capturing these data through a point-of-sale (POS) or property management system (PMS) will be critical in assisting in this process. There are two aspects to the conversion to understand, the back-of-house (BOH) vs the front-of-house (FOH) staff coupled with understanding the forecasted demand and the level of service to be delivered. This conversion will typically be identified as a labor standard based on the service levels.

According to Thompson (1998, 2003, 2004), there are four components to labor scheduling. Once the manager has forecasted customer demand, it can be translated into staff requirements, thus scheduling the employees and adjust in real time.

1) Predict customer demand for service. Identify the service characteristics and what service transactions change over time (i.e., customer arrival rates).
2) Calculate the number of employee hours required to fulfill the demand needs.
3) When developing the actual work schedule consider the skill level of employees, desires, and requests; this will allow the manager to identify who will do what work and when.
4) Change the work schedule as necessitated by the actual demand, while ensuring effective customer service levels.

4.1. The Fair Labor Standards Act (FLSA)

The Fair Labor Standards Act (FLSA) of 1938 has various components that an employer must comply with.

1) Minimum age requirements and length of hours allowed to work for youthful individuals.
2) Definition of what the overtime allocation for a work-week is; 40 hours in one week (regardless if the paycheck distribution is bi-weekly).
3) Indicates what the standard work-week is, five 8-hour shifts per week for a total of 40 hours per week.
4) Mandates during an eight-hour day, that there are two paid 15-minute breaks and one 30-minute meal break.
5) Determine if it makes financial sense to code the employee as exempt or non-exempt, based on the number of hours worked weekly along with the potential of overtime.

4.2. Scheduling

Daily schedules. For success to be in line with financial operations, the goal is to schedule a sufficient number of employees, in a given time period, in order

to meet the expected demand while meeting the targeted service level. The juggling that comes into place, when making the schedule, will depend on the legal aspects based on local, state, and federal laws: (a) minimum number of hours to be worked in a single day, (b) maximum number of hours in a single day, (c) union regulations, and (d) meal and rest breaks. One way to work within the schedule components is to employ part-time employees in addition to the full-time employees.

Weekly schedules. The preparing of a weekly schedule is not as simple as one would infer. Additional aspects to consider include (a) illness, (b) vacation, and (c) holidays. Since most hospitality operations are open on holidays, the additional cost of paying an employee on a holiday to work must be considered. In addition, the days off, hours available, and preferences must be taken into consideration. Another to consideration is allowing employees to have two consecutive days off in a row, especially in the operations that are open seven days a week.

4.3. Flexible Schedule Techniques

In various departments in the industry, there will be times during a shift where the employee is idle or not necessarily performing tasks to the job. For example, in a restaurant, while waiting for a guest to consume their food, there might not be any other tasks to be completed. Despite the fact that the employee is not technically doing anything at that moment, they still must be paid. In order to maximize efficiency, there are numerous flexible schedule techniques utilized to be more efficient with the dollars spent for labor. One strategy in nonunionized properties is during slow time periods, it is common for management (fixed labor) to send home the hourly line-level employees and then do the job themselves. Alternatively, cross-training employees are another way to control labor cost. The number of variable employees will depend upon on the business volume.

1) **Split shifts:** This technique designates a break in between the shift that is time away from the operation, especially useful and convenient for individuals who reside close to the establishment. Split shift scheduling works well for managing costs by having the employee working during the peaks of a shift and not during the valley. For example, an employee could be scheduled for a lunch shift, then a longer unpaid break, and then return to work the dinner shift. This does lead to a longer work day for the employee and could be problematic with union operations.
2) **Part-time employees:** Part-time employees can be used to assist in covering the peak periods of business operations, thus allowing the full-time more productive employees to work the steady shifts. An advantage of the including part-time employees is that they are typically paid less and, in many cases, do not par-take in benefits.
3) **Irregular shift scheduling:** In hotel operations, for example, scheduling may be done with varying start and end times. During the weekday, operations may

start room attendants at 8 o'clock vs on the weekends, when guests may sleep a little later, the start time commences at 9 o'clock. Staggering shifts allow management to stagger the start and stop times of employees throughout the day. Overlap times can be incorporated into a day as well. Consider, for example, an hour of an overlap from the p.m. shift at the front desk by one hour into the night audit shift. Swing shifts can be implemented by scheduling an employee to float between shifts. For example, in a restaurant, it might be one person to work between the lunch and dinner shifts.

4) **Cross-training:** By cross-training current employees, they are able to work in more than one position; this allows an organization to better handle peak demand periods. This could also allow for a reduction in a customer backup or wait times during times of a high demand.
5) **Breaks:** It is both a requirement of the law and a strategy to improve productivity. A break from work will give an employee an opportunity for pause, a chance to collect their thoughts, converse with colleagues, engage in personal mindfulness, and mentally prepare for the next session of the day's shift. During the course of an eight-hour day, an employee is required by law to have a 30-minute meal break; this can be either paid or unpaid, it is up to the employer, but the break must be allocated for in the schedule. In addition, the employee is eligible to take two 15-minute breaks during the course of the day; these breaks are to be paid.
6) **On-call:** An on-call employee is an individual who is placed as a temporary hold on the schedule; their services are required if the business levels demand their presence. These employees may be required to call-in prior to coming to work for a shift to confirm if their presence is required. Or they may come in to work and then be sent home, but yet be available should the business levels unexpectedly increase.
7) **Overtime:** In general, the practice of using overtime, whereby an employee is paid one and a half times their hourly base wage, is to be avoided. Acceptable overtime includes the extra hours that staff are needed due to a sudden, unforeseen spike in demand or activity. For example, if a busload of stranded passengers shows up at a hotel, a manager is going to need extra help cleaning the rooms and serving breakfast the next day. This is welcomed business, in which the extra expense is paired with extra revenues. Wasteful overtime, however, includes the extra hours that come from sloppy time clock activity or clever staffers gaming the system. Some team members will regularly clock in five minutes early or shave time from scheduled breaks. These unscheduled minutes add up, and if numerous people do this every day, the cost can be significant.

4.4. Lateral Service

The Ritz-Carlton believes that in order to create teamwork, any hospitality organization should use lateral service, a term they coined, in order to

ensure that the needs of the guest are consistently met. Lateral service has been adopted by many organizations and can even be found in collective bargaining agreements. **Lateral service** is an agreement between the employer and employee stating that helping employees where and as needed (based on the extent of qualifications) regardless of job duties, job classification, or seniority (Agreement, n.d.).

4.5. Managing Scheduling Challenges and Real-time Decision Making

The service industry is faced with challenges, such as varying setup times, interruptions, and unexpected changes in jobs, which will make the task of scheduling more difficult. With the variations in demand and other factors which impact business, there is no optimal schedule that is perfect for every situation (Stevenson, 2018). Technology can assist in making as optimal of a schedule as possible with real-time data. There are several advantages to using scheduling technology according to Davis and Heineke (2005):

1) It can reduce the time it takes for managers to complete the weekly schedule.
2) Allows managers to actually devote more time to managing the operations and less time in creating the weekly schedule.
3) Once the legal and policy requirements are loaded into the software, the scheduler will be more efficient with the labor hours for each week as well as enhancing the employee's productivity.

Real-time actions come in the form of short-lived or long-lived. A short-lived action includes sending employees off to a break or recalling them back early, extending the length of a shift (which could possibly include overtime), and requesting an employee complete additional tasks. Long-lived actions, commit additional resources, include sending employees home early, calling additional employees to work a shift, and reassigning employees to different jobs (Thompson, 1999).

4.6. Labor Investment

Hospitality organizations tend to consider labor just as an expense; however, since it is the largest daily cost per day, it should be viewed as an investment. Considering labor expense as an investment is more difficult for owners to be on board with, since they do not necessarily see a return on investment (ROI). Unlike traditional ROI, there is no percentage of return on labor, instead operators should look to the operations that are the best performing by actually being more productive. An operation is productivity rich when they use productivity guidelines and track their return on productivity by reviewing the cost per schedule or the cost per forecast based on the labor standards.

Discussion Questions

1. Provide a reason(s) why CPOR, as an economic standard, should not be used when planning a staff schedule.
2. Louie's Restaurant has forecasted 350 covers for Friday evening; the standard is 22 covers per server. Perform the calculation to determine the number of servers that can management schedule. Round fractions to the nearest whole number.
3. As the general manager of the American Diner restaurant, the full-time employees are scheduled to work 40 hours/week. During the month of May, you employed 30 full-time employees and 20 part-time employees, each scheduled for 18 hours, according to the labor report. Calculate the number of FTEs.

Case Exercises

1. The following two questions refer to the fancy Hungarian Goulash Restaurant. The labor standard for servers at dinner is: fixed: eight hours, variable: add four hours for every additional 30 covers, above a minimum of 30 covers. Assume that each server is scheduled for four hours. Rounding rule: perform the calculation and keep only the whole number, ignore the decimal part.
   1) 160 covers are expected for tomorrow's dinner. How many server hours should be scheduled?
   2) What is the minimum number of covers that would trigger nine servers?
2. The Palace Hotel is known among business travelers for its cleanliness. The hotel houseperson provides housekeepers with the items needed to clean guest rooms and helps stock their carts. In addition, they take care of the common areas of the Palace, such as the lobby area, the corridors, and the public bathrooms. The fixed labor standard for this position is one person (eight hours) per shift, including overnight. Above 100 arrivals and departures, management is entitled to add another eight hours. Over 150 arrivals and departures, they can include eight more hours. When arrivals and departures exceeded 310, one more eight-hour shift can be added. Tonight's hotel occupancy will be 180 rooms and 110 of these will check out tomorrow morning. Tomorrow night's occupancy is expected to be 268 rooms. How many houseperson hours should be scheduled for tomorrow if we assume 0% double occupancy?
3. The 186-room Bayles Royal Hotel is in the process of revising their current processes for determining the housekeeping schedule. Based on the information provided below, use your best judgment to answer the following problem sets and create a potential shift schedule for the housekeeping staff with the chart on the following pages.

Table 2. Room-Type Detail.

Room Type	Room Size	Credits	Quantity
Deluxe king room	400 square feet	1	128
Deluxe double room	430 square feet	1	42
Executive suite	720 square feet	2	9
Premier suite	1,650 square feet	3	5
Presidential suite	2,800 square feet	5	2

Problem Sets

A. If the Bayles Royal Hotel has all 186 rooms booked for today, how many room attendants will be needed for tomorrow's housekeeping schedule?
B. Calculate the ratio between the total number of credits and the total number of rooms.
C. If the Bayles Royal Hotel has an 86% occupancy rate on Monday, how many room attendants are expected to be scheduled for Tuesday?
D. Bayles Royal Hotel's housekeeping schedule for Sunday has already been completed on the following chart. Please review the scheduling guidelines below and complete the remainder of the housekeeping scheduling on the chart. It is possible for the answer to vary, so long as the rules are followed.

Schedule Guidelines

- Today's schedule is based on the occupancy rate from the previous day. According to the room occupancy report from the previous day, the manager will determine how many room attendants will need to be scheduled for the next business day. For example, Monday's occupancy data are used to calculate the number of room attendants needed for Tuesday's housekeeping schedule.
- Each room attendant will be assigned a maximum of 12 credits per eight-hour shift. Some hotels convert the guestroom into a credit-based system,according to the type, size,and the features of the guestroom. As seen in the Room Type Detail chart, a standard room would earn 1-credit where the suite can earn 5-credits.
- A room attendant can be scheduled for the morning shift from 8:00 a.m. to 4:30 p.m. or for the night shift from 2:00 p.m. to 10:30 p.m.; this includes a half-hour break. In total, 80% of the room attendants for each workday will be scheduled for the morning shift.
- When calculating the number of room attendants needed, always round up the number. For example, if Monday needs 21.2 room attendants, schedule 22 room attendants.
- A full-time employee should be scheduled five days a week; a part-time employee should not work more than four shifts per week. Try to avoid overtime.
- Avoid scheduling an individual on a back to back; therefore, do not schedule a night shift following with a morning shift.

Bayles Royal Hotel – Housekeeping Schedule

Abbreviations: **F (Full-time), P (Part-time), OC (On-call), REQ (Request a day off), VAC (vacation)**	**May 27** **Sunday**	**May 28** **Monday**	**May 29** **Tuesday**	**May 30** **Wednesday**	**May 31** **Thursday**	**June 1** **Friday**	**June 2** **Saturday**
Occupancy Forecast (Last Saturday: 56%)	72%	99%	99%	95%	89%	60%	55%
Housekeepers Needs	9.9						
1 Anna F	OFF-REQ	OFF-REQ					
2 Grace F	8:00 a.m.						
3 Camila F	OFF-REQ						OFF- REQ
4 Mariana F	8:00 a.m.		OFF-REQ				
5 Zoe F	OFF						
6 Paula F	VAC	VAC	VAC	VAC	VAC	VAC	VAC
7 Emily F	2:00 p.m.				OFF-REQ	OFF-REQ	
8 Abigail F	8:00 a.m.						
9 Michelle F	OFF						
10 Juana F	OFF						
11 Luz F	OFF				OFF-REQ		
12 Nell F	8:00 a.m.				OFF-REQ		
13 Nora F	2:00 p.m.		OFF-REQ	OFF-REQ			
14 Maddie F	OFF						
15 Sasha F	8:00 a.m.						
16 Vera F	OFF-REQ					OFF-REQ	
17 Alice P	OFF						
18 Becca P	OFF						
19 Kathy P	OFF						
20 Donna P	8:00 a.m.						
21 Julie OC	OFF						
22 Kim OC	8:00 a.m.						
23 Carol OC	8:00 a.m.						

Fig. 4. Partial Housekeeping Schedule for Bayles Royal Hotel.

- Room attendants may request a specific day off or take vacation days. Without affecting the overall scheduling or creating overtime, the manager should satisfy the requests.
- The schedule is posted every Wednesday. A completed schedule is from Sunday to Saturday.

Managerial Challenge

You are the analyst at the Teagarden Resort hired to improve its scheduling. You are tasked to help the resort with staffing the correct number of labor hours for housekeeping and front office. You analyzed two years' worth of weekly historical labor hours and occupied rooms over the same time period.

Information

- The total labor hours over the prior two years is 25,000 for housekeeping and 10,000 for the front office.
- The total number of occupied rooms over the prior two years is 20,000 rooms.
- The Revenue Manager of the Teagarden Resort has forecasted 150, 200, 225, and 175 rooms sold in the upcoming weeks.
- The housekeeping staff earn on average $15 per hour and the front desk staff earn on average $17 per hour.
- The GM at Teagarden Resort had originally scheduled the housekeeping staff (to 200, 280, 350, and 200 total hours) and the front office (to 85, 110, 120, and 80 total hours). In the next four weeks, prior to using your recommended hours.

Table 3. Revenue Forecast.

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
Rooms sold	60	65	85	65	30	60	30
Rooms available	100	100	100	100	100	100	100
Rooms revenue	$6,000	$7,500	$8,500	$6,500	$3,000	$5,000	$3,000

Questions

1. Calculate the labor hours needed per room for the housekeeping and the front office staff at the Teagarden Resort.
   Hint: *Hours needed per room sold = Hours per staff type/Rooms occupied*
2. Calculate the recommended labor hours needed for the housekeeping and front office at the Teagarden Resort for the next four weeks.
   Hint: *Recommended staffing hours = Forecasted rooms occupied × Hours needed per room sold*

3. Using your recommended labor hours calculated (2), determine the total hours saved compared to the GM's original staffing hours for both housekeeping and the front office staff over the next four weeks.
4. How much savings, in wages, for housekeeping and the front office does Teagarden Resort generate by going with your recommended staffing hours when compared to the GM's original labor hours?

Added Insight

You are the General Manager of The Relaxed Suites, and your boss has given you a new set of labor standards (refer to Fig. 5). You are to use these standards to determine how many hours to schedule employees in different positions to ensure the right amount of staffing. Below is the revenue forecast details for this week.

Questions

1. How many hours should front desk clerks be scheduled for on Wednesday?
2. How many hours should maintenance engineers be scheduled for on Friday?
3. How many hours should the night auditors be scheduled for on Tuesday?
4. How many hours should the breakfast attendants be scheduled for on Wednesday?
5. One of your room attendants will be assigned to clean the following rooms:
   - Checkout: 10
   - Deep clean: 2

   If this employee clocks in at 9:00 a.m. and does not take any breaks, what time should they clock out if they are exactly on target for the standards?
6. What is the average daily price paid by customers who stayed on Sunday?

Risk and Crisis Management

During business disruption, hotels need to consider three levels of staffing. In any situation where the hotel is running with minimal occupancy the so-called zero-base staffing model is to be utilized. In the past, zero-base staffing models were not widely considered as a way to staff; it was more of a theoretical concept. With the advent of a crisis, the concept of having a hotel realize that they have zero staffing and build from there. In order to maintain a smooth operation at an acceptable level, in this situation, the majority of the staff will consist of managers wearing several hats. For example, the front desk manager can serve the breakfast in addition to the duties of working at the front desk. Depending on the size and complexity of the hotel, between four and nine employees will be needed to operate the hotel when under 10% occupancy. It is important to understand that the zero-base model will always operate at an operational loss.

The next staffing model to move toward is the transition staffing where profit is in the recovery stage. Even though the hotel seems to be returning to a normal

Hotel View - Labor Plan Viewer

Hotel: **The Relaxed Suites**

Filter Division/Dept: All

Fixed Hours (Hours do not change): Builds hours no matter what the condition or performance at the hotel

Position (Clock Code)	Mon Hours	Tue Hours	Wed Hours	Thu Hours	Fri Hours	Sat Hours	Sun Hours	Weekly Hours	Plan Wage Per Hour	Details
Executive Housekeeper (15)	5.71	5.71	5.71	5.71	5.71	5.71	5.71	40.00	$13.22	Details >>
Front Desk Manager (13)	5.71	5.71	5.71	5.71	5.71	5.71	5.71	40.00	$15.87	Details >>
General Manager (31)	5.71	5.71	5.71	5.71	5.71	5.71	5.71	40.00	$25.00	Details >>
Hskp Supervisor (18)	0.00	0.00	0.00	0.00	0.00	8.00	8.00	16.00	$10.50	Details >>
Night Auditor (14)	8.00	8.00	8.00	8.00	8.00	8.00	8.00	56.00	$8.93	Details >>
Sales Coordinator (36)	5.71	5.71	5.71	5.71	5.71	5.71	5.71	40.00	$12.13	Details >>
Director of Sales (35)	5.71	5.71	5.71	5.71	5.71	5.71	5.71	40.00	$20.00	Details >>
Training Front Desk (44)	5.71	5.71	5.71	5.71	5.71	5.71	5.71	39.97	$12.00	Details >>
Training Front Desk (44)	5.71	5.71	5.71	5.71	5.71	5.71	5.71	39.97	$14.00	Details >>

Vary by Occupancy with Tier (Same Day): These hours can change at given tiers of occupancy. This uses the same days occupancy.

Position (Clock Code)	Min	Max	Mon Hours	Tue Hours	Wed Hours	Thu Hours	Fri Hours	Sat Hours	Sun Hours	Weekly Hours	Plan Wage Per Hour	Details
Front Desk Clerk (12)	0.0 %	70.0 %	16.00	16.00	16.00	16.00	16.00	8.00	8.00	96.00	$8.17	Details >>
Front Desk Clerk (12)	70.0 %	80.0 %	24.00	24.00	24.00	24.00	24.00	16.00	16.00	152.00	$8.17	Details >>
Front Desk Clerk (12)	80.0 %	100.0 %	30.00	30.00	30.00	30.00	30.00	30.00	30.00	210.00	$8.17	Details >>
Hskp Houseman (17)	0.0 %	35.0 %	4.00	4.00	4.00	4.00	4.00	4.00	4.00	28.00	$9.12	Details >>
Hskp Houseman (17)	35.0 %	50.0 %	8.00	8.00	8.00	8.00	8.00	8.00	8.00	56.00	$9.12	Details >>
Hskp Houseman (17)	50.0 %	100.0 %	12.00	12.00	12.00	12.00	12.00	12.00	12.00	84.00	$9.12	Details >>
Maintenance Engineer (34)	0.0 %	35.0 %	0.00	4.00	4.00	4.00	4.00	0.00	0.00	16.00	$10.50	Details >>
Maintenance Engineer (34)	35.0 %	50.0 %	6.00	6.00	6.00	6.00	6.00	0.00	0.00	30.00	$10.50	Details >>
Maintenance Engineer (34)	50.0 %	100.0 %	8.00	8.00	8.00	8.00	8.00	0.00	0.00	40.00	$10.50	Details >>

Vary by Occupancy with Tier (Previous Day): These hours can change at given tiers of occupancy using the previous days occupancy.

Position (Clock Code)	Min	Max	Mon Hours	Tue Hours	Wed Hours	Thu Hours	Fri Hours	Sat Hours	Sun Hours	Weekly Hours	Plan Wage Per Hour	Details
Breakfast Attendant (10)	0.0 %	70.0 %	6.00	6.00	6.00	6.00	6.00	6.00	6.00	42.00	$9.23	Details >>
Breakfast Attendant (10)	70.0 %	100.0 %	8.00	8.00	8.00	8.00	8.00	8.00	8.00	56.00	$9.23	Details >>

Vary by Minutes Per Room (Room Attendants Only): Calculates plans based on minutes per room goals for your specific housekeeping clean types (e.g. stayover rooms, check-out rooms etc.). These plans are for Room Attendant positions only. Contact us if you need to change your housekeeping clean types.

Position (Clock Code)	Plan Based On:	MPR	Plan Wage Per Hour	Details
Room Attendant (16)	Checkouts	30.00	$7.93	Details >>
Room Attendant (16)	Deep Cleans	60.00	$7.93	Details >>
Room Attendant (16)	Stayovers	18.00	$7.93	Details >>

Vary by Minutes Per Room (Laundry/Other using Total Cleans): Calculates plans based on the total number of rooms cleaned in the hotel. This is typically used for laundry, houseman, or similar positions. Do NOT use this plan type for Housekeeping Room Attendants.

Position (Clock Code)	MPR	Plan Wage Per Hour	Details
Laundry Attendant (19)	7.00	$8.58	Details >>

Note: This Added Insight case study is provided with courtesy from Hotel Effectiveness.

Fig. 5. Hotel Labor Standard Sample.

Table 4. Four-Phase Reopening Plan Per Day.

	Phase 1		Phase 2		Phase 3		Phase 4	
Rooms	**FTEs 30**	**Hours**	**FTEs 60**	**Hours**	**FTEs 100**	**Hours**	**FTEs 150**	**Hours**
General manager	1	–	1	–	1	–	1	–
Call center manager	1	–	1	–	1	–	1	–
Front desk assistant manager	1	–	1	–	1	–	1	–
Housekeeping manager	1	–	1	–	1	–	1	–
Engineering manager	1	–	1	–	1	–	1	–
Total managers	5		5		5		5	
Night auditor	2	16	2	16	2	16	2	16
Front desk agent	3	24	3	24	3	24	4	32
Guest services attendants	3	24	3	24	3	24	4	32
Total front-of-house hourly staff	8	64	8	64	8	64	10	80
Housekeeping attendant	2	16	4	32	6	48	10	80
Maintenance engineer	0	8	0	8	1	16	2	32
Public area attendant	1	8	1	8	2	16	2	16
Total back-of-house hourly staff	3	32	5	48	9	80	14	128
Total hourly staff	11	96	13	88	17	120	24	176
Management headcount	5		5		5		5	
Hourly headcount	11		13		17		24	
Total headcount	16		18		22		29	

Note: Example represents a hotel with a minimum of 400 rooms and food and beverage services closed.

level of operation, it will barely breakeven. Additional line-level staff will be required, for example, to clean the rooms; however, managers will continue to work in various functions throughout the hotel. The final category is the profit staffing level; this is staffing the hotel in order to be profitable based on the occupancy level. Based on the same principle, the following example found in Table 4 outlines a four-phase reopening plan that represents how many FTEs should be scheduled per day in a Midwest hotel in the United States.

Questions

1. The "new normal" after COVID-19 has found hotel stayover clean time to be shrinking and the departure clean time to be increasing. Explain.
2. Under what normal circumstances, excluding crisis situations, would hotels experience zero-base staffing?

Glossary

Attrition: The percentage of labor hours that will not be utilized for various reasons, such as sickness or employee turnover.

Economic standards: Profitability metrics that are commonly used by management companies and owners to assess operations cost-efficiency.

Fixed labor hours: The number of employees required to maintain a smooth operation at a basic service level.

Fixed payroll costs: The periodic payments that salaried managers receive.

Full-time equivalent (FTE): A unit indicating the workload of a single employed person working full time.

Labor standards: Rules that determine how many labor hours are needed for each position based on operational metrics.

Man-hours per occupied room (MHPOR): A measure of the productivity of hotel housekeepers or room attendants.

Productivity: The relationship between the output of goods and services and the input of sources.

Productivity standards: The acceptable quantity of work to be done by qualified employees who perform their work according to the defined performance standards.

Service standards: Distinctive attributes that define customers' expectations.

Split shift: The technique to schedule employees one day with two time periods with time off in between.

Staffing model: The labor standards to identify the number of labor hours needed for each job class.

Variable labor hours: The number of hours that are added above the fixed labor hours, adjusted according to the business volume.

Variable payroll costs: Costs that are paid to the employees based on a changing schedule based on the expected business level.

Acknowledgment

The authors wish to acknowledge the information and the ongoing support provided for the development of this chapter by the leadership of Hotel Effectiveness, including Mike Martin, Chief Executive Officer, Taylor Beauchamp, Chief Product Officer, Del Ross, Chief Revenue Officer, and James Taflinger, hotel labor management expert. The authors sincerely appreciate the numerous interviews with Del Ross.

The Bayles Royal Hotel schedule case exercise was designed by Yibei Ji, a graduate of the Boston University School of Hospitality Administration.

The authors also would like to acknowledge the contribution of Dr. Mark Legg, an Assistant Professor in the Boston University School of Hospitality Administration, for the creation of the Managerial Challenge feature.

References

Agreement. (n.d.). Agreement between Unite Here Local 23 and Hyatt Regency Denver Colorado Convention Center. Retrieved from https://www.unitehere23.org/wp-content/uploads/Hyatt-Regency-Denver-exp-02-28-2018.pdf

Baker, T. (2019, September 3). As labor costs rise, US hotels to see profit declines. Retrieved from http://www.hotelnewsnow.com/Articles/297920/As-labor-costs-rise-US-hotels-to-see-profit-declines

Davis, M. M., & Heineke, J. (2005). Scheduling. In *Operations management: Integrating manufacturing and services* (5th ed., pp. 608–635). New York, NY: McGraw Hill.

Dopson, L. R., & Hayes, D. K. (2011). Managing the cost of labor. In *Food and beverage cost control* (5th ed., pp. 275–339). Hoboken, NJ: Wiley.

Gu, Z. (2004). *Management science applications in tourism and hospitality*. New York, NY: Routledge.

Heizer, J., Render, B., & Munson, C. (2017). Short-term scheduling. In *Operations management: Sustainability and supply chain management* (12th ed., pp. 599–634). Upper Saddle River, NJ: Pearson.

Hotel Effectiveness. (2015). *Cheat sheet: Hotel labor management essentials*. Retrieved from https://info.hoteleffectiveness.com/lm-best-practices-resources

Krajewski, L. J., Malhotra, M. K., & Ritzman, L. P. (2016). Use operations to create value. In *Operations management: Processes and supply chains* (11th ed., pp. 1–47). Upper Saddle River, NJ: Pearson.

Mandelbaum, R. (2017, August 15). The components of payroll costs in hospitality. Retrieved from https://www.hotel-online.com/press_releases/release/the-components-of-payroll/

Mill, R. C. (1989). *Managing for productivity in the hospitality industry*. New York, NY: Van Nostrand Reinhold.

Mill, R. C. (2006). *Managing the lodging operation*. Upper Saddle River, NJ: Pearson.

Stevenson, W. J. (2018). *Operations management* (13th ed.). New York, NY: McGraw Hill.

Szende, P. (2013a). (Ed.). Dining room operations: Establishing service standards and procedures. In *Hospitality management learning modules* (1st ed.). Upper Saddle River, NJ: Pearson.

Szende, P. (2013b). Establishing labor standards and scheduling basics. In *Hospitality management learning modules* (1st ed.). Upper Saddle River, NJ: Pearson.

Thompson, G. M. (2003). Labor scheduling: A commentary. *The Cornell Hotel and Restaurant Administration Quarterly*, *44*(5–6), 149–155.

Thompson, G. M. (1998). Labor scheduling, part 1: Forecasting demand. *Cornell Hotel and Restaurant Administrative Quarterly*, *39*(5), 22–31.

Thompson, G. M. (1999). Labor scheduling, part 4: Controlling workforce schedules in real time. *Cornell Hotel and Restaurant Administration Quarterly*, *40*(3), 85–96.

Thompson, G. M. (2004). Planning-internal duration in labor-shift scheduling. *Cornell Hotel and Restaurant Administration Quarterly*, *45*(2), 145–157.

US Bureau of Labor Statistics. (2019, September 4). Employment by major industry sector. Retrieved from https://www.bls.gov/emp/tables/employment-by-major-industry-sector.htm

Chapter 8

Managing Capacity and Waits

Alec N. Dalton and Andrew M. Daw

Abstract

Service experiences and waiting lines are often – unfortunately – seen to go hand in hand. This chapter explains why this is the case. Beginning with an exploration of capacity and operating constraints, discussion then delves into both the mathematical origins and psychological implications of waiting lines. The final section offers hope to managers and guests alike, with a survey of different operations strategies and tactics that can eliminate or abate the need to wait.

Keywords: Capacity; demand; queueing; service process; waits; waiting lines

Learning Outcomes

After completing this chapter, you should be able to:

1. Explain the objectives of capacity management versus demand management.
2. Illustrate the fundamental elements of process flows, and especially of queues.
3. Describe the basic mathematical models for waiting lines in hospitality businesses.
4. Recognize key psychological implications of waiting for services.
5. Conceive of different techniques for managing capacity and demand.

Outline

Operations Management in the Hospitality Industry, 167–187

doi:10.1108/978-1-83867-541-720211008

Getting Started

According to *The New York Times*, Americans spend roughly 37 billion hours per year waiting in lines (Stone, 2012). Think about that for a moment. People wait in line when buying coffee in the morning. People wait to purchase food in cafeterias or quick-service restaurants. People wait to buy groceries. People wait virtually in the case of calls to customer service hotlines. Even on vacation, people wait – perhaps to board a bus or a plane or a train and even to ride an amusement park attraction. Why do customers need to wait so often, and why are hospitality services seemingly plagued by waiting? This chapter will answer both of these questions, including the mathematics behind waiting. Most importantly for hospitality operations managers, this chapter will also address methods for eliminating or reducing waits.

1. Capacity and Constraints

Key to economics is the balance (or imbalance) of supply and demand. Supply consists of the goods and services available for consumption, and demand constitutes the amount of those goods and services that buyers are willing and able to purchase. In the specific case of service businesses, that definition of demand suffices. Supply, on the other hand, requires an additional dimension because the supply of services is limited by the firm's capacity to produce those services at any moment.

For example, service in a fast-food restaurant is limited by the number and speed of ordering stations, by the duration of cooking processes, and by the number and speed of staff packaging and presenting food to guests. The only way to prevent waits from ever happening would be to operate a vastly wasteful business: the restaurant would have to have dozens of ordering stations to match periods of peak demand, but in off-peak periods, staff would become idle; they could try preparing some food in advance, but that might result in stale offerings or food waste from items too cold and old to serve. In a full-service restaurant at peak times, capacity may be limited not only by the number of available servers and by the efficiency of the kitchen but also by the availability of seats and tables for dining parties.

Any of these components can result in a guest waiting, but all of these components can also be managed to balance the wait time of the guest with the profitability of the business. **Capacity management** refers to an organized effort to measure, control, and optimize production capacity. Whether intentional or not capacity is inbuilt into all business processes. The theoretical level of output that a process is designed to achieve is called, naturally, **design capacity**. "Theoretical"

is an important descriptor here because companies have planned or unplanned activities that may reduce capacity well below the level designed. Planned activities include maintenance that infringes on service areas or training sessions that occupy staff: the capacity that remains after the effects of planned activities subtract from design capacity is referred to as **effective capacity**; this capacity is controllable by the business, as the plans dictate. Unplanned, uncontrollable events also occur, such as the malfunction of computer systems or employee call-outs or no-shows (generally termed absenteeism): **actual capacity**, therefore, is the true capacity that remains after planned and unplanned activities absorb some design capacity. Fig. 1 depicts these relationships.

To maximize profitability, businesses often seek to close the gap between actual capacity and design capacity. This is referred to as **utilization** and is represented with the formula

$$\text{Utilization} = \frac{\text{Actual capacity}}{\text{Design capacity}}$$

Recognizing that planned activities need to occur and are controllable, businesses also seek to maximize **efficiency**, which is proportional as

$$\text{Efficiency} = \frac{\text{Actual capacity}}{\text{Effective capacity}}$$

While higher utilization and efficiency rates are ideal, standards may be informed by company policy and industry benchmarks.

To provide examples of each calculation, consider a hypothetical hotel. There are 100 rooms in total, which means the design capacity is 100 rooms per night. Subtracting planned constraints, such as five rooms taken out-of-order for carpet

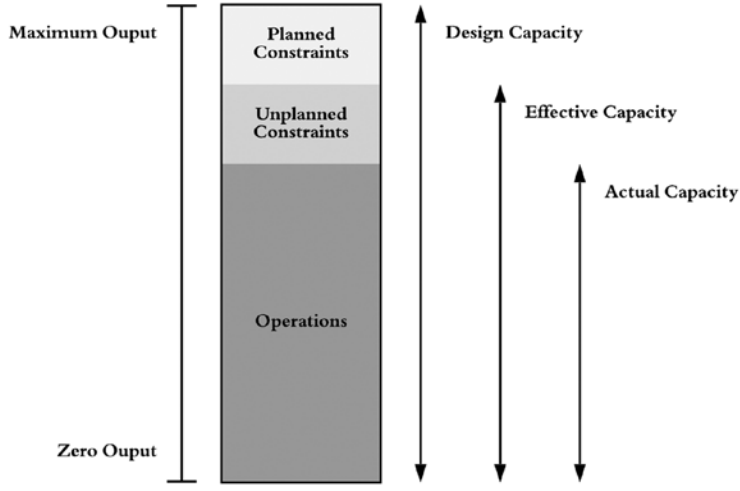


Fig. 1. The Relationship Between Design, Effective, and Actual Capacity Levels. *Source*: Adapted from Greasley (2006, p. 239).

cleaning, the effective capacity becomes 95 rooms per night over the cleaning period. Unplanned constraints may still happen, such as a pipe burst that makes five additional rooms unexpectedly uninhabitable: the actual capacity is now 90 rooms per night. Utilization and efficiency result as follows:

$$\text{Utilization} = \frac{\text{Actual capacity}}{\text{Design capacity}} = \frac{90 \text{ rooms / night}}{100 \text{ rooms / night}} = 90.0\% \qquad \text{and}$$

$$\text{Efficiency} = \frac{\text{Actual capacity}}{\text{Effective capacity}} = \frac{90 \text{ rooms / night}}{95 \text{ rooms / night}} = 94.7\%.$$

Understanding the utilization and efficiency for this hotel can help managers decide how many rooms to sell for a given night and whether to change future planned constraints in the face of unplanned happenings.

If capacity management concerns the ability of a firm to service its customers, **demand management** refers to the ability of a firm to attempt to moderate demand. Popular demand management techniques include the use of promotions to attract customers at off-peak times, the scheduling of services via appointments or reservations, and the fluctuation of prices based on peak and off-peak service times. After first considering the mathematics of capacity and the psychology of queueing, this chapter will then return to focus on the management of capacity and demand.

2. Queueing

2.1. Fundamentals of Queueing Theory

As a discipline, **queueing theory** is devoted to the description, control, and analysis of service processes using math. Queueing theory addresses service systems as mathematical probability models. Probability is used because there are many components to service processes that are unknown or evolve randomly. For example, the times that guests arrive to check in to a hotel are often not known in advance, and the durations of time that each party spends at a restaurant will vary from group to group. In some contexts, a queue may refer to the number of customers waiting for service (i.e., the "line"), but in this text, we will use this term queue to refer to the total number of customers in the service system at a given point in time.

Across the various models used in queuing theory, there are five main components. First is the **arrival process**, which is the representation of how the customers enter the system, inherently capturing the amount of demand for service. Most often this is characterized by a known average rate of arrivals. Average is a key word here: the true rate of arrivals in a given time frame is taken to be random, but the overall average rate across time may be known. For example, it may be established that – on average – 100 club-goers arrive to a nightclub each hour; the number that will arrive in a given hour tomorrow evening, however, is yet to be definitively known. This **arrival rate** can also be modeled as varying with time, so that time-of-day effects and seasonality can be incorporated into analysis.

As an example, this reflects the fact that ski resorts typically receive more guests in February than they do in July. However, this time inconsistency is again only meant to refer to the mean number of arrivals. Just because the average number of customers arriving is known doesn't mean that the precise number of customers is known; probability models help to assess this number. The **Poisson process** is the most commonly used probability model for arrivals in queueing systems. This arrival process is defined by the two following properties: the number of arrivals occurring in any given interval of time is distributed as a Poisson random variable, and any two intervals that are disjoint from one another (i.e., they do not overlap) are independent, meaning that the number of arrivals that occur in one interval has no effect on the number of arrivals that occur in the other. As an interesting consequence of this definition, this also implies that the time between two subsequent arrivals follows an exponential distribution. These conditions make the Poisson process quite useful for calculation. However, it is worth noting that there are also some theoretical justifications for why the Poisson process may often be applicable in the real world. For example, it is known that in many circumstances, the combination of many independent arrival processes will take on Poisson process tendencies even if the underlying individual processes are not necessarily Poisson processes themselves. Further, researchers have also shown that the Poisson process can actually even arise in the case of strategic customers seeking to minimize their own waiting times, provided that there is a large number of customers (Lariviere & Van Mieghem, 2004).

Buffets frequently involve waiting lines. Whether self-serviced or staff-serviced, guests will form lines with some discipline to obtain food and beverages. Understanding basic queueing theory can be beneficial for banquet managers and restaurant managers to operate efficient buffets.

After the arrival process, the second main component of queueing models is the **duration** of each customer's service. In the hotel check-in example, this would be the length of time that the guest spends at the desk receiving assistance. This time can be distributed as any positive random variable, but the most commonly used probability distribution is the exponential distribution. Similar to the ubiquity of Poisson processes for modeling the arrivals to queues, the exponential distribution is popular for its usefulness in calculation. In particular, if a queueing model has both Poisson process arrivals and exponentially distributed service, then it satisfies the Markov property, meaning that the distribution of the future states of the queue depends only on the current state and not the full history of the process. Such queues can be referred to as Markovian queueing models.

As a natural accompaniment to the service distribution, the third main component of a queueing system is the total number of **service agents (or servers or channels)** available. This number represents the total number of employees available to perform service, or the total number of channels through which multiple customers can be simultaneously served. As one would expect, this amount has a significant impact on the overall performance of the service system and on the customer experience. In complex settings, there may even be many different customer types and many different server skill sets. As an example of different customer types, consider a restaurant in which some parties are walk-in customers and some parties have a reservation. For an example on how this can relate to employee skill sets, consider an international hotel receiving guests speaking many different languages. This then drives the necessary server skill sets, as there should be enough employees that speak each language to properly serve the arriving guests.

Returning to the hotel desk example, a single-server queue represents a desk with only one receptionist greeting guests, whereas a desk with several employees is better represented by a multi-server queue, in which guests may wait for the next available of the multiple agents employed. On the other hand, the infinite-server queue has infinitely many servers available. While this may seem unrealistic for in-person systems, one can note that it is a natural model for the number of users on a website, for example. Furthermore, the infinite server queueing model is also quite useful as an approximation for a service system with a very large number of servers or for when the service is a general experience rather than an individual activity. For example, one could represent the total number of guests at a theme park as an infinite server queue, as the actual park capacity is much larger than the number of attendees in most standard settings.

After the number of servers, the fourth main component of a queueing model is the total capacity of the queueing system. In this context, the capacity refers to the maximum number of customers that could be in the service system simultaneously, including both those being served and those waiting. Thus, the capacity is at least the number of servers in the system. This capacity can vary significantly by context. For example, the queues for attractions at a theme park may be effectively modeled as being infinitely large, as additional waiting space for the attraction can often be allocated in the park's walkways. By comparison, many restaurants may only have a small space for waiting and thus can lose customers

when that area is too full. This would constitute a finite capacity system, and in this setting, there is a particular challenge that it may not be possible to record when customers are lost due to the system being at capacity. In queueing theory, this is referred to as a customer being "blocked."

For the fifth and final main component of a queueing model, consider the order in which customers are served – also known as the **queue discipline**. The customer sequencing is not only a managerial decision but also one that can be changed simply: no extra employees need to be hired, no additional space needs to be allocated or acquired. In single- or multi-server queueing models, this service policy dictates how the next customer is chosen to enter service when an agent becomes available. The most commonly used service ordering is "first come, first served" (FCFS), which selects the customer who arrived earliest as the next to begin service; it may also be referred to as "first in, first out" (FIFO). This is a natural and often fair policy, as the customer who has waited the most is always at the front of the line. An alternative to FCFS is LCFS, meaning "last come, first served," which takes the most recent customer to arrive as the next to be served. Other more sophisticated policies include priority systems, in which customers may be served in order of importance rather than order of arrival such as is used in airplane boarding, or processor sharing, in which all servers do work collectively and all customers enter service immediately.

2.2. Common Mathematical Models for Queueing

Having now defined the fundamental components of queueing theoretical models, a sufficient foundation has been laid to look at some particularly well-known models and their associated formulas. To begin, consider a common single-server queueing model and its five main components. Assume that the arrival process is a Poisson process with arrival rate $\lambda > 0$. This means that over a time interval of length t, the probability that k customers arrive can be calculated via

$$P(N = k) = \frac{(\lambda t)^k}{k!} e^{-\lambda t}.$$

So, if a concierge desk receives $\lambda = 3$ guest requests per hour and if it closes in $t = 2$ hours, the probability that the desk receives exactly $k = 6$ requests before closing is $P\ (N = 6) = 0.16$. For the second main component of the queueing model, now assume that the service duration is exponentially distributed with rate $\mu > 0$. That is, the probability that the service is completed within s units of time is given by

$$P\left(S \le s\right) = 1 - e^{-\mu s}.$$

If on average it takes the concierge 15 minutes to resolve a guest's request, this means that she can serve at a rate of $\mu = 4$ requests per hour. The probability that a request can be completed in 30 minutes (0.50 hours) or less is then

$$P\left(S \le 0.50\right) = 1 - e^{-\left(4 \times 0.50\right)} = 0.86$$

By definition, this single-server model has one server, and it can also be assumed that there is unlimited waiting space, meaning infinite capacity.

For the fifth and final component, assume that the concierge operates in FCFS fashion, so that the guest who has waited the longest is the next to be served. With λ as the arrival rate and μ as the rate of service, one further assumption will be made – that $\lambda < \mu$. With this assumption that the rate of arrivals is smaller than the rate of service, the service system will not be overloaded. For intuition on this fact, think of a sink: if the faucet flows faster than the sink drains it will always overflow, but otherwise it will not. With these assumptions, the probability that there are k customers in the system in the long run is

$$P(Q=k)=\left(1-\frac{\lambda}{\mu}\right)\left(\frac{\lambda}{\mu}\right)^{k},$$

meaning that the queue length is geometrically distributed. It is worth noting that this is not only the distribution of the queue in its long-run steady state, but it is also the distribution of the queue length across all time. That is, $1-\lambda/\mu$ is both the probability that the queue is empty at a distant point in time and the percent of all time that the queue will be empty. The coincidence of these distributions will be true for all Markovian queueing models. Because there is only one server, if there is at least one customer in the system, then the server is definitively working. Then, $\lambda/\mu = 1 - P(Q{=}0)$ is the **server utilization** of this single-server model. In the concierge desk example with $\lambda = 3$ and $\mu = 4$, the utilization is 3/4 = 75%:

$$\frac{\lambda}{\mu}=\frac{3}{4}=1-P(Q=0)=0.75$$

As a second example, consider an infinite-server queueing model. Again assume that the arrival process is a Poisson process with rate λ and that the service durations are exponentially distributed with rate μ. Now, assume that we have both infinitely many servers and infinite capacity. Because of the infinitely many servers, all customers immediately enter service. These assumptions imply that the long-run probability that there are k customers in the system is calculated

$$P(Q=k)=\frac{1}{k!}\left(\frac{\lambda}{\mu}\right)^{k}e^{-\frac{\lambda}{\mu}},$$

meaning that the queue length is Poisson distributed. Note that in this case, it does not need to be assumed that $\lambda < \mu$, and that is because there are infinitely many servers. In the sink analogy, this is the same as saying that the sink can drain as fast as possibly needed. As an example of this model, consider a particular slope at a ski resort. While there may only be one mountain, a ski slope can be a fitting application of an infinite server queueing model because there is essentially unlimited capacity on the slope itself. Suppose that guests arrive to the top of this mountain at rate $\lambda = 20$ skiers per hour and suppose that the run takes 12 minutes on average, meaning that $\mu = 5$ runs per hour. Then, the probability that there are no skiers currently skiing is $P(Q{=}0) = 0.14$:

$$P\left(Q=0\right)=\frac{1}{0!}\left(\frac{20}{5}\right)^{0}e^{-\left(\frac{20}{5}\right)}=0.14.$$

For a third example, imagine a hybrid of the single-server and infinite-server examples and study a multi-server queueing model. Specifically, this system has Poisson process arrivals at rate λ, exponential service at rate μ, c servers, infinite capacity, and FCFS service ordering. In this case, the sink analogy implies that we must have $\lambda < c\mu$ or else the system will be overworked. Then, it is known that the probability that the queue is empty is equal to

$$P\left(Q=0\right)=\left(\frac{1}{c!}\left(\frac{\lambda}{\mu}\right)^{c}\frac{c\mu}{c\mu-\lambda}+\sum_{k=0}^{c-1}\frac{1}{k!}\left(\frac{\lambda}{\mu}\right)^{k}\right)^{-1},$$

and using this the probability that there are k customers in the system can be calculated through

$$P\left(Q=k\right)=\begin{cases}\dfrac{1}{k!}\left(\dfrac{\lambda}{\mu}\right)^{k}P\left(Q=0\right) & \text{for } 0\le k<c,\\[2ex] \dfrac{1}{c!c^{k-c}}\left(\dfrac{\lambda}{\mu}\right)^{k}P\left(Q=0\right) & \text{for } c\le k.\end{cases}$$

While this formula is certainly more complicated, recognize familiar terms hidden inside this equation. One can note that for queue lengths smaller than the number of servers (i.e., $k < c$), the probability mass function of multi-server queue resembles that of the infinite-server queue. Similarly, for queue lengths at or above the number of servers (i.e., $k \geq c$), the multi-server probabilities resemble that of the single-server queue. For intuition on this, consider the following: when a multi-server queueing system is below its number of servers, any arriving customer immediately enters service – just like in an infinite-server system. However, above this level, there are always c servers working at rate μ, meaning that the overall system rate of service completion is $c\mu$. Since all completions happen at the same rate regardless of the number in system (provided it is above the number of servers), this is just like a single-server queue. Thus, the multi-server queue can be thought of as a type of hybrid between the infinite- and single-server queues. As an example application of this model, consider a pool bar at a resort. Suppose that there are $c = 2$ bartenders, each of whom can make $\mu = 20$ drinks per hour. Suppose that $\lambda = 30$ guests arrive to the pool bar each hour. Then, the probability that there are no customers waiting for their drinks to be made (nor any waiting to place an order) is $P(Q{=}0) = 0.14$:

$$P\left(Q=k\right)=\left(\frac{1}{2!}\left(\frac{30}{20}\right)^{2}\frac{2\times20}{2\times20-30}+\sum_{k=0}^{2-1}\frac{1}{0!}\left(\frac{30}{20}\right)^{k}\right)^{-1}=0.14.$$

Since there are no customers, this is also the percentage of time that both bartenders are idle. By comparison, the probability that both bartenders are busy but there are no guests waiting to order is $P(Q{=}2) = 0.16$.

$$P\left(Q=2\right)=\frac{1}{2!\times 2^{2-2}}\left(\frac{30}{20}\right)^2\times 0.14.$$

Each of the previous three scenarios – the concierge desk, the ski slope, and the pool bar – are examples of single-phase queueing systems, meaning that the service is conducted in one single segment. The concierge desk is a single-server, single-phase system, whereas the pool bar is a multi-server, single-phase system. In some contexts, the word "channel" may be used instead of "server," meaning that the concierge desk would be called a single-channel, single-phase system, for example. There are also many settings in which the service is conducted over multiple phases, particularly in hospitality. For example, a resort spa package may include both a massage and time in a sauna. As the guest moves from one segment to another, this constitutes moving between phases of service. If the resort spa has several masseuses and space for multiple guests in the sauna, this would be a multiple-server (or multiple-channel), multiple-phases service system.

For more general queueing models, it can be more challenging to get explicit, closed-form mathematical expressions. However, there are some powerful results that do hold in generality, as well as several practical approximations that are useful in many cases. Perhaps the most potent and ubiquitous equation in queueing theory is a formula known as **Little's Law**, which holds for very general queueing models (Little, 1961). For L as the average number of customers in system, λ as the average arrival rate, and W as the average time each customer spends in system, Little's Law states that

$$L = \lambda W.$$

What this means is that the average number of customers in a system is equal to the average rate of arrivals multiplied by the average time spent in the system. Suppose a fast-food restaurant sees an arrival rate of $\lambda = 2$ customers per minute, and each customer spends $W = 2$ minutes in line. At any given time, the average number of customers in the system will be $L = 4$ customers.

$$\begin{aligned} L &= 2 \text{ customers per minute} \times 2 \text{ minutes in the system per customer} \\ &= 4 \text{ customers in the system.} \end{aligned}$$

This general relationship is a fundamental tool in any service manager's belt, as it is often the case that two of these three quantities can be easily calculated, and this directly produces the third. Another reason for this equation's power is that beyond the full queueing system, it also holds for subsystems. Meaning, if one defines the number of customers waiting for service as a subsystem of the total number of customers, Little's Law still holds and implies that the number of customers waiting is equal to the customer arrival rate times the amount of time the customer spends waiting.

3. Psychology of Waiting

Beyond the pure mathematics of queueing theory, waiting has meaningful implications for guests of hospitality businesses. As managers consider ways to balance capacity and demand from a cost standpoint, they should also realize the effects of waiting on customer satisfaction and revenue. David Maister (1985), a noted scholar on waiting psychology, outlines eight propositions about guests' perceptions of queues:

1) **Occupied time feels shorter than unoccupied time**. In restaurants, for instance, hosts often invite guests to peruse the menu while the guests wait for their table; waiting areas may also include televisions, or guests may be directed to a bar or lounge to occupy their time.
2) **Preservice waits feel longer than in-service waits**. Guests value a sense of progress as they maneuver the customer journey. Guests arriving for a cruise will typically find the pre-boarding waits to feel longer than the wait for an escort to their cabin once they embark on the ship.
3) **Anxiety makes waits seem longer**. Imagine a passenger riding a taxi to the airport with plenty of time to spare before flight boarding. Now imagine the same ride, except the passenger is running late and risks missing their plane. The latter ride will seem remarkably longer than the former due to anxiety – specifically, anxiety about the unknown experience at the completion of the waiting period. In a similar vein, physically comfortable waits feel shorter than uncomfortable waits.
4) **Uncertain waits are longer than known, finite waits**. When calling a reservations hotline, customers will find greater satisfaction from being quoted an estimated wait time or being given their rank in line instead of waiting to the tune of endless holding music. This proposition extends to guests' learning curves: guests new to an experience will feel that waits are longer than those who have not previously queued for the experience.
5) **Unexplained waits are longer than explained waits**. Picture a guest waiting in the lobby of a hotel, waiting to register for her room. No other guests are waiting. A front desk agent acknowledges the guest but does not beckon her to approach – instead, the agent asks her to wait while they type feverishly into their computer. Without explanation, this wait will seem longer than if the agent politely explained they will serve the guest in a moment after completing the prior transaction. Building on the fourth proposition, wait transparency concerns both the duration of the wait and the reason there is a wait in the first place: answers to both will help guests clarify their expectations for the wait time.
6) **Unfair waits are longer than equitable waits**. Even if a FCFS approach is taken, exceptions may be necessary. In amusement parks, disabled guests may be afforded the opportunity to use alternate entryways to board rides safely. Independent guests may also form a single-rider line, which can be used to fill gaps when larger parties are uneven. The random onboarding of guests onto an attraction, however, can result in confusion and resentment for perceived unfair treatment.
7) **The more valuable the service, the longer the customer is willing to wait**. Thinking again about theme parks, consider that separate lines may also exist to board the

front car of a roller coaster. The distinct "rush" of adrenaline from that particular seat entices some guests to wait even longer for the special experience, even if they could board a car farther back in the train much sooner.

8) **Solo waits feel longer than group waits**. Per the first proposition, time occupied in the presence of a group of family, friends, or colleagues will seem to pass faster than time in isolation. The final proposition goes deeper, though: even if a waiting guest does not know others in the queue, the presence of others fosters a sense of togetherness that reinforces the queue discipline and validates a need to wait in the first place.

Whereas pure operations management is focused on the actual state of operations, including process throughput and service times, **perception management** is the organized approach to affecting customer perceptions.

Other psychological phenomena and behaviors should also be considered when designing queues. When customers approach a queue and make an initial estimation of queue length, they decide whether to enter the line or not: skipping the line due to perceived length is referred to as **balking**. When a customer enters a line but grows tired of waiting and exits the line, they exhibit a behavior called **reneging**. Finally, in a queue configuration with multiple lines, if the customer enters a line but subsequently moves to a different line due to a perception of shorter wait time, they are said to be **jockeying** through the lines. While neither of these scenarios is ideal for guest satisfaction, balking and reneging are particularly undesirable for the business because of the opportunity costs: in each instance, potential revenue is lost because the service experience or purchase was forfeited by the wait-weary guest.

Considering the mathematics of queueing theory, plus these psychological factors, strategies begin to emerge for successfully managing guest perceptions and coordinating the operational processes. When selecting queues in the first place, managers should satisfy four core guest needs (Rafaeli, Barron, & Haber, 2002):

1) A sense of progress toward their goal or service experience.
2) A sense of control over what is happening.
3) A desire for activity.
4) A sense of fairness with how their wait was managed.

4. Managing Queues

In addition to applying queueing mathematics and psychology, managers should also consider ways in which they can affect capacity and demand in optimal manners. The following sections outline recommended techniques that can be applied to achieve either means.

4.1. Moderating Capacity

There are two primary approaches for establishing capacity. The first is a **level capacity strategy**, through which capacity is fixed at a constant amount. Because services are

so dynamic in terms of the arrival times and processing times for customer experiences, utilization fluctuates. In times of low demand, capacity operated with a level strategy may be severely underutilized; unlike in manufacturing, where inventory can be stored until it is needed, customer experiences cannot be stored since they are co-created at touchpoints in the real-time customer journey. On the flip side, in periods of peak demand, the organization will be prone to reach its capacity – leaving resources strained and guests dissatisfied by long waits or inattentive service.

The **chase demand strategy** is the alternative to level capacity, and it involves changing capacity levels over time to accommodate demand. For example, hotel front desks or housekeeping departments may adjust staffing levels due to forecasted arrivals, departures, and occupancy levels. In restaurants, in addition to staffing adjustments for more or less popular shifts and days of the week, adjustments can be made to the kitchen inventory. Bozarth and Handfield (2008) outline three core sub-strategies:

1) The **lead capacity strategy** involves anticipating demand by adding excess capacity before the demand actually materializes. While this will do a better job of guaranteeing prompt and complete service, it is also prone to waste in cases where demand has not yet reached fuller utilization or when it does not materialize as expected. Nonetheless, this is perhaps the most common strategy for hospitality businesses because demand can be somewhat forecasted based on historical norms and reserved future business, on top of a desire by most service firms to deliver quality experiences.
2) The **lag capacity strategy** involves adding capacity after demand materializes. While this ensures better utilization of resources, it is also difficult for companies to react quickly enough: if a restaurant's business surges, it cannot expect additional cooks or servers to arrive immediately to support newly grown demand.
3) The **match capacity strategy** offers the greatest capacity utilization, because it balances the lead and lag strategies: in essence, the strategy attempts to reduce periods of high over- or under-utilization of capacity. This is the most dynamic approach to capacity management, and one of the hardest for service firms to execute because staff are not always immediately available to flex. A solution to this, however, is cross-training employees. The Ritz-Carlton, for example, engages in a practice called "lateral service": when demand is expected to peak – say with the plating of a large banquet meal, or with the cleaning of hotels rooms due to high occupancy turnover – all available Ladies and Gentlemen (the staff of The Ritz-Carlton) from any department are called upon to lend a hand and assist with less technical elements in service to the department in need.

Fig. 2 compares the various capacity management strategies.

Bordoloi, Fitzsimmons, and Fitzsimmons (2018) suggest a variety of operations tactics that can be used – individually, and in many cases in combination – to optimize the capacity and serve as many customers as possible:

1) **Maximizing efficiency during peaks**. Main tasks can be concentrated during rush hours while supportive tasks can be put off to slack times. For example,

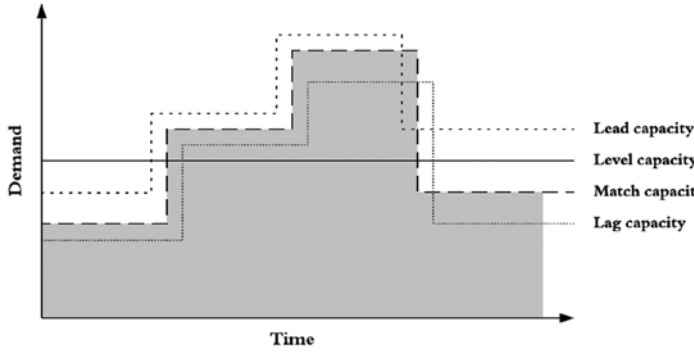


Fig. 2. Comparing Strategies for Capacity Management.

servers at restaurants can stock napkins and prepare silverware during non-meal times and focus on serving customers during meal times. Downtime, especially anticipated downtime for maintenance and training, should be planned in a way that limits hinderance on the business. Reducing setup times, or at least coordinating setup before demand peaks, can also help staff work more efficiently and move through processes with less time consumed preparing for service; in restaurants, the preparation of ingredients prior to the start of a meal period (called *mise en place*) offers a great examples. The standardization of service further plays a key role in helping to not only lessen setup time but in creating general efficiencies in business processes: service customization typically requires more robust labor, which is evidenced by the vastly different throughputs achieved by fast-food eateries versus fine dining restaurants. Of course, opportunities to automate processes should also be considered to more efficiently and effectively service customers.

2) **Scheduling work shifts**. Meeting the varying staffing requirements is possible by figuring out daily and monthly demands. Staggering shifts can help staff multiple employees at the same time during peak periods and reduce capacity during downtimes. Staggering is also helpful to ensure employees can take breaks mid-shift while still ensuring guests can be assisted.
3) **Cross-training employees**. Hospitality operations can hire less personnel and create flexibility during peak demand times by cross-training employees. Instead of handling few responsibilities, staff can manage a variety of tasks and, in turn, feel more satisfied and motivated with their job. Labor pools and job rotation are techniques that can also increase employees' collective skills and ability to lean-in and support demand spikes in certain areas.
4) **Using part-time employees and rental equipment**. When peaks are persistent and predictable, such as mealtimes at restaurants or check-in and checkout times at hotels, part-time employees can effectively supplement full-time employees. Hospitality operations often place employees on standby for peak demand times. Similarly, equipment can also be rented or leased to meet peak demands.

5) **Sharing capacity**. When capacity is underutilized due to little demand, hospitality operations can share capacity on a temporary or recurring basis. Airlines often share aircrafts, gates, baggage carousels, and ground personnel during slower seasons. UberPool is another great example, whereby the cars in the ridesharing service pick up customers along their routes to drop off other customers; this approach increases the number of seats that are occupied in each car at any given time. While it may result in longer transit times for each customer, Uber offsets this inconvenience by charging lower fares for these carpool trips.
6) **Creating adjustable capacity**. A portion of capacity can be utilized commendably through innovative design. Hotels move partitions between meeting rooms to accommodate different sizes of events and conferences and attempt to make full use of all available space. Restaurants also arrange floor plans such that they can adjust their tables and chairs to serve different party sizes as new guests arrive.
7) **Increasing customer participation**. Customers can become part of the service delivery system by employing the "self-service" concept. This is another instance where automation poses benefits. For example, customers might order directly at an ordering kiosk and pick up their food from a designated retrieval area; especially in fast-food settings, guests will usually clean their tables after dining, too. By increasing customer participation, hospitality businesses can reduce labor needs (and costs) by hiring fewer personnel, and customers can receive faster or less-expensive service.

4.2. Moderating Demand

Another capacity management strategy is actually demand management, the approach that attempts to control demand to match available capacity. The key to demand management, from a queueing standpoint, is to regulate arrival rates. Hospitality operations may attempt to smooth demand by either stimulating demand when supply is underutilized or shifting demand when demand is in excess:

1) **Scheduling and reservations systems**. Customers can make appointments for services (e.g., restaurant and hotel reservations, flight tickets, arena show or game passes, etc.) instead of arriving and taking a chance with a walk-in experience. **Virtual queueing** also exists, whereby guests obtain a place in a line but do not have to physically stand in a line: Disney, for instance, uses a service called FASTPASS that allows guests to reserve time for entering into a shorter line than the traditional queue. Six Flags takes as similar approach with THE FLASH Pass, as does Universal Studios with the Express Pass: in these two cases, the companies actually charge guests a premium fee for the use of more flexible virtual queueing systems than Disney's free model. Order-ahead services also provide a virtual queue, and they are becoming increasingly popular in the digital age: many restaurants, from Starbucks' Mobile Order & Pay

program to the Lunch and Dinner To-Go offerings at Chili's Bar & Grill, allow customer to order food and beverages and quickly retrieve them upon arrival. Reservation systems and virtual queues allow companies to anticipate – and even cap – demand.

2) **Pricing and promotion**. The entire discipline of revenue management is focused on maximizing the sales of available capacity, whether in the form of hotel room nights, dining reservations, concert tickets, or theme park admission. Offering discounts or promotional prices can grow demand from price-conscious customers, while increasing prices or charging peak or prime-time pricing can have the opposite effect. Advertising specials and promotions available in low-demand period can also help attract customers to off-peak times. When considering pricing, companies should keep in mind their service value proposition: quality service is not solely defined by the reliability of service but also guests' perceptions of the experience gained for the price paid.
3) **Complementary services**. Providing complementary services is a natural way to occupy waiting customers and expand the market. For example, restaurants distract the waiting customers during busy times by suggesting drinks at the lounge. Both the restaurant and customers benefit by such a complimentary service because the restaurant can generate additional revenue and customers do not get frustrated for having to wait in line.

Discussion Questions

1. After reading this chapter and understanding how lines form and can be mitigated, do you think companies should try to eliminate lines in every case? What should a company consider when deciding how hard it should try to get rid of waits?
2. Suppose there is a fast-food restaurant with a single cashier taking orders. On average, the cashier can transact 60 orders an hour. If three customers arrive every four minutes, typically, what is the server utilization of the cashier? What is the probability that the cashier is not serving a guest at any moment?
3. Consider a typical concierge desk at a luxury hotel. In this case, a single concierge is on-duty during any given shift, with no overlap. Usually, a concierge is in the process of assisting a guest while a line of five guests queues for service. A new customer enters the line every minute, on average. What is the average time each customer is in the "system" (waiting or being served) for receiving concierge assistance?

Case Exercises

1. When Tom opened Super-Stuffed Subs, he thought hard about the capacity of his restaurant. He bought enough grills, designed sufficient prep stations, and hired a team of staff members to cook and transact sales. He estimated that his restaurant could serve 90 guests per hour, on average. As he started operating the business, he realized that some necessary activities – like training, cleaning, and inventory prep – occupied the time of his staff and reduced

capacity to about 80 guests per hour. When he reviewed operating results after the first few months, however, he realized that his team can only serve 70 guests per hour, on average. What was his capacity utilization and efficiency, and why weren't they both 100%?

2. Suppose you are the front office manager of a busy hotel neighboring an international airport. There is a fairly steady stream of guests arriving and departing throughout the day. On average, 60 guests visit the desk every hour. Also on average, there are five guests either in line or being served at any time. What is the average amount of time it takes for guests to wait and be served?
3. Tim owns a travel agency that operates a call center to help customers plan their vacations. His current system is fairly unsophisticated. When a guest calls, they are added to a queue that gets served on a first-come, first-served basis. Until an agent answers the call, guests only hear a basic dial tone. He's been hearing complaints from guests about long wait times, but he does not have enough revenue to support the expenses of hiring additional staff. Considering Maister's propositions about queueing psychology, what other changes could Tim make to his call system that would likely improve customer satisfaction?

Managerial Challenge

Following in the footsteps of big chains like McDonald's, Tom Smith is deciding whether to implement self-service touchscreen ordering kiosks and app-based ordering for his 20-unit fast-food chain called Best Burgers. In the case of McDonald's, such kiosks returned several benefits: McDonald's claims the kiosks have an increased average check versus traditional orders at a service counter; the company also reduced the time guests wait to order (Hafner & Limbachia, 2018). While these technologies may offer a golden opportunity for the "Golden Arches," Tom is conscious that kiosk and app-based ordering pose some challenges for fast-food operators. He wonders if it will be worthwhile for Best Burgers.

Questions

Especially with respect to queueing, what issues might arise with kiosk ordering? What advice would you give Tom to ensure guest satisfaction and company profitability if Best Burgers was to implement this technology?

Added Insight

While waiting lines are typically associated with the beginning of a service experience – at check-in in a hotel, or at the host stand in a restaurant – there are many phases of guest experiences where waiting occurs. Consider the common case in restaurants where guests are waiting for attention from servers. Perhaps the guest wishes to place an order, to request utensils or condiments, to receive

the check, or to pay the check. Technology is increasingly eliminating some of these pain points. For example, Clover offers a mobile payment device that allows receipts to be presented to guests and paid at the same time – credit cards can be swiped right at the table, without the need for servers to go back and forth (Clover, n.d.). Systems like Ziosk go beyond payment and allow guests to order food, call servers, and pay immediately with tabletop tablets (Ziosk, n.d.). As technology advances, it can involve guests in greater degrees of self-service and alert staff when attention is needed. The result, often, is shorter wait times.

Question

To improve guest experiences and profitability, what considerations should a restaurant make when evaluating the use of technology like Clover or Ziosk?

Risk and Crisis Management

This chapter highlighted numerous examples of physical waiting lines, a common consequence of capacity constraints. Most of the examples pertained to waiting to begin a service (e.g., lining-up at a host stand in a restaurant) or waiting mid-service (e.g., queueing for food that's already been ordered in a fast-food or fast-casual establishment). Remarkably common examples of waits also address safety, as well.

Consider a trip to a sporting arena or music venue, a trip to a popular amusement park, or arriving at an airport or cruise terminal. In each of these situations, especially since the terrorist events of September 11, 2001, it is common for patrons to wait in line to undergo security screening with metal detectors, bag searches, and the like. From a security standpoint, these types of lines necessitate an enhanced level of queue discipline. Such lines must operate efficiently to process massive volumes of guests, and they must also ensure sufficient protocols at the service phases so that (a) no guest bypasses safety measures, and (b) all guests are fairly and thoroughly screened. As an unfortunate example, it is not uncommon that flyers must wait an hour or more at some the busiest airports in order to pass through pre-flight security or post-flight customs screenings. Continuous innovation in screening and surveillance technology, as well as the introduction of trusted traveler programs like Global Entry and CLEAR, are among measures that airports and other hospitality venues employ to expedite queueing for safety's sake.

Questions

1. While security lines are fairly ubiquitous around the world, the visible presence of security efforts in some unique places can negatively affect guest experiences. When Disney, Universal, SeaWorld, and other theme park operators introduced metal detectors for park entry around 2015, the installation for safety inadvertently upset guests: it drew their attention to the inherent risks in large social gatherings, and it deflated the escapist experience sought by many theme park goers (Barnes, 2015). How can companies in such positions

balance their duty of care for their guests with the goal of creating satisfying experiences?

2. The COVID-19 pandemic posed an interesting challenge to queueing in that many governments required "social distancing" or the physical spacing of people to allow personal radiuses that reduced the risk of disease spread. What tactics did hospitality business use to queue guests, for security purposes and otherwise, while maintaining healthy physical distance between guests?

Glossary

Actual capacity: The real capacity of a service, after omitting planned and unplanned constraints.

Arrival process: The order and timing by which customers enter a service system.

Arrival rate: The rate at which customers enter a service system.

Balking: The behavior when a customer considers but ultimately rejects waiting in line due to the perception that the outcomes of queueing are less valuable than the waiting time.

Capacity management: An organized effort to measure, control, and optimize production capacity.

Chase demand strategy: A capacity planning strategy in which capacity is adjusted to demand, versus the constant capacity levels set by a level capacity strategy.

Demand management: A capacity planning strategy in which firms attempt to moderate the arrival rate of customers, alternative to adjusting the service and production capacity of business processes.

Design capacity: The ideal capacity of a business, without taking into account planned and unplanned constraints that reduce utilization and efficiency.

Duration: The total length of time spent by each customer in a service system.

Effective capacity: The capacity of a business after removing inefficiencies and underutilization due to unplanned constraints.

Efficiency: The degree to which a business plans the use of its controllable capacity, as measured by dividing actual capacity by effective capacity.

First come, first served (FCFS): A service order in which customers are served in the order they enter the queue.

Jockeying: The behavior in a multi-queue configuration when a customer moves from one queue to another due to perceptions that the new queue will have a shorter remaining wait time than that of the original queue.

Lag capacity strategy: A chase demand capacity planning strategy in which capacity is added after demand materializes.

Last come, first served (LCFS): A service order in which the customers who most recently enter the line are prioritized for service.

Lead capacity strategy: A chase demand capacity planning strategy in which capacity is added before demand materializes, based on forecasts.

Level capacity strategy: A capacity planning strategy in which capacity is fixed, versus the dynamic capacity levels set by a chase demand strategy.

Little's Law: A theorem for queueing whereby the average number of customers in a service system is equal to the average arrival rate times the average duration of customers.

Match capacity strategy: A chase demand capacity planning strategy in which capacity is adjusted dynamically to closely match actual demand, often based on the use of forecasts.

Perception management: The use of psychology to manage customer thoughts, emotions, and behaviors.

Phase: A step in a process or queueing system where some action needs to be performed.

Poisson process: A common queueing model in which the timing and rate of arrivals are randomly distributed.

Queue discipline: The order in which customers are served in a queueing system.

Queueing theory: A branch of mathematics and operations research that studies the formation and implications of waiting lines.

Reneging: The behavior when a customer enters a queue but then leave, due to the perception that the outcomes of further queueing are less valuable than the remaining waiting time.

Server utilization: The rate at which a queue server is occupied performing a service, calculated as the arrival rate divided by the service duration.

Service agent (or server or channel): In a process, the persons or stations conducting particular stages of the service.

Yield management (or revenue management): The leverage of pricing to affect demand levels among price-sensitive customers.

Utilization: The degree to which a business plans the use of its full capacity, as measured by dividing actual capacity by design capacity.

Virtual queueing: The use of reservations, often digitally, to queue customers without needing them to be physically present in an actual line.

References

Barnes, B. (2015, December 17). Disney and other theme parks add metal detectors for holidays. Retrieved from https://www.nytimes.com/2015/12/18/business/media/disney-metal-detectors-theme-parks.html

Bordoloi, S. K., Fitzsimmons, J. A., & Fitzsimmons, M. J. (2018). *Service management: Operations, strategy, information technology* (9th ed.). New York, NY: McGraw-Hill.

Bozarth, C. C., & Handfield, R. B. (2008). *Introduction to operations and supply chain management*. Upper Saddle River, NY: Pearson Education.

Clover. (n.d.). Restaurant POS system that does it all. Retrieved from https://www.clover.com/pos-solutions/restaurant. Accessed on January 19, 2020.

Greasley, A. (2006). *Operations management*. Chichester: John Wiley & Sons Ltd.

Hafner, J., & Limbachia, D. (2018, June 7). McDonald's: You buy more from touch-screen kiosks than a person. So expect more kiosks. Retrieved from https://www.usatoday.com/story/money/nation-now/2018/06/07/mcdonalds-add-kiosks-citing-better-sales-over-face-face-orders/681196002/

Lariviere, M. A., & Van Mieghem, J. A. (2004). Strategically seeking service: How competition can generate Poisson arrivals. *Manufacturing & Service Operations Management*, *6*(1), 23–40.

Little, J. D. (1961). A proof for the queuing formula: $L = \lambda W$. *Operations Research*, *9*(3), 383–387.

Maister, D. H. (1985). The psychology of waiting lines. In J. A. Czepiel, M. R. Solomon, & C. F. Surprenant (Eds.), *The service encounter* (pp. 113–123). Lexington, MA: Lexington Press.

Rafaeli, A., Barron, G., & Haber, K. (2002). The effects of queue structure on attitudes. *Journal of Service Research*, *5*(2), 125–139. https://doi.org/10.1177/109467002237492

Stone, A. (2012, August 18). Why waiting is torture. *The New York Times*. Retrieved from https://www.nytimes.com/2012/08/19/opinion/sunday/why-waiting-in-line-is-torture.html?mtrref=www.google.com&assetType=REGIWALL

Ziosk. (n.d.). This is Ziosk. Retrieved from https://www.ziosk.com/. Accessed on January 19, 2020.

This page intentionally left blank

Chapter 9

Measuring Quality

Michelle (Myongjee) Yoo and Alec N. Dalton

Abstract

This chapter covers four main concepts: service quality, quality assurance for measurement, quality assurance for management, and service failure and recovery. The first section mainly discusses the fundamentals of service quality. The service quality gap model is also highlighted to identify the gaps between customer expectations and the actual perceptions of service at different stages of service delivery. In the second section, different measurement methods for quality assurance are demonstrated. Examples of qualitative and quantitative methods are included.
In the third section, the important management objectives of quality assurance, improvement, and control are covered. By using a combination of the quality assurance methods from the second section, hospitality operators can accomplish internal accountability, external accountability, performance improvement, and innovation. In the fourth and final section, causes and consequences of service failures are covered together with the service recovery paradox to express the implications of poor quality.

Keywords: Quality assurance; quality management; SERVQUAL; service quality; service quality gap model; service recovery

Learning Outcomes

After completing this chapter, you should be able to:

1. Describe and demonstrate the five dimensions of service quality.
2. Apply the service quality gap model to diagnose hospitality service problems.
3. Demonstrate how hospitality operations can close the service quality gaps.

Operations Management in the Hospitality Industry, 189–209

doi:10.1108/978-1-83867-541-720211009

4. Distinguish and utilize the different methods to measure service quality.
5. Identify the objectives and benefits of quality assurance for management.
6. Execute the service recovery paradox effect in accordance with service failures.

Outline

Getting Started

Four collective entities play a role in evaluating quality. The **voice of the customer** (VoC) provides feedback on how well (or not) guests' needs and requirements were satisfied, relative to their expectations. The **voice of the employee** (VoE) presents the viewpoint of service professionals, often producing valuable guidance on inefficiencies and "pain points," along with ideas for improving processes. The **voice of the process** (VoP) yields technological insights on how a process accepts inputs and transforms them into outputs. Finally, the **voice of the business** (VoB) lends a financial voice to quality. Taken together, these voices produce a multidimensional understanding of how a business is operating, and they speak to how different tradeoffs affect the guest and employee experiences and the business' operations and financial outcomes.

Measuring quality in the hospitality industry is a complex task because customers' perceptions of service quality are determined by various intangible factors. Nevertheless, why do hospitality operations attempt to measure quality? Isn't providing service with a smile enough to satisfy customers? This chapter considers the four collective entities and intends to explain the importance of measuring quality in the hospitality industry.

1. Understanding Service Quality

1.1. Dimensions of Service Quality

Service quality refers to the degree of excellence of the service. Hospitality operations constantly strive to achieve higher service quality as it ultimately leads to competitive advantage and business success. While there are various attributes that affect quality appraisal, the following breakdown represents the five dimensions against which service quality can be defined (Parasuraman, Zeithaml, & Berry, 1988):

1) **Assurance:** Assurance refers to the knowledge and courtesy of the service personnel and their ability to inspire trust and confidence. For example, a general manager at a fine dining restaurant should be competent in performing service and communicate effectively while being polite and respectful.
2) **Empathy:** Empathy refers to caring and individualized attention toward the customers. For example, a hotel front desk agent might regard a customer's urgent situation as their own problem and find a solution in an effort to support the customer's needs.
3) **Reliability:** Reliability refers to the ability to perform the promised service dependably and accurately and consistently. For example, customers expect their personal information is accurately recorded when they book their flights, and they expect flight departures and arrivals to be on time when they travel on airlines.
4) **Responsiveness:** Responsiveness refers to the willingness of the service personnel to help customers and provide prompt, timely service. For example, serving complimentary desserts at a restaurant for a table that had to wait for an exceptionally long time for their meal can turn a poor customer experience into a favorable one.
5) **Tangibles:** Tangibles consist of the appearance of facilities, equipment, personnel, and any other physical representation of the service. For example, the front desk agents at a luxury hotel should be well dressed and appear neat when guests check-in at a hotel, and the rooms should be impeccably clean.

1.2. Service Quality Gap Model

Initially, Parasuraman, Zeithaml, and Berry (1985) suggested the **service quality gap model** (Fig. 1) to conceptualize service quality, where the customer's evaluation is determined by the difference between customers' expectations and the actual perceptions of the service they received. The model proposes five gaps: Gap 1 through Gap 4 relate to the hospitality firm, while Gap 5 relates to the customer. To use the model, hospitality operators should measure each of these gaps and take steps to manage and minimize each gap.

Gap 1 (customer expectation–management perception): Gap 1 (knowledge gap) is the discrepancy between the customer's expectations of service and management's perceptions. This gap arises because management does not understand exactly what their customers expect. The reasons why this gap may occur include lack of management and customer interaction, lack of communication between service employees and management, insufficient market research, and failure to listen to customer complaints. To close Gap 1,

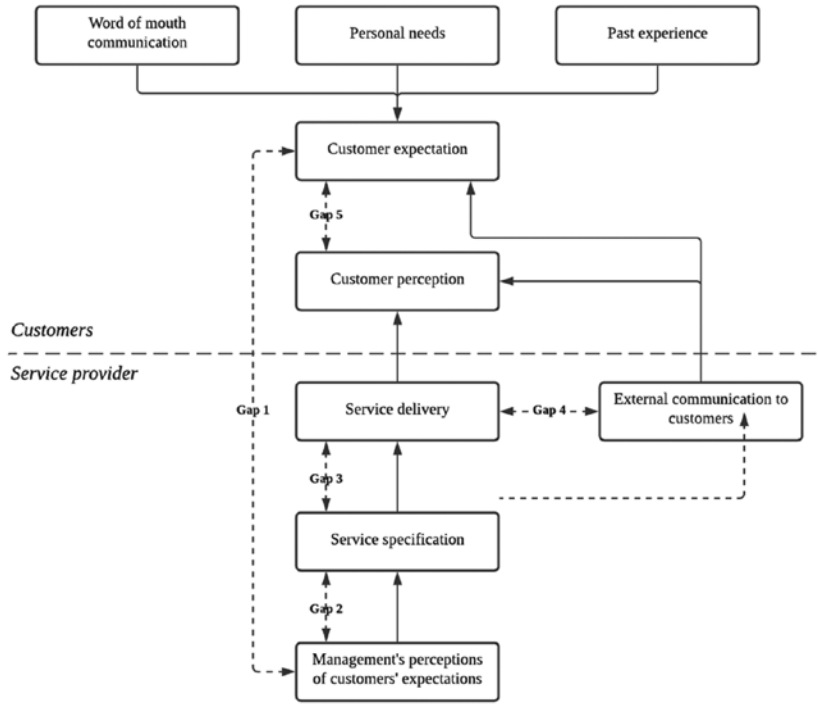


Fig. 1. The Service Quality Gap Model. *Source*: Adapted from Parasuraman, Zeithaml, and Berry (1985, p. 44).

hospitality operators can consider improving market research, encouraging communication between service employees and management, and reducing the levels of management as strategies to close Gap 1.

Gap 2 (management perception–service specification): Gap 2 (service standard gap) is the discrepancy between management's understanding of customers' needs and the translation of that understanding into the service design, such as service delivery policies and standards. The reasons why this gap may occur include lack of management commitment to service quality, lack of customer service standards, poorly defined service levels, and failure to regularly update service level standards. This gap causes customers to seek for alternatives with better service quality. To close Gap 2, hospitality operators can consider setting goals and standardizing service delivery policies, reinforcing customer-centered service standards, and measuring staff performance to close Gap 2.

Gap 3 (service standard–service delivery): Gap 3 (service delivery gap) is the discrepancy between the service standards and the actual delivery of the service. The reasons why this gap may occur include deficiencies in human resources policies, failure to match supply and demand, lack of employee training, lack of teamwork, and inappropriate job design. To close Gap 3, hospitality operators can consider implementing revenue management strategies, setting

hiring standards, recruiting and retaining customer-centric employees, educating and providing appropriate training to employees, and giving employees greater empowerment to close Gap 3.

Gap 4 (service delivery–external communication): Gap 4 (communication gap) is the discrepancy between the service performance levels and what is promised to customers through the communication mix. The reasons why this gap may occur include overpromising, lack of coordination between the operations and marketing team, and lack of control and employee training. This gap leads to customer dissatisfaction and further causes customers to turn to alternatives. To close Gap 4, hospitality operators can consider developing a clear line of communication between all related departments (e.g., marketing intermediaries, operations), involving employee input into promotions campaigns, managing realistic customer expectations, and consistently delivering service to the stated and promoted standards to close Gap 4.

Gap 5 (service expectation–service perception): Gap 5 (customer satisfaction gap) is the discrepancy between customers' expectations and perceptions. When expectations are exceeded, service is perceived to be exceptional and customers are satisfied. However, when expectations are not met, service is perceived to be unacceptable and customers are dissatisfied. This gap can occur because of one of the other four gaps or simply because the customer misinterprets the service quality. Hospitality operators can only close Gap 5 by closing the other four gaps.

2. Quality Assurance for Measurement

A famous leadership expression, often attributed to the guru Peter Drucker, asserts that "What gets measured gets managed." Indeed, effective quality management begins with measurement. The American Society for Quality quotes the International Organization for Standardization when defining **quality assurance** as the "part of quality management focused on providing confidence that quality requirements will be fulfilled" ("Quality Assurance vs Quality Control," n.d.). Tangentially, **quality control** refers to the "part of quality management focused on fulfilling quality requirements." With respect to services, quality assurance measures the degree to which an experience conforms to business standards and customer expectations; quality control encompasses the ability of the organization to manage the consistency of execution and to move the experience closer to the expectations (a practice known as **quality improvement**). Together, quality assurance, improvement, and control form the basis of a **quality management system**. Although measuring quality assurance in the hospitality industry is often more complex due to its characteristics of intangibility and inseparability, different methods and tools are introduced below. The methods that follow include those that are closely associated with customer satisfaction, loyalty, growth, and profitability as an indicator of achieving quality assurance.

2.1. Surveying

Surveying is one of the most common methods of quality assurance in the hospitality industry. Benefits include the ability to receive volumes of responses for limited distribution effort and development cost. Risks, conversely, include an array of cognitive biases that affect the truthfulness of responses; consumers also face survey fatigue due to the abundance of questionnaires they are asked to complete, and this can diminish response rates. To combat these risks, operators should leverage the expertise of marketing researchers to develop effective survey programs.

The questions on a survey should thoughtfully gather desired information about the guest experience, especially with respect to satisfaction. Three groups of questions are particularly common:

1) Questions about the **terminal experience** address the outcomes of the experience, and the experience process in its totality. An example of this would be to ask a guest to rate their overall satisfaction on a scale from "extremely satisfied" to "extremely dissatisfied." Another example might ask about a guest's emotional satisfaction, such as how well the firm personalized the experience on a scale from "no personalization" to "entirely personalized."
2) Questions about **instrumental experiences** address different touchpoints and moments of truth in the customer journey. An example is a question asking a hotel guest for their satisfaction with the cleanliness of the guestroom. Asking whether guests experienced any problems would also be considered instrumental.
3) Questions about **segmentation**, especially about geographics (where a guest lives) and demographics (other respondent variables like age, income, family size, etc.), may also help to qualify survey responses and allow the firm to segment feedback based on certain groups of guests. This is especially helpful for understanding the satisfaction of target markets. Note that psychographic and behavioral questions – two other dimensions for segmentation – are not common for operations-related surveys but may be valuable if a joint survey is being used for both operations and marketing research.

Multiple question types are also relevant for different purposes. Questions primarily fall into two groups: open-ended questions provide space for entering a free-text response, and closed-ended questions provide a finite list of response options. Closed-ended questions, in turn, have two main types: categorical questions are used to count responses, and they include multiple choice and binary questions (yes/no, true/false, etc.); interval or ratio questions allow respondents to assign rankings or ratings to questions along some scale.

2.2. SERVQUAL

Instead of totally inventing a new survey, operators can leverage commonly used survey questions that are generally applicable across service industries. Presented by Parasuraman, Zeithaml, and Berry (1988), **SERVQUAL** is a survey instrument

that measures service quality. It is a multi-item assessment that measures the five dimensions of service quality in a total of 22 statements using a seven-point Likert scale. Table 1 illustrates the items included in the SERVQUAL questionnaire. Developed based on the service quality gap model, the survey contains expectation statements with matching perception statements. The score of service quality is computed by calculating the difference between the ratings of customers' expectations and perceptions, where a higher score indicates higher-quality service. By averaging the score for each dimension, hospitality operators can also determine which area has poor service quality (indicated by a lower score) and needs attention for improvement.

Table 1. SERVQUAL Questionnaire Items.

Dimension	**Questions**
Assurance	Employees are trustworthy.
	Employees are polite.
	Instill confidence in customers.
	Customers feel safe in their transactions.
Empathy	Give customers personal attention.
	Deal with customers with care.
	Understand customer needs.
	Have the customer's best interest at heart.
	Operate at convenient hours.
Reliability	Dependable in handling customers.
	Reassuring when problems arise.
	Deliver service timely.
	Deliver service as promised.
	Maintain error-free records.
Responsiveness	Inform customers when service will be performed.
	Provide prompt service.
	Willing to help customers.
	Respond to requests promptly.
Tangibles	Neat and professional appearance.
	Equipment is up to date.
	Facilities are visually appealing.
	Materials associated with service are visually appealing.

2.3. Customer Engagement

Customer engagement, which is one of the most powerful predictors of customer loyalty, is all about the interactions between the customer and the hospitality firm. Developed by Gallup Consulting, the **CE**[11] is a survey tool that measures customer engagement using a metric with a total of eleven questions as presented in Table 2 (Gallup Consulting, 2009):

These questions are measured on a three-point scale (−1 = "I don't agree," 0 = "I'm not sure," and 1 = "I agree"), and the summed values range from −11 to 11 (23 points). Based on these responses, customers can be classified into the following four categories:

1) Fully engaged: those who are emotionally attached and behaviorally loyal;
2) Engaged: those who are in the beginning level of feeling emotionally attached;
3) Disengaged: those who are emotionally and behaviorally neutral; and
4) Actively disengaged: those who are emotionally detached.

CE[11] demonstrates the link between customer engagement and business performance: fully engaged hotel customers spend 46% more per year than actively disengaged customers, and fully engaged casual restaurant customers make 56% more visits than actively disengaged customers. The tool suggests a healthy ratio of fully engaged customers and actively disengaged customers is 8:1. Hospitality

Table 2. CE[11] Questionnaire Items.

Questions	**Category**	
Overall, how satisfied are you with [*Brand*]?	Rational loyalty	Emotional attachment
How likely are you to continue to choose/repurchase [*Brand*]?		
How likely are you to recommend [*Brand*] to a friend/associate?		
[*Brand*] is a name I can always trust.	Confidence	
[*Brand*] always delivers on what they promise.		
[*Brand*] always treats me fairly.	Integrity	
If a problem arises, I can always count on [*Brand*] to reach a fair and satisfactory resolution.		
I feel proud to be a [*Brand*] customer.	Pride	
[*Brand*] always treats me with respect.		
[*Brand*] is the perfect company for people like me.	Passion	
I can't imagine a world without [*Brand*].		

operations can utilize the engagement ratio as a macro-level indicator for improving and managing customer engagement as a key driver to business success.

2.4. Net Promoter Score

Offered by Reichheld (2003), the **Net Promoter Score (NPS)** is a decisive survey tool to measure customer's overall satisfaction with a company's service and the customers' loyalty to the brand. NPS is an index ranging from −100 to 100, and it can be easily calculated by asking a single question to customers: "How likely are you to recommend our company to a friend or colleague?" The question is asked on a scale that ranges from 0 (not likely at all) to 10 (extremely likely). Based on the rating scores, customers are classified into three categories: promoters (9–10 rating), passives (7–8 rating), and detractors (0–6 rating). NPS is determined by the ratio of **promoters** to **detractors**. For example, if 60% of respondents were promoters and 20% were detractors, the NPS is 40 (60 − 20). The equation of NPS is expressed as follows:

$$\text{NPS} = \frac{\text{Number of promoters}}{\text{Number of total respondents}} - \frac{\text{Number of detractors}}{\text{Number of total respondents}}.$$

NPS outcomes vary widely by industry. Generally, an **NPS** above 0 is considered "good," and over 50 is considered "excellent." According to the US Consumer 2019 Net Promoter Benchmarks Study (NICE Satmetrix, 2019), the average for airlines scored 39, hotels scored 36, and travel websites scored 18. The leaders of these industries are Southwest (71), The Ritz-Carlton (68), and Airbnb (44). Companies with higher NPSs are more likely to grow faster and are more successful.

2.5. Auditing, Inspecting, and Mystery Shopping

While services are highly variable, standardization helps to achieve some degree of consistency and reliability. Interchangeably, companies can use processes called **audits, inspections,** or **mystery shops** to observe the guest experience and evaluate standards in a holistic manner. Consider especially that guests may not be aware of a firm's standards, and thus they may not even know that a standard is or is not being executed properly: if a casino uses branded floor mats at entryways, but they go missing for a period of time, would a guest recognize (1) that there should be mats present and (2) that those mats should even be branded? An auditor with knowledge of that standard, however, would easily catch the omission.

Several key considerations should be made when developing an inspection program. One of the most significant decisions involves who conducts the audit. A company may choose to do so internally, perhaps with a manager inspecting their team: a front office manager in a hotel, for example, could observe her staff deliver check-in experiences and take note of compliance to standards. Obviously, the staff may be conscious that an observation is taking place and may make deliberate efforts to perfect their service delivery when they see a manager

watching them. Hiring an external mystery shopping company is one way to overcome this challenge, by employing an anonymous auditor to observe the service experience and report their findings to the firm. A critical consideration when hiring external shoppers is that they be sufficiently trained in the precise standards. Mobile technology is making this easier, since auditors (both internal and external) can now use cell phones to reference standards and record performance more subtly than carrying a clipboard or checklist, and they can do so more accurately than trying to remember performance and logging results when they are unseen by staff. In a similar vein, a final core consideration is whether audits are announced or unannounced: in the former case, staff are informed that an audit will occur and are apt to change their behavior to ensure compliance. On the other hand, unannounced audits occur more spontaneously – often with disguised auditors; consequently, they require operators to expect an audit at any time. These foundational considerations can help a firm establish the nature of an audit program.

Once audits occur, it is important that results get digested by both managers and frontline staff. This informative feedback should be critically reviewed to praise compliance and to root out noncompliance with process changes and employee retraining. Unless action is taken based on audit results (or based on any type of feedback, really), process and performance outcomes will remain uncontrolled.

2.6. Alternative Tools and Methods

The following methods are also commonly used by hospitality business to capture feedback from guests via public sources. According to a 2015 study by New York University and the online reputation management company TrustYou, 95% of survey respondents report reading travel reviews prior to booking trips (Ady, 2015). More recently, a 2018 survey by TripAdvisor revealed 94% of US diners are influenced by online reviews (Guta, 2018). Clearly, word of mouth provides a pervasive sounding board for the hospitality industry.

1) **Social media:** Travel advisory sites like TripAdvisor, Yelp, and OpenTable specialize in capturing and sharing hospitality-related feedback on hotels, restaurants, and other experiences. Across all industries, platforms like Facebook and Instagram also curate ratings and reviews for business. Companies can look to this data as a source of customer feedback, and particular attention should be placed on **online reputation management**: since the ratings and reviews can be seen by potential customers deliberating on which service providers to patron, care should be taken to respond diplomatically to feedback (especially negative feedback); the best way to reduce the likelihood of post-experience negative reviews is to learn about guests' issues and resolve them while the experiences are still underway and before the guests leave the premises.
2) **Proprietary reviews:** In the hospitality industry, some professional organizations offer recommendation guides to provide an independent review

based on standards of various rigor. Many of these guides emerged from companies attempting to promote leisure travel: the American Automobile Association (AAA) inspections and diamond ratings, the Forbes Travel Guide (originally the Mobil Travel Guide) star ratings, and the Michelin Guide (by automotive tire manufacturer Michelin) star ratings are among the most reputable sources of hotel, restaurant, and spa reviews. Magazines often popularize travel recommendations, such as *Travel + Leisure*'s annual "World's Best Awards" and *Conde Nast Traveler*'s "Readers' Choice Awards." With corporate angles, some marketing research agencies also rate entire companies and brands, as is the case with J.D. Power's "North America Hotel Guest Satisfaction Index Study" and "Airline Loyalty Program Satisfaction Study." Many of these guides offer the reviewees – often for a fee – detailed reviews and notes on compliance with the given guide's standards. While these proprietary reviews may not provide as many datapoints as social sites with thousands of reviews, they can still be valuable references for benchmarking the competitive landscape along comparable standards.

3. Quality Assurance for Management

Recall the phrase from the beginning of the last section: "What gets measured gets managed." Using a combination of the quality assurance methods previously outlined, service firms can accomplish several important management objectives.

3.1. Internal Accountability

Within the firm, managers and frontline staff can be held accountable for their performance. For example, a mystery shop may reveal that housekeepers consistently forget to refresh the bath amenities for stayover guests. The housekeeping manager should be held responsible for improving the training and supervision of his or her staff to ensure compliance. On the other hand, survey results may indicate that a particular restaurant server consistently delivers exceptional dining experiences: the manager of that team member ought to praise the server to both encourage continued success and to provoke other servers to mirror the favorable behaviors. The consequences of accountability include both improvement opportunities and recognition.

3.2. External Accountability

Social and proprietary review sites, as well as total market quality surveys and customer panels, give a firm a sense of the public perception of the firm's service quality. Consumers will inherently hold the firm accountable for improving quality with the volume of purchases (and repurchases). Firms with poor or inconsistent quality are likely to see customers desert the business, consequently losing revenue opportunities.

3.3. Performance Improvement

In every case, feedback should be reviewed and acted upon. As outlined at the beginning of this chapter, feedback can come from customers, employees, processes, or the business at-large. Once actual performance is known, it should be compared with expected performance and efforts should be made to match the two. The service quality gap model can help with this appraisal.

3.4. Ideation and Innovation

Periodically, standards should also be assessed with evolving customer expectations to ensure the firm's offerings stay relevant versus competitors and consumer preferences. Feedback can be a tremendous source for innovative ideas. Firms should identify ways to reduce pain points that cause guest problems and create frictional experiences. Companies may also receive unsolicited opinions from guests who suggest alternative ways to deliver services. Some firms, like Starbucks, even invite customers to share ideas in an unsolicited manner ("What's Your Starbucks Idea?", n.d.). In any form, feedback is a gift that firms should capture and consider.

4. Service Failures and Recovery

Service problems, also known as defects, are a natural consequence of the variability and human-oriented nature of services. While many organizations seek defect-free guest experiences, it is immensely difficult for hospitality businesses to totally eliminate all problems. This section considers where problems come from, and how to resolve them systematically.

4.1. Causes of Guest Problems

Kandampully and Solnet (2015) outline four sources of problems:

1) **The service itself**, whereby the offering was delivered incorrectly or in an unsatisfying fashion. For example, an overbooked restaurant may not be able to honor a dining reservation. In a hotel, a carpet may be found with stains.
2) **The service provider**, that is to say the manner in which service professionals engage with guests. Staff attitude and responsiveness to guest concerns are common forms of this failure.
3) **The service environment**, in which factors beyond the control of the firm affect guest perceptions. This should not be confused with facility issues, which relate to the service itself. Instead, consider that noisy construction in the neighborhood may impact guests' ability to enjoy rest and relaxation in a hotel.
4) **The customer**, which involves two dimensions. On the one hand, a customer can cause his own problems: failing to notify a hotel of an arrival delayed by a day may prompt the hotel to resell the room to another guest. Alternatively, customers may cause each other problems: odorous guests on airplanes and belligerent guests in bars are notorious examples of unpleasant experiences

Server Errors	Customer Errors
Task:	*Preparation:*
• Doing work incorrectly • Doing work not required • Doing work in the wrong order • Doing work too slowly	• Failure to bring necessary materials • Failure to understand the role in transaction • Failure to engage the correct service
Treatment:	*Encounter:*
• Failure to acknowledge the customer • Failure to listen to the customer • Failure to react appropriately	• Failure to remember steps in the process • Failure to follow the system flow • Failure to specify desires sufficiently • Failure to follow the instructions
Tangible:	*Resolution:*
• Failure to clean facilities • Failure to provide clean uniforms • Failure to control external factors • Failure to proofread documents	• Failure to signal service failures • Failure to learn from experience • Failure to adjust expectations • Failure to execute post-encounter action

Fig. 2. Common Types of Service Failures. *Source*: Adapted from Chase and Stewart (1994, pp. 35–44, cited in Bordoloi, Fitzsimmons, & Fitzsimmons, 2018)

that result from no direct fault of the firm, but that affect another customer's perception of their own service experience.

Building on research by Chase and Stewart, Bordoloi, Fitzsimmons, and Fitzsimmons (2018) further illustrate some of the common errors made by servers and customers, respectively.

Ultimately, service problems reflect breakdowns in service processes which impact guest satisfaction. Effort should be made by organizations to learn from problems and systematically prevent them from recurring in the future.

4.2. Consequences of Guest Problems

Problems – and poor quality in general – have meaningful business impacts. The **cost of quality (COQ)**, also known as the **cost of poor quality (COPQ)**, is a framework that outlines four groups of problem-related financial implications (Cost of Quality, n.d.):

1) **Appraisal costs** involve the costs to measure and monitor quality. These include audit costs and supplier verification costs.
2) **Internal failure costs** are operating expenses incurred when companies take internal measures to resolve issues in the guest experience. Examples include rework, scrap, and other waste from inefficient processes or lacking internal communications.

3) **External failure costs** are incurred when resolving issues detected by customers. Rebates and returns, as well as recovery efforts, are common in the industry. An example would be a complimentary ("comp") meal in a restaurant if food or service is underwhelming to the guest.
4) **Prevention costs** include the expenses related to quality improvement and control efforts. Examples include the costs of training, standards development, and ongoing quality assurance.

Overall, the equation of COPQ is expressed as follows:

$$\text{COPQ} = \text{Appraisal costs} + \text{Internal failure costs} + \text{External failure costs} + \text{Prevention costs}$$

Hall (1990) further distinguishes these costs in three types:

1) **Hard costs** require a direct expense by the firm, such as when a hotel offers an amenity, voucher, or rebate as compensation to recover the guest.
2) **Soft costs** require an expense by the firm, but they are indirect from the guest. For instance, if a restaurant host mistakenly escorts guests to a table that is already occupied, the host will need to spend time and effort identifying a new table for the guests. Rework is a common form of soft cost.
3) **Opportunity costs** are "future sales lost as a direct result of the error." The firm may not have an expense, but the firm loses potential revenue. If a hotel is oversold and a guest is walked to another hotel, the original property loses the revenue that the guest may have provided for the room rental, food and beverage purchase, and miscellaneous expenses (in this example, the hotel may also incur a hard cost if they offer to pay for the guests' accommodations elsewhere; labor by a front desk agent to locate a hotel with available rooms would be considered a soft cost).

As the last example highlights, a single incident can have multiple costs. In some instances, problems can also cause a cycle of related, contingent problems: if a hotel guest has issues with bathroom plumbing, informs the phone operator, but no action is taken by the hotel, the guest has now experienced two issues: (1) the original plumbing issue; and (2) the subsequent service failure when a reported issue went unaddressed; the dissatisfaction of the guest will rise exponentially until all issues are resolved. This example highlights an effect called **conditional spillover** and demonstrates the importance of prompt, complete service recovery.

4.3. Resolution of Guest Problems

Heskett, Sasser, and Hart (1990) identify three key "moments of truth" for service recovery breakdowns:

1) When the service defect occurs in the first place.
2) When the server does not proactively identify and resolve the service defect in advance of guest feedback.
3) When the guest provides feedback but it goes unresolved.

In hospitality, all feedback is helpful feedback. By listening to the voice of the customer, operators can understand guests' individual and collective needs, resolve immediate issues, and correct systemic dissatisfiers. Service recovery with each incident is important, as is system-wide improvement.

At each of these stages, and desirably in the earlier moments versus the later ones, service providers should take action to avoid negative outcomes and promptly and completely ensure guest satisfaction. **Closed-loop feedback** describes the process by which guest feedback in general gets acknowledged by the service firm. Especially if the firm misses the three moments of truth before a guest completes a survey, posts a review on social media, or shares the issue in some other way, the firm should ensure it connects with the customer for service recovery. Some research suggests a phenomenon referred to as the **service recovery paradox**, "a situation in which [ultimate] customer satisfaction [following a problem] can exceed prefailure satisfaction" (McCollough & Bharadwaj, 1992). While this is not a universal phenomenon, certainly being affected by the severity of the issue and the service firm's response strategy, in some instances the paradox can result in advantageous satisfaction and loyalty.

As problems arise, companies can respond in various ways. Bordoloi, Fitzsimmons, and Fitzsimmons (2018) outline four main approaches to doing so:

1) **Case by case:** As guest complaints arise, address each one individually and uniquely.
2) **Systematic response:** Implement protocol to offer consistent responses when particular problems reoccur.
3) **Early intervention:** For consistent problems, attempt to resolve the common cause(s) and prevent the defects from occurring.

4) **Substitute service recovery:** Offer a solution to a competitors' problem and win their customers (for instance, a restaurant close to a busy competitor may try to attract guests unwilling to wait).

Operators should consider the costs of quality when determining appropriate resolutions for problems. Balancing the costs of quality with the benefits of customer satisfaction (e.g., loyalty, returns, referrals, etc.) is necessary for profitability.

Discussion Questions

1. Select a hospitality organization of your choice and apply the service gap model to diagnose hospitality service problems. Discuss and suggest the solutions that can close the service quality gaps for the hospitality organization you selected.
2. Table 3 illustrates the mean SERVQUAL questionnaire scores for an upper-upscale hotel, listed for each dimension. Discuss which areas have the worst service quality and list examples of how the hotel can improve them.

Table 3. SERVQUAL Questionnaire Mean Scores.

Dimension	Expectation Mean	Perception Mean
Assurance	4.27	3.54
Empathy	4.55	3.63
Reliability	4.49	3.76
Responsiveness	4.63	3.88
Tangibles	4.71	4.12

3. Table 4 illustrates the different types of costs that were incurred at a casual dining restaurant for the month of May. Classify all of the different costs into the four categories and calculate the cost of poor quality. Finally, discuss what are some strategies that can drive down the cost of poor quality.

Case Exercises

1. Mrs. Smith is looking for a fun restaurant to try in her area, and she searches for reviews online. Photos from Candy Bar catch her eye as she sees examples of extravagant milkshakes enjoyed by diners. She is particularly intrigued by a rave review of a chocolate milkshake adorned with candy bars, brownies, and a price of only $5.00! She visits Candy Bar, only to be disappointed: the same milkshake is now $15.00, and – despite the menu stating otherwise – there is no brownie on top of her shake. According to the service quality gap model, what gaps did Mrs. Smith experience?
2. At Hotel Greene, 50% of the departed guests are considered Promoters via the NPS survey system. At Hotel Bleu, 60% of the departed guests are considered promoters. Both hotels have an NPS of 30%. How is this possible?

Table 4. Different Types of Costs for a Casual Dining Restaurant.

Cost Category	Amount
Marketing	$1,000
Purchasing failure	$1,000
Salary	$42,000
Quality planning	$0
Operational appraisals	$0
Rework	$500
Inspections and tests	$1,500
Rent	$11,000
Quality audits	$0
Scrap	$250
Customer complaint adjustments	$1,000
Warranty charges	$500
Miscellaneous quality evaluations	$200
Operations failure	$2,500
Employee training	$2,000

3. Suppose that a hotel has been oversold for a night, with five reservations that cannot be accommodated. Consequently, five guests are "walked" to a nearby hotel. The original property offers to pay for transportation to and from the new hotel, for the nightly rate at the new hotel for that evening, and for a complimentary night back at the original hotel for a future night. Identify the costs of poor quality and determine what type of costs they are.

Managerial Challenge

As the first midscale hotel brand in its segment, XYZ Hotels introduced a new complimentary breakfast experience for guests with enhanced service across its more than 1,000 units in the United States. This new, complimentary offer was designed to exceed guests' expectations with the new breakfast experience featuring fresh, healthy, and delicious offerings with an innovative approach inspired by modern culinary trends. For example, it includes (1) the classic hot and savory breakfast menu items, (2) fresh-baked pastries and waffles or pancakes with flavor options to satisfy their sweet tooth, and (3) a variety of on-the-go options, such as pressed juices, smoothies, or breakfast bars that are perfect for busy morning guests. However, the new complimentary breakfast offer faces several challenges: using brand standards, how can XYZ Hotels implement high-quality service across the country at the same time?

Question

To achieve desired standards and outcomes, how would you recommend the hotel managers ensure the quality of this new breakfast experience across the country?

Added Insight

In the hospitality industry, the success of the franchise model is contingent on quality assurance. Franchisors extend their standards to franchisees both for uniformity and continuity (Judd & Justis, 2008). In franchise agreements, franchisors will stipulate the methods for quality assurance and the expected performance levels. Guest satisfaction surveys and mystery shops are among the most common methods used by franchisors to evaluate franchisee operations. Penalties for noncompliance will also be outlined and may range progressively from remedial training to fines to franchise termination (also known as disenfranchisement or, in the hotel business, deflagging). Franchisors need to maintain the consistency of the franchise brand, and franchisees fulfill a contractual obligation to uphold a certain level of performance.

Question

Select a hospitality brand that acts as a franchisor and research their operations. How does the company use quality assurance techniques to monitor and control franchisee performance?

Risk and Crisis Management

There has been a recent, noticeable rise in extremist organizations or hate groups, and there are over 1,000 hate groups now active in the United States. These groups advocate and practice hatred, hostility, and violence toward a variety of classes of people ("Hate Groups Reach Record High", 2019). Within the hospitality industry, businesses may encounter situations where they have to serve customers who are related to these types of groups. While some argue that business owners have the right to refuse service to specific people, others dispute that the service industry is obligated to serve everyone – even those with different political viewpoints.

Recently, an incident that happened at a bar known as a local hot spot in Los Angeles County spread through social media and sparked excessive attention. A group of customers asked the staff not to serve the members of a hate group who were hanging out at the bar. However, the staff refused to remove them and the two groups ended up getting into a fight. The confrontation between the two parties went viral on social media and the bar received massive amounts of negative reviews and calls for a boycott. People thought the bar deliberately supported the racist group by doing nothing. Although the bar announced that they did not support the hate group on their Facebook page afterward, they were heavily criticized for not proactively removing them. The bar tried to restore its image by announcing that they would screen patrons and prohibit any hate groups from

being on the premise, and by hosting a community benefit event to assure the public that they cared about the community. Despite all these efforts, the bar could not reestablish their destructive reputation and ended up closing down.

The advancement of social media has increasingly affected the hospitality industry. Nevertheless, consequences may not always be positive or beneficial for the businesses. Such a small, politically motivated incident would have gone unknown to the public a couple of decades ago. Nowadays, however, even small happenings can reach numerous people – and anyone can communicate in a heated discussion about an action through social media. Due to the unique characteristics of the hospitality industry, such as its high interaction with customers and publicly visible service encounters, businesses in the industry can find themselves in difficult spots and in the midst of heavy coverage on social media. Thus, critical questions emerge: why does the action of a hospitality firm matter? And how should hospitality leaders handle such situations?

Questions

1. As the owner, how would you manage social media that contains negative opinions about the bar/organization?
2. What are some possible strategies to restore the image of the bar/organization?

Glossary

Appraisal costs: Costs associated with the measurement of quality, such as auditing expenses.

Audits (or inspections or mystery shops): A technique to evaluate whether operations meet quality standards, in which an inspector (typically disguised) simulates a customer experience and compares the journey and outcomes to company requirements.

CE[11]**:** A survey instrument developed by Gallup that evaluates customer engagement.

Closed-loop feedback: The act of a service provider responding to customer feedback, such as replying to survey responses, in order to assure the customer that their voice has been heard and to offer resolution to any lingering problems.

Conditional spillover: The effect one part of an experience has on subsequent parts of the experience, typically with respect to defects and problems (e.g., a guest detecting hair in a hotel bathtub may become more sensitive to cleanliness lapses elsewhere).

Cost of quality (COQ or cost of poor quality): The sum of costs associated with the maintenance or failure of quality.

Customer engagement: The interactions between the customer and a service provider.

Detractors: Customers who do not favor or reject a particular brand or company.

External failure costs: Costs incurred to compensate the guest for the resolution of a problem.

Hard costs: Actual expenses associated with the cost of quality.

Instrumental experience: An event in the customer journey, such as a specific service touchpoint or moment of truth.

Internal failure costs: Costs to the business, unseen by guests, that support the resolution of a guest's problem.

Net Promotor Score (NPS): A management tool that measures the ratio of promoters to detractors.

Online reputation management: Efforts to control public perceptions of a service by encouraging positive word of mouth, disincentivizing negative publicity, and responding to the latter when it arises.

Opportunity costs: The loss of potential future sales as a consequence of problem incidence.

Prevention costs: Expenses in process improvements to eliminate or reduce the risk of future problems.

Promoter: Customers who endorse and sponsor a particular brand or company.

Quality assurance: Management efforts to measure and assess operations processes and outcomes relative to quality requirements.

Quality control: Management efforts to meet quality requirements through orderly operations processes.

Quality improvement: Management efforts to move current operations performance toward more efficient or effective levels, in line with (or exceeding) quality requirements and customer expectations.

Quality management system: An organized approach for measuring, improving, and controlling quality levels.

Segmentation: Attributes of customers (e.g., age, income, postal code, hobbies, travel purposes) that allow customers to be grouped based on similarities.

Service quality: The degree of excellence of the service.

Service quality gap model: A framework to identify and resolve potential service quality gaps.

Service recovery paradox: A phenomenon that occurs when effective problem resolution results in stronger customer engagement post-failure than pre-failure.

SERVQUAL: A survey instrument that measures service quality.

Soft costs: Efforts to reduce or respond to poor quality with no direct financial expense.

Surveying: The use of questionnaires to understand guests' (and sometimes employees') perceptions and expectations of service quality.

Terminal experience: The cumulative customer journey, especially with respect to overall perceptions and satisfaction.

Voice of the business: Feedback, especially of a financial nature, from the ultimate business results.

Voice of the customer: Feedback from customers about their service experience.

Voice of the employee: Feedback from employees about their work experience and about their customers' experiences.

Voice of the process: Feedback from technology about the effectiveness and efficiency of business processes.

References

Ady, M. (2015). Understanding which hotel attributes prompt travelers to book. Retrieved from https://www.trustyou.com/blog/research/understanding-which-hotel-attributes-prompt-travelers-to-book

Bordoloi, S. K., Fitzsimmons, J. A., & Fitzsimmons, M. J. (2018). *Service management: Operations, strategy, information technology* (9th ed.). New York, NY: McGraw-Hill.

Cost of Quality. (n.d.). Retrieved from https://asq.org/quality-resources/cost-of-quality

Gallup Consulting. (2009). Customer engagement: What's your engagement ratio? Retrieved from file:///Users/myoo/Down\loads/Customer%20Engagement%20Ratio%20Brochure.pdf

Guta, M. (2018). 94% of diners will choose your restaurant based on online reviews. Retrieved from https://smallbiztrends.com/2018/06/how-diners-choose-restaurants.html

Hall, S. J. (1990). *Quality assurance in the hospitality industry*. Milwaukee, WI: ASQC Quality Press.

Hate Groups Reach Record High. (2019, February 19). Retrieved from https://www.splcenter.org/news/2019/02/19/hate-groups-reach-record-high

Heskett, J. L., Sasser, W. E., & Hart, C. W. L. (1990). *Service breakthroughs: Changing the rules of the game*. New York, NY: The Free Press.

Judd, R. J., & Justis, R. T. (2008). *Franchising: An entrepreneur's guide* (4th ed.). Mason, OH: Cengage Learning.

Kandampully, J., & Solnet, D. (2015). *Service management principles for hospitality and tourism* (2nd ed.). Dubuque, IA: Kendall Hunt.

McCollough, M. A., & Bharadwaj, S. G. (1992). The recovery paradox: An examination of customer satisfaction in relation to disconfirmation, service quality, and attribution based theories. In C. T. Allen (Ed.), *Marketing theory and applications* Chicago: American Marketing Association.

NICE Satmetrix. (2019). NICE Satmetrix 2019 consumer net promoter benchmark study. Retrieved from https://www.satmetrix.com/wp-content/uploads/2019/04/2019-Benchmarks.pdf

Parasuraman, A., Zeithaml, V., & Berry, L. L. (1985). A conceptual model of service quality and its implication for future research. *The Journal of Marketing*, *49*(4), 41–50.

Parasuraman, A., Ziethaml, V., & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, *62*(1), 12–40.

Quality Assurance vs Quality Control. (n.d.). Retrieved from https://asq.org/quality-resources/quality-assurance-vs-control

Reichheld, F. (2003). The one number you need. *Harvard Business Review*, *81*(12), 46–54.

What's Your Starbucks Idea? (n.d.). Retrieved from https://ideas.starbucks.com/

This page intentionally left blank

Chapter 10

Improving Effectiveness and Efficiency

Susan L. Hyde and Paul J. Bagdan

Abstract

This chapter covers total quality management (TQM) with respect to the Lean and Six Sigma methods used to improve the effectiveness and efficiency of hospitality operations. In the first section, TQM is discussed. In the second section, Lean and Six Sigma techniques are examined individually. Then, Lean and Six Sigma are connected with an example of a housekeeping case study that applies both methodologies. In the third section, business analytics are explored and statistical process control analysis is demonstrated using a hotel room cleanliness example. The fourth section summarizes the concepts of change management, which is critical for embracing the philosophies of TQM. Finally, project management is discussed in the fifth and last section.

Keywords: Total quality management; DMAIC; Lean; project management; change management; Six Sigma; quality

Learning Outcomes

After completing this chapter, you should be able to:

1. Comprehend the concept of total quality management.
2. Denote the basic tenets of Lean techniques.
3. Describe the methodology of the Six Sigma DMAIC process and supporting statistics.
4. Relate the techniques of Lean and Six Sigma to an industry operational challenge.
5. Explain the cost of poor quality.
6. Outline many of the elements essential to leading organizational change.

Operations Management in the Hospitality Industry, 211–241

doi:10.1108/978-1-83867-541-720211011

Outline

Getting Started

To be effective and efficient in hospitality operations, operators must be proficient in understanding, diagnosing, and improving business processes. Experienced operators armed with the strategic use of the quality sciences have a foundation for success. This chapter is designed to be read thoroughly to understand the basic concepts of improving effectiveness and efficiency in the hospitality industry and later to be used as a diagnostic resource when encountering challenges in operations. Each concept is defined and explained, paired with examples and resources for reference.

1. Total Quality Management

Total quality management (TQM) is a company's philosophical attitude, behavior, and commitment to shareholders, customers, and employees. The focus of this chapter is TQM through an operational lens. However, a company's commitment to TQM reaches to all aspects of a business, including but not limited to:

- Performance improvement for operations (the primary focus of this chapter).
- Vendor selection and purchasing.
- Employee selection, recruitment, and retention.
- Brand standards, standard operating procedures (SOPs), and policy documentation.

- Control and measurement systems, including audits, customer surveys, and other voice of the customer monitoring programs.

TQM was first advocated in the late 1970s when Japan struggled to produce consistent, quality products. TQM was first known to be adopted in the United States in the mid-1980s when the US Navy was looking to adopt statistical methods to establish control methods (Quality Resources, n.d.). Since the adoption and development of the manufacturing business in Japan and by the US Navy, there has been adoption of the philosophies throughout the world. There have been standards written and adopted. There are even governing and nongoverning bodies that certify both individuals and organizations in different facets of TQM.

2. Lean Six Sigma

Lean Six Sigma is the marriage between **Lean** and **Six Sigma**, two of the mostly widely used approaches to TQM. To understand Lean Six Sigma, understanding of the foundations of both Lean and Six Sigma are first necessary.

2.1. Lean

Lean, originally referred to as lean manufacturing or lean production, comes from Japanese manufacturing principles intended to reduce and eliminate unnecessary waste while maintaining and improving efficiency in operations. Toyota is notable in adopting the Lean system. Toyota created a total production system (TPS) which is still used today. The premise is to reduce all wasteful, non-value-added activities. Table 1 outlines the seven original categories of such waste (Ohno, 1988).

Lean does not magically happen. It is the result of operational experience, strategy, teamwork, and the utilization of a robust set of tools. It also requires a tremendous amount of trial and error.

Kaizen is a Japanese term for "change for the better." Kaizen is a critical component of Lean because it embodies the overarching philosophy of continuous improvement that is central to TQM.

2.1.1. Lean Tools. There are many tools used across the Lean methods. Some of these tools include the following:

1) **5S** This organization tool promotes efficiency by making sure that everything has a place – and that everything is in its place. While originally expressed in Japanese, the Five Ss in English stand for "sort," "set-in-order," "shine," "standardize," and "sustain." Recently, organizations have adopted a sixth S for "safety" (An Introduction to 6S, n.d.). Fig. 1 shows how the Five Ss flow cyclically.
2) **Process mapping:** This method visualizes the steps in a process, such as seating guests at a restaurant, preparing a produce order, or approving sales contracts. The technique is also referred to as flowcharting. It can be particularly helpful to analyze where breakdowns or bottlenecks may occur. Fig. 2 offers

Table 1. The Seven Original Wastes of Lean.

Type	Definition	Example
Transport	Instances involving the excessive movement of parts, inventory, etc.	Over-stocking housekeeping carts that become too heavy to push
Inventory	Instances with failure to have the right amount of inventory to fulfill production needs	Having only one case of hotel bathroom amenities on hand and facing a 30-day lead time for replenishment
Motion	Instances when people or equipment move more than production necessarily requires	Making multiple trips to the food storeroom for forgotten ingredients
Waiting	Instances when people or products are waiting for some action in order to be ready for further servicing or enjoyment	Failing to stagger hotel room housekeeping in such a way that requires incoming guests to wait for rooms to become available
Overproduction	Instances when production surpasses demand	Preparing too much *mise en place* for dinner service and needing to dispose of unused ingredients
Overprocessing	Instances when excessive work or rework is performed to achieve the desired results	Vacuuming over the same portion of carpet multiple times, with minimal incremental cleaning with each successive pass over
Defects	Instances when products and services fail to comply with standards or guests' needs	Providing stained linen, overcooking steaks, or recording incorrect reservation details

an example of a process map that differentiates different roles to seat guests at a restaurant. This particular approach is sometimes referred to as swim lane process mapping because of the graphical divisions that resemble swimming lanes in a lap pool. Please note that this example is oversimplified. More details and steps should be added to reveal challenges with the process and to document key performance indicators. Customer journey maps and service blueprints are among the more robust types of process maps used in hospitality.

3) **Visual management tools:** These tools are powerful means for communicating and enforcing standards in very straightforward and simple ways. They use pictures, icons, and labels to depict correct or incorrect behaviors; tape, hangers, hooks, and boxes can also be used to designate where items belong. Visual management tools and the Five Ss often go hand in hand. These tools are effective in areas that require organization and structure where training

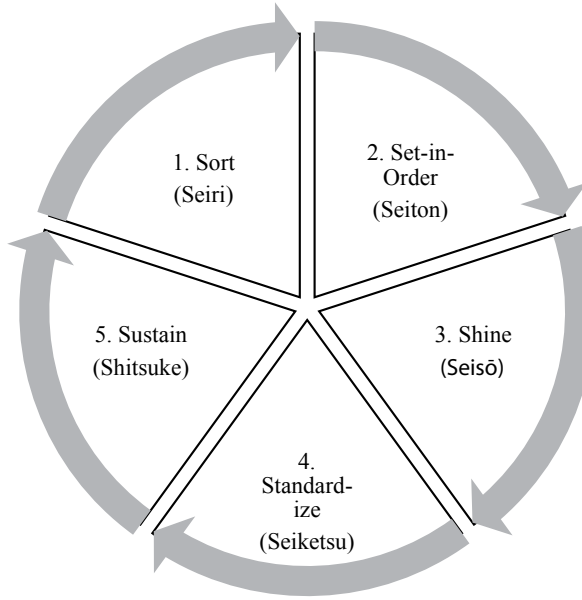


Fig. 1. The 5S. Adapted from Hirano (1995).

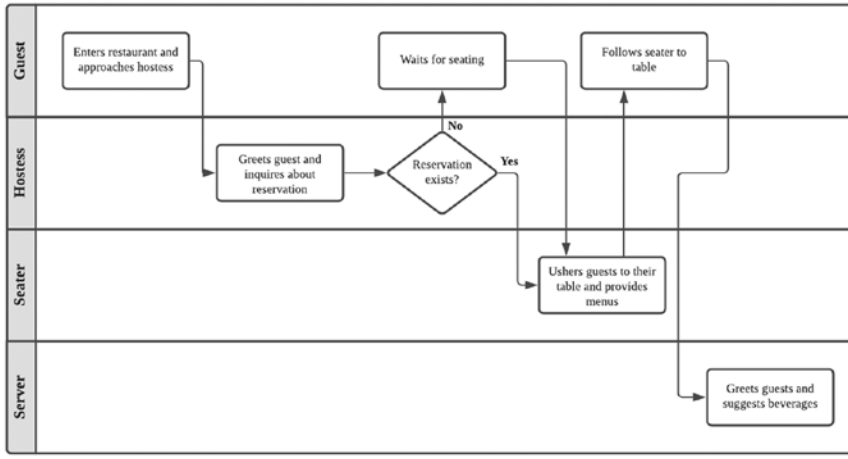


Fig. 2. Sample Process Flowchart With Swim Lanes, Showing the Seating of Guests in a Restaurant.

and communication may be limited due to occupancy, turnover, and language barriers. In hotels, housekeeping closets are often organized using visual management tools to keep linens, cleaning products, and bathroom amenities in order. In restaurants, pantries, refrigerators, and other storage spaces use similar organization methods. In addition to making inventory easy to locate, visual management tools can also help managers spot inventory in low supply.

4) **Five Whys:** The Five Whys, also referred to as root cause analysis, is a helpful framework for understanding the underlying causes that result in service problems. The premise is that users identify a defective outcome and ask "Why?" several successive times, until a clear source for the problem can be determined. Some have reasoned that root causes are distinguished by the fifth time the analyst asks "Why?" Although it may take any number of times asking the question, the trick is to not stop until a reasonable source problem is identified (Ask 'Why' Five Times About Every Matter, 2006). Fig. 3 provides an example of this logic.

   To ensure that enough questions were asked, and that the step-by-step reasoning makes sense, analysts can restart at the bottom and work backward to the top, using "therefore" between each subsequent answer. In this case, one would recite the following: "The linen shoots are broken, and the elevators are busy because it is a heavy turn day. *Therefore*, the linen was not sent to the laundry." And so the approach would continue until reaching the original effect: "*Therefore*, housekeepers are short of linen on heavy turn days." If the logic follows in both directions, the tool is being applied properly and is sufficiently determining a root cause.
5) **Fishbone diagrams:** Fishbone diagrams, also called cause-and-effect diagrams and Ishikawa diagrams (Ishikawa, 1968), depict the causes and effects (or the inputs and outputs) of processes. These diagrams are a clear way to visually display multiple contributing factors of a problem or defect. There are several

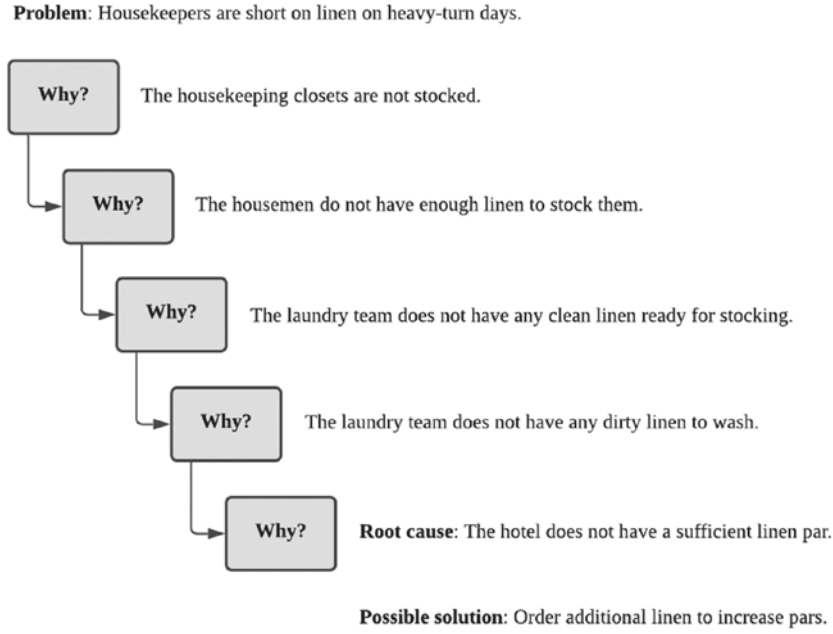


Fig. 3. Sample Five Whys Analysis for Housekeeping Inventory Issues.

different ways to categorize the "fishbones" in that cause the effect; among the more popular approaches is to outline the equipment, process, people, materials, environment, and management causes. Fig. 4 visualizes an example of a linen shortage (the effect) and its principal causes.

6) **Gemba walks:** Gemba is a Japanese term for "the actual place." The idea of the gemba walk (An Introduction, n.d.) is like that of "management by walking around" (MBWA) but is much more involved of a process. The idea is for the manager to be on the floor of the operation, learning how an operation flows by observing and talking to associates. To conduct a gemba walk, consider the following preparations.
   a. Determine the purpose of the walk (e.g., inspect hotel room to determine cleanliness; observe compliance with check-in procedures at the front-desk check-in procedures).
   b. Review and understand the SOPs.
   c. Determine the time of the walk, ensuring that the work will be in progress at the time of the walk.
   d. Observe the process that is taking place. Look for instances of the seven types of waste, such as repetitive motions, overproduction, and overprocessing.
   e. Consider whether the operators followed the SOPs.
   f. Look for opportunities for improvement. Perhaps SOPs were followed and yet still resulted in wasteful activities: thus, correct SOPs to reduce waste. Perhaps SOPs were not followed: consider the design of activities and determine how the process can be better adhered to (e.g., retrain employees, deploy Five Ss and visual management tools, etc.).

      In addition to preparing, the rules of engagement must be established and followed. This will ensure that the improvement team will interact and behave on the floor with the associates. For example:

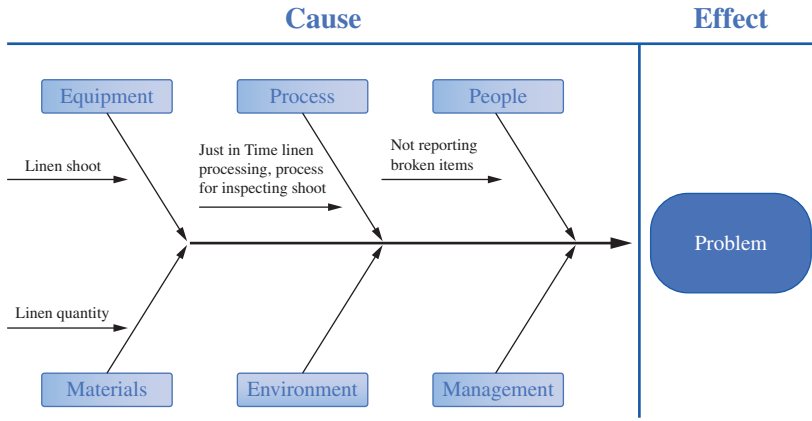


Fig. 4. Sample Cause-and-Effect Diagram Showing Causes of a Linen Shortage.

- Ask questions but do not offer judgment.
- Listen to associates: the best ideas often come from those doing the work.
- Record observations for later reference.
- Show respect: thank associates for their time, stay out of their way, and be safe.
- Walk in pairs when possible, to get different points of view.
- Also realize that people do not typically perform the same when they know that they are being observed. This is sometimes referred to as the **Hawthorne effect** and must be considered when reviewing the findings.

In summary, Lean offers a comprehensive set of qualitative and quantitative tools to improve the overall operational efficiency and consistency of an operation. In addition to this brief description, the entirety of Lean techniques is much more extensive. The tools referenced above are a mere sample of available resources.

2.2. Six Sigma

Six Sigma is the second component of **Lean Six Sigma**. It is a set of tools and techniques that focus on performance and process improvement. It was introduced by Motorola in the 1980s and relies heavily on statistical analysis. The objective of Six Sigma methods is to reduce variations in the outputs of a process. The name is derived from the goal of reducing such defects to less than 3.4 parts per million, which requires outputs conform within six **standard deviations** (noted by the Greek letter sigma, σ) of a process mean and upper or lower specification limits. This objective highlights the real challenge of achieving true Six Sigma success within hospitality given the variability of service outcomes (it is far more suited for manufacturing quality management); that said, the methodologies of Six Sigma for quality planning and control are still relatively transferrable to hospitality businesses seeking consistency in guest experiences.

Six Sigma is a framework that provides a systematic approach to problem-solving. Six Sigma processes do not jump to conclusions before determining underlying root causes. The foundational process used is called **DMAIC,** which stands for Define, Measure, Analyze, Improve, and Control (Lean Six Sigma Definition, n.d.). The process is represented in a cycle (see Fig. 5), with a breakdown as follows:

2.2.1. Define. In this first phase, a problem is clearly stated. A formal project charter is typically used to complete this phase. The **project charter** clarifies goals, objectives, rules, expectations, plan, resources, and scope – all to address a problem statement. Consider this example of a problem statement:

> On high turn days, housekeepers are not stocked with enough linen to efficiently clean hotel rooms and have them flipped to vacant-clean for by check-in time for arriving guests. Currently, the check-in time is delayed by approximately 30 minutes on average, which costs an average of $20.50 per delayed room or $63,800 annually.

As this example shows, Six Sigma focuses heavily on addressing underlying problems to correct broken processes and realize cost savings or claim revenue

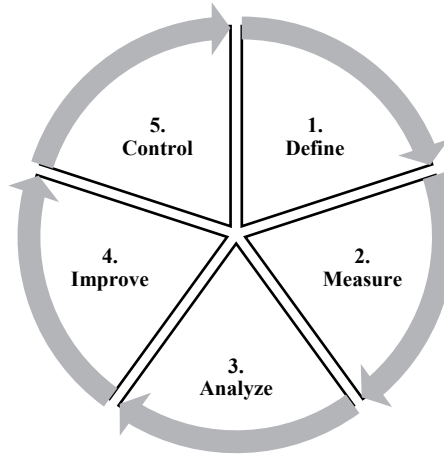


Fig. 5. The DMAIC Process.

opportunities. A **SIPOC (Suppliers, Inputs, Processes, Outputs, Customers) diagram** might also be completed to further understand the issue and its implications across a supply chain and production system; Fig. 6 highlights the linen-related supply chain related to the sample problem statement. This linen issue will be a recurring case study for exploring the rest of DMAIC steps. With the information above identified, the process is begun, and it can move onto the next phase: Measure.

2.2.2. Measure. The purpose of this second phase is to establish a critical baseline for performance. The measure phase quantifies the data to be analyzed. Measured aspects of hospitality operations might include restaurant covers per hour, hotel check-in's per front desk agent, or cruise cleanliness satisfaction by cabin. Managers must determine what to measure and how those items will be measured. It is also necessary to confirm that the data are readily available; if not, it must be sourced, or proxy data must be obtained. Once data are available, a historical baseline of performance should be determined. A simple baseline might look like the example in Fig. 7, which captures post-stay guest satisfaction survey **sample sizes** and scores relating to housekeeping service. Note: do not underestimate the importance of a good measurement system. As the common expression suggests, "Garbage in equals garbage out." Make sure that the data are validated (meaning consistent, free of missing entries, and free of incorrect entries) and that it will be attainable moving forward.

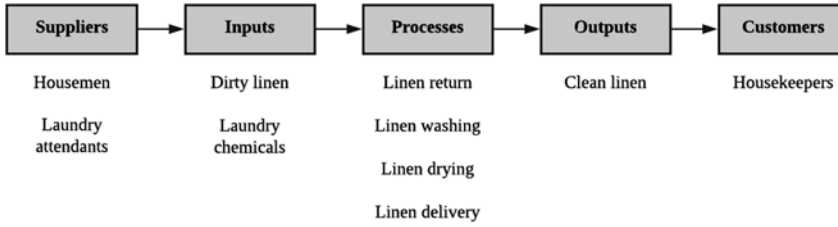


Fig. 6. A SIPOC Example Involving Hotel Laundry Operations.

	JAN '19	FEB '19	MAR '19	APR '19	MAY '19	JUN '19	JUL '19	AUG '19	SEP '19	OCT '19	NOV '19	DEC '19	TOTAL
Sample Size	247	452	300	288	402	350	388	200	304	278	350	399	3958
Score	75.0%	80.0%	79.2%	78.5%	81.0%	78.8%	80.1%	79.2%	77.7%	77.0%	78.9%	80.1%	79.0%

Fig. 7. Baseline Data of Housekeeping Scores From a Guest Satisfaction Survey.

2.2.3. Analyze. This third phase is where a root cause is uncovered. It reveals the magnitude of the problem. In this phase, tools may be borrowed from Lean as well as a myriad of additional statistical techniques from Six Sigma. The quantity of acceptable variances should also be established. The acceptable tolerances (sigmas) should ensure the production and delivery of a service consistently meets the desired level of quality.

2.2.4. Improve. This phase requires the development and piloting of potential solutions. There are several options for a team to generate potential solutions including brainstorming, brainwriting, rapid ideation, etc. The goal of this phase is to put a plan into action for measurable improvements. This phase includes a detailed action plan with accountability of resources and timelines. The **PDCA (Plan, Do, Check, Act) cycle** is often followed when building action plans.

2.2.5. Control. A goal of any improvement project is to sustain the changes for the foreseeable future. For example, analysts may wish to improve overall quality, duration (throughput time or waiting periods), reducing variation, etc. In each of these examples, it is important to have a plan for sustainability. This may include documenting processes, writing SOPs, training employees, creating audits, and exacting other means for maintaining accountability.

2.3. Blending of Lean and Six Sigma

The Lean Six Sigma marriage is not without controversy and debate. There are many Lean purists and many Six Sigma purists. Lean was originally intended to reduce waste. Six Sigma focuses on conformance quality. In today's world, organizations expect both. The goal for any organization is to improve their return on investment (ROI), of which both Lean and Six Sigma have been proven to successfully do. Companies have organized performance improvement, continuous improvement, quality, and operational excellence teams and departments – all charged to varying degrees with providing value and quality to the enterprise at the lowest possible cost to the company.

2.4. Statistical Process Control

Statistical process control (SPC) is defined as the use of statistical techniques to control a process or production method (Quality Resources, n.d.). First, as noted in the DMAIC step on measurement, a baseline for outcomes must be established – in this case, the baselines might instead be "lines," since upper and lower **control limits** will be determined based on historical data and forward-looking goals. These control limits set the boundaries for acceptable quality. An example is included later in this chapter. Given its mathematical precision, statistical process control brings integrity to the data being collected and analyzed. The statistics

will help to validate sample sizes, detect and discount or discard outlier data, and set reasonable expectations on anticipated outcomes that are driven by the changes a performance improvement team recommends. Statistical process control offers confidence, which is needed to make assumptions, predictions, and – ultimately – decisions that are all backed by science and data.

2.5. Implementing Lean Six Sigma

Lean Six Sigma implementation requires leadership support, resources, training, and accountability to be executed successfully. It is really that simple … or that difficult! Consider key components for organizational adoption of a Lean Six Sigma program:

- **Leadership support**: Performance improvement must be among leaders' priority. It cannot be something they believe in because they read about it or know that their stakeholders are pushing it. Leadership must learn it, understand it, practice it, and support it. There must be passion around reducing waste and defects. Everyone involved in operations must understand why such goals are important and how success will help them, their customers, and their shareholders in the long run. Lean Six Sigma cannot be "the flavor of the month" when it comes to management systems.
- **Resources**: Lean Six Sigma requires dedicated resources. If team members are expected to be on Lean Six Sigma teams in addition to their normal duties, their workload must be adjusted to incorporate the time requirements of performance improvement projects. These cannot be viewed as "side projects" that will not require much work: team meetings, analysis, observations, etc. must often be performed during peak hours. This also means that team members must be able to step away from their operations.
- **Training**: Formal training is required to succeed in the highly technical ways of Lean Six Sigma. Processes must be followed, complex math must be performed, and analysis must be robust and scientific. Additionally, the confidence and credibility given to associates via education will help them tremendously – in terms of their own comfort leading projects and in terms of an organization's trust in their expertise and recommendations. Many respected institutions offer established Lean Six Sigma training programs, which are typically graded in a sequence of colored belts. Consider both Green Belt (intermediate) and Black Belt (advanced) training programs for key operations leaders that might be tasked with managing Lean Six Sigma projects. Consider Yellow Belt (elementary) training for all others in the organization to strengthen their awareness of their roles in ensuring quality and efficiency.
- **Accountability**: Continue to monitor and measure the results. Per a quote often attributed to Peter Drucker, "What gets measured gets managed." Results need to be continuously monitored, and performance appraisal programs, bonus compensation, and other forms of accountability must incorporate continuous improvement qualities and objectives.

2.6. Developing a Lean Six Sigma Toolbox

Creating a quality "toolbox" is a powerful process for any hospitality operations manager and for organizations at large. The best toolboxes are not purchased but are instead built over time – the contents are not pieces of hardware but rather the tools, techniques, and frameworks honed through education and experience with Lean Six Sigma and similar programs. Teams might share templates for common resources using shared computer drives, and many templates are also available online through private organizations or quality institutions, like the American Society for Quality (ASQ). When continuous improvement opportunities arise, managers should consider the project needs and assess what to pull from the toolbox; again, both education and practice will help immensely.

2.7. Applying Lean Six Sigma

Remember, Lean Six Sigma emphasizes reducing costs and providing customer value. Customers can be guests outside the organization, or even "internal customers" that benefit from a certain process as stakeholders. Not every idea for improvement is worthy of a project, and most projects have several possible options for solving the issue at hand. A systematic approach is important for qualifying projects, and **decision matrices** often serve that purpose. As a team, operations managers should consider a project and determine business need, management commitment, and resource availability. Options can then be scored using a matrix of these criteria, and the option with the highest scores gets prioritized. Fig. 8 provides a sample decision matrix.

Per the figure, Option 3 is selected given its highest total value. Once a project is selected, managers must then determine which type of Lean Six Sigma project would be most appropriate. Several options exist, most of which fall into the five categories highlighted in Fig. 9.

The following is a hypothetical example of a Lean Six Sigma process improvement initiative, using DMAIC to address a hotel housekeeping challenge.

2.7.1. Background Information. Temporary labor is often used in markets across the United States when hourly labor is not abundantly available to fill staffing needs. Temporary agencies provide workers to hotels as needed. The skill levels of allocated staff vary between markets and agencies. The departments who frequently rely on temporary staffing include banquets, stewarding, and housekeeping. In some cases, up to 100% of their staffing needs are supported by temporary agencies.

In a densely populated urban market, several hotels were struggling with their housekeeping cleanliness scores on guests' post-stay satisfaction surveys. Upon further evaluation, these hotels were staffed with between 40% and 90% temporary housekeeping labor. The market's labor scarcity was unlikely to change, and the hope of decreasing the ratio of temporary workers versus actual employees was not realistic. The team decided they needed to increase the level of performance

Category	Criteria	Option 1	Option 2	Option 3
Business need	Value for customer	9	9	9
	Reduced cost for company	3	1	9
	Employee satisfaction	3	3	3
	Environmental or company priority	1	1	1
Management commitment	Executive priority	9	3	9
	Management availability	3	3	3
Resource availability	Quality data readily available	1	1	1
	Team member availability/ bandwidth	3	1	3
	Team member interest	9	9	9
	Total	41	31	47

Fig. 8. Decision Matrix Used to Determine an Optimal Choice Among Options. *Note*: 9 = high; 3 = medium; 1 = low.

of the temporary housekeepers and hold the temporary agencies accountable. They embarked on a Lean Six Sigma project and brought in a small team of Lean Six Sigma quality facilitators to work with their team.

2.7.2. Define. The team began their assessment of the issue and developed a charter, which documented the following information and preliminary decisions:

- **Problem statement and hypothesis:** Three hotels in the market use a third party to staff approximately 40%–90% of their housekeeping labor resource requirements, with some variation between properties. Guest satisfaction

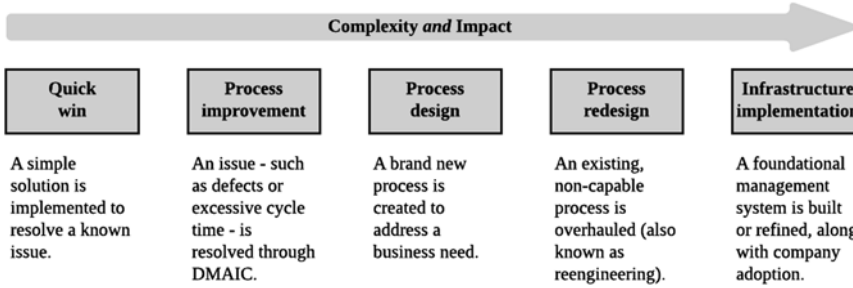


Fig. 9. Typical Lean Six Sigma Project Types. *Source*: Adapted from five Lean Six Sigma project types (2018, March 23). Retrieved from https://goleansixsigma.com/5-lean-six-sigma-project-types/

survey scores for cleanliness ranked in the 50th percentile for all three properties, while cleanliness problems reported elsewhere on the survey consistently rank among the two most common problem categories for each property. The hypothesis is that temporary workers are driving are scores down.

- **Scope:** The project scope will focus on improving the effectiveness of third-party housekeeping resources.
- **Team selection**: The team will comprise of housekeeping directors, supervisors, room inspectors, and human resources representatives from each property.
- **Project leaders**: The project will be jointly led by the three housekeeping directors.
- **Project sponsors**: The project will be jointly sponsored by the three general managers of the participating hotels.

With that foundation laid, the team continued along the path to process improvement.

2.7.3. Measure. Looking across possible datapoints, the team decided to hone-in on guest feedback – after all, the goal of the project was to improve guest satisfaction with housekeeping service. Voice of the customer (VoC) data were available through customer satisfaction surveys, which were already being sent to guests after they depart. This yielded a suitable volume of historical and ongoing data, which the team could stratify as follows. One primary metric from the survey used in the measurement analysis was the cleanliness satisfaction per guest: this could be averaged for all guests, and it could also be paired with property management system data to determine average scores by hotel floor, by individual guestrooms, and therefore by housekeeper. The team also considered the incidence of housekeeping problems per guest, for all guests in total, and as a percentage of affected reservations versus all reservations over a period of time.

As an aside, when analyzing data, it is important to have a sample size of data that supports **statistically significant** findings. Datasets that are too large can become unwieldy and even expensive (if there is a cost to source data); sample datasets that are too small, however, will not be properly representative of a total population. Various statistical methods exist for determining suitable sample sizes, and they typically balance the sample size with the amount of allowable error in the results.

In this case, the team had a sufficient sample of data. Looking at the various focal metric options, they decided to measure cleanliness satisfaction scores from the guest

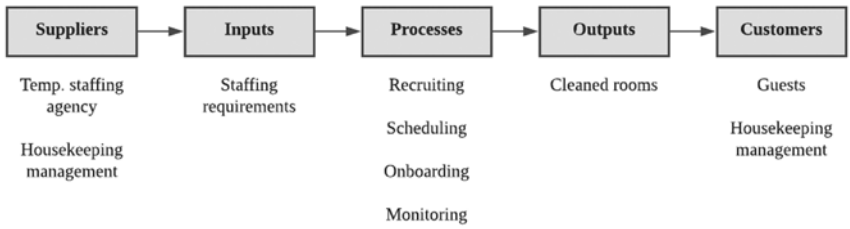


Fig. 10. A SIPOC Diagram Summarizing the Housekeeping Operation in the Case Study.

Floor	Sample	Housekeeper	JAN '19	FEB '19	MAR '19	APR '19	MAY '19	JUN '19	JUL '19	AUG '19	SEP '19	OCT '19	NOV '19	DEC '19	TOTAL
3	45	Temp-Samantha	55	45	40	47	46	50	51	52	53	54	49	50	49.3
4	68	Temp-Judy	72	71	68	67	76	74	72	73	71	70	73	70	71.4
5	72	Temp-Betty	65	64	63	66	65	65	64	63	62	61	62	66	63.8
6	45	Temp-Carmen	72	71	70	69	71	70	69	70	69	70	71	72	70.3
7	54	Temp-Alex	68	65	69	66	65	66	65	66	66	65	67	67	66.3
8	32	Temp-Julie	65	69	66	65	66	65	66	66	65	67	67	66	66.1
9	62	Temp-Ismelda	40	47	46	50	51	52	53	54	49	50	45	47	48.7
10	60	Temp-Bettina	64	65	64	63	66	65	65	64	63	62	61	62	63.7
11	78	Temp-Catherine	72	71	68	67	76	74	72	73	71	70	72	72	71.5
12	48	Temp-Katherine	71	68	67	76	74	72	73	71	70	72	72	70	71.3
14	55	Temp-Lexie	45	40	47	46	50	51	52	53	54	49	50	49	48.8
15	54	Temp-Essence	55	45	55	45	40	47	46	50	51	46	50	51	48.4
16	39	Temp-Becky	50	55	45	55	45	40	47	46	50	51	46	50	48.3
17	53	Temp-Chrstina	64	64	65	64	63	66	65	65	64	63	62	64	64.1
18	47	Varies	50	70	66	72	67	66	47	62	72	70	49	51	61.8
19	65	Temp-Amanda	71	68	71	68	67	76	74	72	73	71	70	70	70.9
20	45	FT-Courtney	70	69	72	71	70	69	71	70	69	69	71	70	70.1
21	39	FT-Eve	76	74	68	71	68	67	76	74	72	73	71	70	71.7
22	73	FT-Colleen	47	46	50	51	52	53	54	49	50	54	49	50	50.4
23	60	FT-Karishma	50	51	52	53	54	49	50	54	49	50	49	49	50.8
24	55	FT-Anya	69	69	68	65	69	66	65	66	65	66	66	66	66.7
ALL	1149		61.3	61.0	61.0	61.5	62.2	62.4	61.9	62.6	62.2	61.8	60.6	61.1	61.6

Fig. 11. Housekeeping Satisfaction Scores (From Guest Surveys), Averaged per Month per Room Attendant.

survey, since the team was trying to reduce variation and improve guest experiences. Because housekeepers were typically assigned to the same floors during each shift, the metric was further refined to calculate average cleanliness scores by floor.

Fig. 11 represents the room cleanliness satisfaction data from all floors. The floor number is on the far left, followed by the sample size, then by the assigned housekeeper and their employment status ("FT" for full-time employees and "Temp" for temporary labor), and finally by the scores over the last full year. For the purposes of this project, the team assumed that only one housekeeper was assigned to each floor and that each person had been on that floor consistently for the entire year. Floor 18 is a "pick-up floor," which means that the rooms are assigned to spare housekeepers based on availability.

Next, the team sorted the data by the full-year average scores per floor to better understand the varying levels of performance. See the rightmost column in Fig. 12.

With baselines established for historical performance, the team set out to define goals for improvement. They considered two objectives: on the one hand, improve the overall cleanliness scores; on the other hand, reduce the variation in scores between floors. For the first goal, improving the overall cleanliness scores, the team used a method called test of proportions. The **test of proportions** assesses whether a sample of data is truly representative of the overall population. It is a

Floor	Sample	Housekeeper	JAN '19	FEB '19	MAR '19	APR '19	MAY '19	JUN '19	JUL '19	AUG '19	SEP '19	OCT '19	NOV '19	DEC '19	TOTAL
21	39	FT-Eve	76	74	68	71	68	67	76	74	72	73	71	70	71.7
11	78	Temp-Catherine	72	71	68	67	76	74	72	73	71	70	72	72	71.5
4	68	Temp-Judy	72	71	68	67	76	74	72	73	71	70	73	70	71.4
12	48	Temp-Katherine	71	68	67	76	74	72	73	71	70	72	72	70	71.3
19	65	Temp-Amanda	71	68	71	68	67	76	74	72	73	71	70	70	70.9
6	45	Temp-Carmen	72	71	70	69	71	70	69	70	69	70	71	72	70.3
20	45	FT-Courtney	70	69	72	71	70	69	71	70	69	69	71	70	70.1
24	55	FT-Anya	69	69	68	65	69	66	65	66	65	66	66	66	66.7
7	54	Temp-Alex	68	65	69	66	65	66	65	66	66	65	67	67	66.3
8	32	Temp-Julie	65	69	66	65	66	65	66	66	65	67	67	66	66.1
17	53	Temp-Chrstina	64	64	65	64	63	66	65	65	64	63	62	64	64.1
5	72	Temp-Betty	65	64	63	66	65	65	64	63	62	61	62	66	63.8
10	60	Temp-Bettina	64	65	64	63	66	65	65	64	63	62	61	62	63.7
18	47	Varies	50	70	66	72	67	66	47	62	72	70	49	51	61.8
23	60	FT-Karishma	50	51	52	53	54	49	50	54	49	50	49	49	50.8
22	73	FT-Colleen	47	46	50	51	52	53	54	49	50	54	49	50	50.4
3	45	Temp-Samantha	55	45	40	47	46	50	51	52	53	54	49	50	49.3
14	55	Temp-Lexie	45	40	47	46	50	51	52	53	54	49	50	49	48.8
9	62	Temp-Ismelda	40	47	46	50	51	52	53	54	49	50	45	47	48.7
15	54	Temp-Essence	55	45	55	45	40	47	46	50	51	46	50	51	48.4
16	39	Temp-Becky	50	55	45	55	45	40	47	46	50	51	46	50	48.3
ALL	1149		61.3	61.0	61.0	61.5	62.2	62.4	61.9	62.6	62.2	61.8	60.6	61.1	61.6

Fig. 12. Sorted Housekeeping Satisfaction Scores (From Guest Surveys), Averaged per Month per Room Attendant.

common test used for goal setting when looking to test the feasibility of a possible goal. While the mathematics will not be discussed here, the team found that a feasible goal would be an overall cleanliness score of 64.9%.

For the second goal, reducing variation between floors, the team used a **test for conformity**. The team set upper and lower control limits for the goal to permit an analysis of acceptable variation. **Variation** is the difference between an ideal state and what actually occurs. The team used historical data to set control limits that will apply for future data, based on the assumption that performance is relatively stable (until improvement efforts begin!). The current average score is 61.6%. The upper and lower control limits set at ±3 standard deviations (σ). For the data above, σ is 2.06%. The upper control limit would be $61.6\% + (3 \times 2.06\%) = 67.8\%$ and the lower control limit would be $61.6\% - (3 \times 2.06\%) = 55.42\%$. As a note on standard deviations, consider that the analysts relied on the **empirical rule** (Hayes, 2020): the empirical rule, also referred to as the three-sigma rule or 68-95-99.7 rule, is a statistical rule which states that for a normal distribution, almost all data fall within three standard deviations of a mean (denoted by μ). Broken down, the empirical rule shows that 68% of data fall within the first standard deviation ($\mu \pm \sigma$), 95% within the first two standard deviations ($\mu \pm 2\sigma$), and 99.7% within the first three standard deviations ($\mu \pm 3\sigma$).

2.7.4. Analyze. The team reviewed the data (depicted in Fig. 13) and deduced the following:

- Seven floors (33.3%) scored above the upper control limit;
- Another seven scored within the control limits; and
- The final seven floors scored below the lower control limit.

This means that 14 floors – two-thirds – are "out of control." The team may think that having seven floors above the upper level is a good thing, but in this case, it represents inconsistency. Of course, the managers will not ask those high-performing housekeepers to deliberately fail cleanings to reduce their performance; instead, the managers must work to systematically increase the baseline

Floor	Sample	Housekeeper	JAN '19	FEB '19	MAR '19	APR '19	MAY '19	JUN '19	JUL '19	AUG '19	SEP '19	OCT '19	NOV '19	DEC '19	TOTAL
21	39	FT-Eve	76	74	68	71	68	67	76	74	72	73	71	70	71.7
11	78	Temp-Catherine	72	71	68	67	76	74	72	73	71	70	72	72	71.5
4	68	Temp-Judy	72	71	68	67	76	74	72	73	71	70	73	70	71.4
12	48	Temp-Katherine	71	68	67	76	74	72	73	71	70	72	72	70	71.3
19	65	Temp-Amanda	71	68	71	68	67	76	74	72	73	71	70	70	70.9
6	45	Temp-Carmen	72	71	70	69	71	70	69	70	69	70	71	72	70.3
20	45	FT-Courtney	70	69	72	71	70	69	71	70	69	69	71	70	70.1
24	55	FT-Anya	69	69	68	65	69	66	65	66	65	66	66	66	66.7
7	54	Temp-Alex	68	65	69	66	65	66	65	66	66	65	67	67	66.3
8	32	Temp-Julie	65	69	66	65	66	65	66	66	65	67	67	66	66.1
17	53	Temp-Christina	64	64	65	64	63	66	65	65	64	63	62	64	64.1
5	72	Temp-Betty	65	64	63	66	65	65	64	63	62	61	62	66	63.8
10	60	Temp-Bettina	64	65	64	63	66	65	65	64	63	62	61	62	63.7
18	47	Varies	50	70	66	72	67	66	47	62	72	70	49	51	61.8
23	60	FT-Karishma	50	51	52	53	54	49	50	54	49	50	49	49	50.8
22	73	FT-Colleen	47	46	50	51	52	53	54	49	50	54	49	50	50.4
3	45	Temp-Samantha	55	45	40	47	46	50	51	52	53	54	49	50	49.3
14	55	Temp-Lexie	45	40	47	46	50	51	52	53	54	49	50	49	48.8
9	62	Temp-Ismelda	40	47	46	50	51	52	53	54	49	50	45	47	48.7
15	54	Temp-Essence	55	45	55	45	40	47	46	50	51	46	50	51	48.4
16	39	Temp-Becky	50	55	45	55	45	40	47	46	50	51	46	50	48.3
ALL	1149		61.3	61.0	61.0	61.5	62.2	62.4	61.9	62.6	62.2	61.8	60.6	61.1	61.6

Fig. 13. Illustration of In-Control and Out-of-Control Guestroom Floors Based on Housekeeping Satisfaction Scores From a Guest Satisfaction Survey.

over time and expand the upper control limit. The team will also analyze those top performers to understand how they can replicate their successes.

The research group also looked at the temporary workers' performance relative to the control limits:

- Of the floors scoring above the upper control limit, five of the seven (71.4%) are cleaned by temporary workers;
- Of the floors scoring within the control limits, another five (83.3%) are cleaned by temporary workers; and
- Of the floors scoring below the lower control limit, yet another five (71.4%) are cleaned by temporary workers.

The original hypothesis was that temporary workers were driving are scores down. The data suggest that this was not the case. The challenges are spread evenly between temporary and full-time workers.

Since the hypothesis was proved to be false, the team conducted another brainstorm together to determine a plan for additional data collection. Ideas included:

- Reading actual verbatim feedback from guests left in open-text responses on the survey;
- Quantifying the feedback that was received from guests during their stay (via phone operators or the front desk);
- Doing a gemba walk to observe how the housekeepers are cleaning rooms and whether they have the correct tools;
- Conducting interviews with the full-time and temporary workers to ask them about their orientation, onboarding, training, inspection feedback, etc.;
- Crafting a fishbone diagram to summarize causes of the problem (see Fig. 14); and
- Conducting the Five Whys, if necessary, to deduce any lingering root causes.

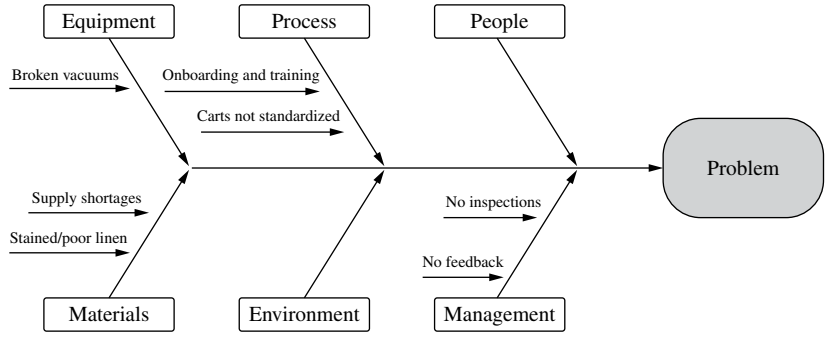


Fig. 14. An Ishikawa Diagram Depicting Issues Identified Within the Housekeeping Case.

This supplemental data yielded the following qualitative insights:

- Guests were frequently complaining about stained linen and hair in the bathroom;
- There was no standardized onboarding or departmental orientation for new team members;
- Housekeeping carts were not standardized with supplies and equipment;
- Supervisors rarely did inspections, and they did not share feedback with housekeepers when inspections were conducted;
- Housekeepers frequently ran short of linen, as well as sticky tape for cleaning hair on bedding and in bathrooms;
- The training housekeepers received was not standardized: housekeepers shadowed another team member for up to a week, at most, but management frequently pulled team members out of training and had them start cleaning on their own (prematurely) due to staffing shortages.

Most of what the team found made sense. They believed they were uncovering the root causes to the low and inconsistent scores except for one thing: training! The hotel prided itself on training. Why was proper training not happening? The Five Whys technique was activated to find out:

- Why are new housekeepers not being properly trained? *Because managers rely on other housekeepers to train new hires on-the-job, rather than using a discrete training program*.
- Why are they using a hands-on approach (without formal training)? *Because the trainers do not have access to such a training program and were never formally trained themselves*.
- Why do the team members lack access to the training, and why were not formally trained themselves? *Supervisors are unaware of any formal training because they were promoted from being housekeepers and had trained the same way as the current frontline team*.
- Why don't they know about the training? *There is no check and balance system to make sure that everyone is properly trained*.
- Why is there not check and balance system? *Because management was never trained or held accountable for training compliance*.
- Why was management never trained? *Many managers were also promoted from within and, like everyone else, missed an opportunity for formal training*.

This analysis suggests a compounding thread of training gaps that are affecting day-to-day job performance.

2.7.5. Improve. Next, the team moved into the fourth phase and began ideating solutions. Many ideation techniques exist, from brainwriting to interviewing frontline staff to gathering ideas in suggestion box campaigns. Brainstorming is a common and fairly easy technique, typically asking participants to consider a challenge and quickly jot thoughts onto notecards or white boards: the goal is a higher quantity of ideas, rather than quality, because innovation may strike from

themes or combinations of ideas, as well as from fringe ideas that might otherwise have been considered unrealistic. When the Lean Six Sigma team conducted their brainstorm, the ideas listed in Fig. 15 emerged.

After talking through each of these ideas, the team then needed to decide which items were likely to make the most impact. One way for selection to occur is by having team members vote on their preferred idea(s). Another approach is to use a **prioritization matrix**, framed in Fig. 16, to score each idea based on potential impact and probable effort.

Either approach can be done individually prior to discussion or assessed as a group. The choice depends largely on the dynamics of a team and the objectives of the decision. When the housekeeping team reviewed their ideas, they opted not for a prioritization matrix but instead for a group assessment of preferred options. In Fig. 17, their top selections are marked with the dark black dots.

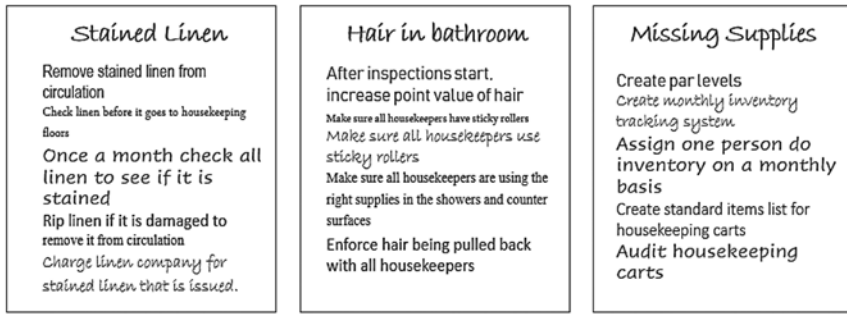


Fig. 15. Initial Brainstorming Ideas Sourced for the Housekeeping Case.

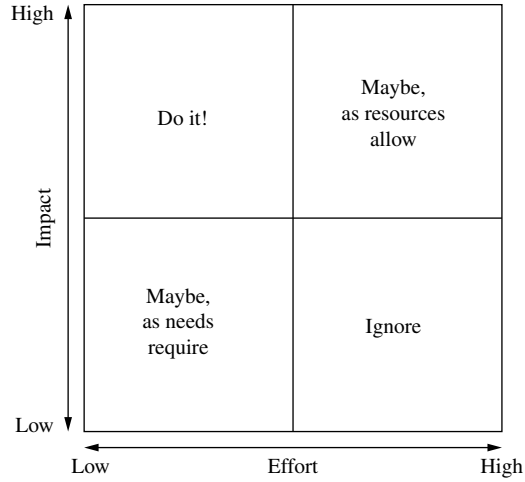


Fig. 16. A Sample Prioritization Matrix, Which Can Help Sort Brainstorm Ideas.

Fig. 17. Revised Brainstorming Ideas Related to the Housekeeping Case.

Investigations revealed some clear opportunities regarding hair in the bathroom and missing housekeeping supplies. The stained linen will need additional discussion to determine suitable actions. The team may consider going back to gather additional ideas including asking housekeepers or benchmarking other successful properties. With clearer objectives in mind to improve housekeeping performance, the team was ready to craft action plans with timelines, action owners, and an allocation of resources – all reinforced with accountability monitored by housekeeping directors and hotel general managers.

2.7.6. Control. Another priority for process improvement is the sustainability of improvements. Different from environmental sustainability, the term here means the likelihood that a process will become embedded within and exercised by an organization so that it is executed consistently into the future. In the control phase, monitoring performance and ensuring accountability are primary objectives. The control phase is often a common pitfall of a project, especially when unsustainable solutions are put in place and monitoring subsides. Team members resume their normal job duties and the energy and focus is not always as rigorous as it was throughout the project. To combat the risks of performance recession, successful project managers will make sure that they:

- Have regularly scheduled meetings and inform new employees and managers of performance changes, at least until new processes become habits;
- Hold team members accountable for meeting new standards;
- Create and socialize scorecards to track performance;
- Communicate progress and additional opportunities to stakeholders and leadership;
- Evaluate results and make changes where needed.

The last bullet cannot be understated. While projects may come and go, there are always opportunities for continuous improvement. This is why DMAIC is framed as a cycle.

3. Business Analytics

Business analytics involves the processes of gathering and discerning data to make informed business decisions. Business analytics are used in more scientific

research methodologies and in strategic thinking. In Six Sigma, business analytics typically plays a key role in the Measure and Analyze stages.

Business analytics are especially used for determining and evaluating **key performance indicators (KPIs)**, such as financial metrics like profitability and guest satisfaction scores from surveys and social media. The **balanced scorecard** is a classic tool use to depict business results across a variety of key management objectives, like financial success, customer satisfaction, employee engagement, and – increasingly – corporate social and environmental responsibility. Given the ever-increasing amounts of data collected in modern organizations through the proliferation of operating and customer-facing technology, many companies have dedicated analytical teams. While this is less common within specific hospitality properties like hotels or restaurants, corporate teams will typically involve extensive business analytics for such purposes as identifying problems, finding lucrative customers, and assisting yield management with dynamic pricing.

These insights can be used to gain competitive advantage in the areas of problem-solving, customer service, efficiency, and revenue enhancement. This process is referred to in a larger, more encompassing process known as a **business process management system (BPMS)** from a technological standpoint. The benefits of BMPS extend beyond operational excellence *within* a company. In the face of increasing competition, advanced analytics can drive insights and actions that become true competitive advantages.

Business analytics can be divided into three main processes: data collection, data interpretation, and competitive advantages (depicted in Fig. 18). Data collection relates to the sourcing and compilation of data from within an organization (e.g., from a PMS system) or from outside (e.g., market research data). Data interpretation involves the manipulation and discernment of data to deduce meaningful conclusions – often via trends, patterns, outliers, optimizations, and rankings. Last but not least, competitive advantages involve the decisions, reactions, and responses to data insights that allow an organization to excel in the marketplace by improving processes and appealing to customers. Fig. 19 depicts additional applications of business analytics within hospitality.

4. Change Theory and Management

4.1. Change Is Natural

Change is nothing new. Change is natural in the progression of life and business. Seldom can an organization remain static. Often, an organization must change

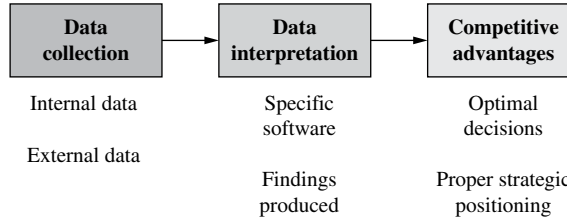


Fig. 18. Basic Objectives of Business Analytics in the Hospitality Industry.

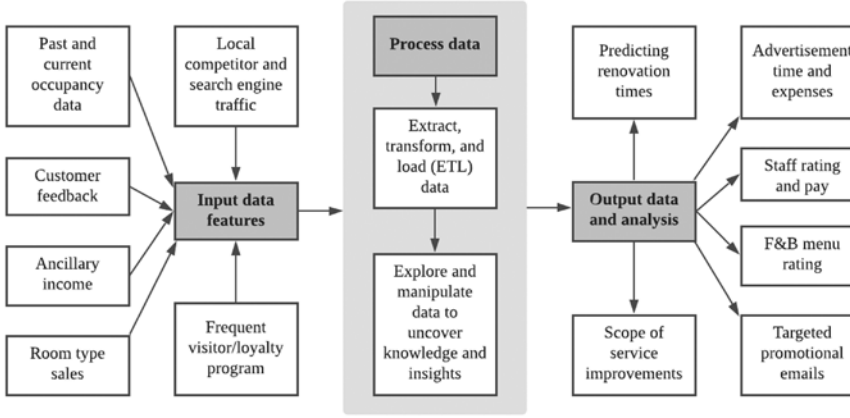


Fig. 19. A Graphical Overview of Business Analytics in Hospitality, With Examples of Possible Data Sources and Decision Applications. *Source*: Adapted from Kothari and Kothari (2017).

to survive. Continuous improvement creates a constant demand to increase guest satisfaction, reduce waste, and altogether improve business outcomes. The common phrase "innovate or evaporate" implies that change will always need to occur for success. Change is something that should be embraced.

4.2. Motivators and Hindrances of Change

Many things cause an organization to change. Ownership and brands change. Competition is ever-increasing. Customer preferences, technologies, and economies change. Demographics evolve. Some things are within the direct control of the organization. The rest require changes in strategy and operations in response to the things outside of an organization's direct control.

It is crucial to have all the stakeholders embrace change. Change can be extremely difficult when one or more of the stakeholders does not support a new direction. Some are paralyzed in their ability to change. Common rationale is that the old way was not that bad, and the new way may not be better. Nearly everyone calculates risks in their head. Change brings the unknown and uncertainty. It is a natural human trait to want to remain static for reasons of certainty and safety, but for these individuals, the uncertainty that change brings can be overwhelming. Many others will be reluctant but open to it. And a few others will immediately be accepting of change.

4.3. Other Pitfalls to Change

In addition to inaccurate anticipations and uncertainties, there are other common pitfalls to organizational change. Some of the most frequently cited challenges include:

- Poor communication;
- Not addressing concerns and emotions;

- Lack of follow-through;
- Jumping to conclusions;
- Fear of past failures; and
- Not admitting mistakes.

Managing change is a difficult and complex task. Everything must be considered, or pitfalls will occur. Fig. 20 demonstrates outcomes that might occur if any core elements are not considered.

4.4. Guidelines to Implement Change Management

There is no shortage of advice on how to successfully implement change. Unfortunately, there is no set of precise guidelines because change response is highly individualized and depends on many variables. Below are some of the guidelines common to implementing change management. Each of these must be adapted to the specific process and culture of an organization.

1) **Rationale:** Establish a clear reasoning for change. It should be represented in a clear vision. Make a list of advantages. Take measurements of the existing. Predict measurements of success.
2) **Planning:** Create a plan for change. Acknowledge the pitfalls and plan against them. Establish estimation of stages of time frame of change. Employ the essential skillsets and allocate the presumed resources. Determine the scope and parameters of the change. Have a plan that includes flexibility.
3) **Communication:** Announce the change. Establish regular intervals of communication throughout the course of the change. Give stakeholders the opportunity to express concerns. Enable a channel for these concerns to be properly vetted.
4) **Implementation:** Be sure to meet the employees where they are with knowledge and concerns of the change. Motivate them with proper incentives. Demonstrate the benefits of the change.
5) **Monitor:** Observe and evaluate the progress. Be flexible when revising the plan. Celebrate the achievements.
6) **Maintenance:** Ensure sustainability of the change. Determine how the change will be evaluated and at what frequency.

5. Project Management

Projects are a normal part of operations, when business-as-usual needs to evolve. Projects might be conducted to determine a cause to a problem, choose a solution, or even implement changes. Or, a project could include all three and more purposes.

5.1. Five Processes of Project Management

The Project Management Institute categorizes the processes of project management into five specific groups (Project Management Institute, n.d.):

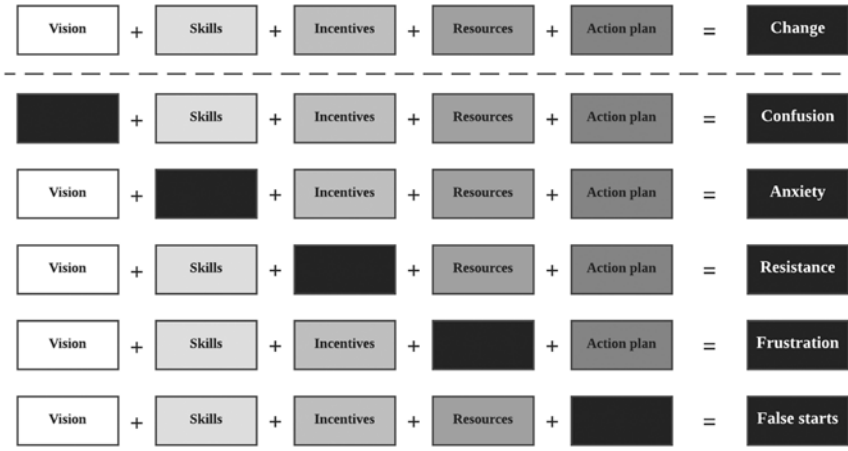


Fig. 20. Organizational Outcomes When Attempting Change With and Without Key Elements. *Source*: Adapted from Knoster (1991).

1) **Initiating:** Initiating is when an idea is launched. It is communicated to all the stakeholders.
2) **Planning:** Planning is the next listed process but is begun much earlier. This includes the determination of goals, resource allocation, team selection, scope, rules, and timelines.
3) **Executing:** Executing naturally follows planning. Plans are put into action. The data are collected, and solutions are developed and implemented.
4) **Monitoring and controlling:** Monitoring and controlling is the act of ensuring that goals and objectives are met. Adjustments are made to plans according to the findings of the evaluations.
5) **Closing:** Closing is the final step of a project. Successes are celebrated and future for sustainability of efforts are enacted.

5.2. Unique Aspects of Projects

Projects are unique and different from typical shift responsibilities. Most projects are conducted in addition to routine day-to-day activities. People on a project team could serve on projects in addition to their regular duties and responsibilities, or projects could be the basis of their employment for the length of the initiative. Projects vary from day-to-day work in that they are nonroutine and terminal in nature. It is common for employees to be involved in multiple projects at the same time. These projects can be standalone in content, or they be connected to others in a larger, concerted effort called a program.

5.3. Project Formation

Each project is unique in nature but they share some similar characteristics. A project goal is established, along with parameters, rules of engagement,

and expectations for performance. Each chosen team member brings a unique skillset to add to the diversity and capability of the team. The PDCA cycle (Deming, 1986) is a simple, straightforward project management tool which allows project teams to create a strategic plan without jumping to conclusions or skipping steps in their process. It is both a planning and an accountability tool and is often used when opting to pilot initiatives. The circuitous steps are as follows:

1) **Plan:** At the inception of a project, a team works together to chart their course of action. The team determines what needs to be by whom, when, and how. Often, they also define success in this phase.
2) **Do:** This is the pilot phase. The team executes a test(s) in a controlled environment.
3) **Check:** The team evaluates the results of the pilot or test to determine the results and identifies key learnings.
4) **Act:** In the final stage, the team either moves forward with the test or begins the cycle again and applies their learnings.

As Fig. 21 depicts, the PDCA cycle works just like the DMAIC wheel – on, and on, and on through a cadence of continuous improvement.

Discussion Questions

1. Lean and Six Sigma methodologies have been recently blended. This chapter outlines the two methodologies and then begins to explain how they are both used. Think of an example of an organizational problem that might benefit from the blending of these two methodologies.
2. Discovering problems in the Measure phase of Six Sigma is helpful for the improvement process. However, this phase might bring multiple problems to light. The Analyze phase aims to reveal the magnitude of each presented problem. Many different tools may be used. Fig. 15 presents three problems: hair in bathroom, stained linen, and out of supplies. For each of these problems,

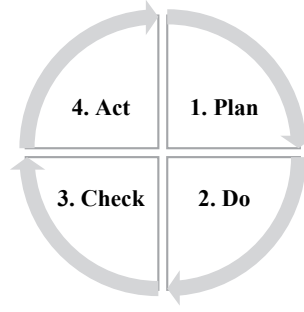


Fig. 21. The Plan, Do, Check, Act (PDCA) Cycle.

determine the magnitude of each. Conduct a survey of the class and rate each of the problems on a Likert scale. Prioritize each of the problems into ranked order.

3. A guest satisfaction survey was administered at an event. The current average score is 71.1 out of a possible 100. The upper and lower control limits are $\pm 3\sigma$. Sigma (σ) was calculated to be 2.33. Compute the upper and lower control limits for analysis of the survey.

Case Exercises

1. Using each component of the DMAIC process, outline the application of the five steps in the process. Then, apply them to an issue with your school food service operation. Determine what will be measured and then propose ways in which the experience can be improved.
2. A coffee shop located near a college campus is having issues with employees chronically being late for their shifts. The manager posts the schedule, and all employees can view the schedule at least two weeks in advance. An app is available to facilitate shift changes and special requests. Apply the Five Whys tool to this issue. Begin with the question: Why are many employees late for their shift? Then report your findings and subsequent questions in bulleted points below.
3. Three employees work at a front desk. One of them appears to be much faster at checking in and checking out guests than the other employees. This causes problems of equity and resentment among the staff. It also makes customers wonder why others get processed much more quickly.
    1) List and briefly describe at least three quality tools you would use to instigate this matter more closely?
    2) For each tool, describe how you would implement it.
    3) For each tool, describe what you might hope to find.
    4) Select one of your answers in C as being correct. Outline a plan as to how you would take corrective action.
    5) Last, outline a control that could be put into place to ensure that your corrective actions continue to work.

Managerial Challenge

Working from home has benefits and disadvantages for Stella Levine, Senior Director of Brand Quality. She leads a team of seven. Each of these team members is also remote. One of her team's objectives is to visit underperforming hotels to help determine root causes to issues and suggest plans for improvement. Stella meets with her team virtually and plans the team's visitation. Communications and information is collected in advance so they have an idea where to begin once on sight. Once there, they meet with the management team and outline some of the methodologies they would like to use for their fact-finding mission.

Questions

1. What preliminary information would Stella collect?
2. What preliminary questions might Stella ask?
3. List some of the potential tools or approaches that Stella can suggest the managers use in their fact-finding mission.

Added Insight

Long before quality improvement became popular in hospitality, The Ritz-Carlton Hotel Company embraced it as an essential component of their business operations. As a result, they are the only hotel company to receive the prestigious Malcolm Baldrige Quality Award – and they earned it twice! Since this time, nearly all other hospitality companies have integrated quality service into their business operations. While many claim guest service is a priority, only a few go to great lengths to implement and successfully manage it.

Questions

1. Go online and determine at least two other hospitality companies that truly excel in quality guest service. List them.
2. Explain why they are considered leaders in quality guest service.
3. Detail how they implement and manage quality guest service.

Risk and Crisis Management

From casinos to cruise ships, sensor and surveillance technology can serve numerous benefits in the realm of quality improvement. Technology can enhance loss prevention: many casinos, as Kevin Horridge (2015) notes, use closed-circuit television systems to identify card counters violating gaming policies. Technology can improve efficiency: Royal Caribbean, for example, introduced facial recognition software to expedite passenger boarding (Gershgorn, 2019). Pioneering companies are even attempting to leverage similar facial recognition software to detect guest satisfaction … or dissatisfaction (Bouzakraoui, Sadiq, & Alaoui, 2019). Additional benefits of surveillance technology include crowd counting to manage capacity and flow and heat mapping for understanding human movement and egress.

While the benefits of surveillance systems seem to expand as innovative technical capabilities advance, progress does not come without the risk of penalties. On the one hand, immature systems can produce unreliable and inaccurate data (Schwab, 2019) that can skew decision making. To act on the data, companies also need agile information systems at employees' fingertips, along with massive computing power. From a consumer standpoint, an array of legal and ethical questions creates even more dilemmas, such as:

- Who truly owns the data: the hospitality organization with the camera, the software company supplying the surveillance system or data warehouse, or the guest being monitored?
- What are the limits of guest privacy, especially in terms of the use of the data?
- Do guests have a right to opt out of surveillance activities?
- What are the responsibilities of the organization and its vendors to protect guest data from cybersecurity threats?
- How does the recording and possession of surveillance and sensing data affect a company's liability, especially regarding its duty of care to guests?

While cutting-edge, these systems may not always help companies cut costs or improve customer satisfaction; they may also expose issues with safety and security that are currently underexplored in legal territory.

Questions

1. For each of the following types of surveillance technology, identify an application for delivering quality services in hospitality. Also note at least one benefit and one risk for each application.
   1) Proximity monitoring (e.g., using RFID, beacon, and geofencing)
   2) Movement heat mapping
   3) Facial recognition

2. Considering the ethics of surveillance systems, what are some steps hospitality companies can undertake to mitigate the incumbent risks and liabilities?

Glossary

Balanced scorecard: A tool for monitoring performance across cross-functional key performance indicators, typically of financial, customer, and human resource-related areas.

Business analytics: Also referred to as business intelligence, the processes of gathering and discerning data to make informed, business decisions. Traditional examples used for key performance indicators (KPIs) are financial performance and guest satisfaction.

Business process management system (BMPS): A framework or system for management that results in continuous improvement and accountability for process excellence.

Confidence level: The desired degree of certainty for the result.

Control chart: A graph used to study how a process changes over time. Data are plotted in time order. It always has a central line for the average, an upper line for the upper control limit, and a lower line for the lower control limit. These lines are determined from historical data.

Control limit: The boundaries, upper and lower, which dictate the range in which output is expected to be achieved when "in control."

Decision matrix: A tool used to help managers select an optimal choice among several options, using consistent criteria.

DMAIC: A Six Sigma process improvement framework that consists of the steps Define, Measure, Analyze, Improve, and Control.

Empirical rule: Also known as the 3σ rule or 68-95-99.7 rule, it states that for a normal distribution, almost all observed data will fall within three standard deviations of the mean.

Five Ss: A Japanese organization tool which promotes efficiency by making sure that everything has a place – and that everything is in its place. The Ss stand for Sort, Set in Order, Shine, Standardize, and Sustain.

Five Whys: Also referred to as the root cause analysis tool, it helps to identify that the underlying issue (or root cause) for a problem. The premise is that an analyst continues to ask "Why?" about a problem scenario and its causes until the root cause is revealed.

Fishbone diagram: Also referred to as cause-and-effect diagram and as an Ishikawa diagram, it represents causes and effects of given issues.

Gemba walks: Referencing the Japanese term for "the actual place," this is a technique of management by walking around in which a manager is on the floor talking to employees and finding out what is going on by observing.

Hawthorne effect: The behavior where a subject (such as an employee) being observed behaves differently than when not under observation.

Kaizen: A Japanese quality management philosophy that emphasizes continuous improvement.

Key performance indicators (KPIs): Primary metrics a business uses to measure performance of a system or the enterprise at large.

Lean: A Japanese methodology intended to reduce and or eliminate unnecessary waste while maintaining and/or improving efficiency of operations.

Lean Six Sigma: The convergence of Lean and Six Sigma methods.

PDCA cycle: A sequence for quality improvement that asks users to Plan, Do, Check, and Act to gain incremental improvements in a process or system.

Prioritization matrix: A graph used to score and sort ideas based on potential impact and probable effort.

Process mapping: A method to understand all the steps in a process. This is also referred to as a flowcharting.

Project charter: A document compiled at the start of a project that clarifies goals, objectives, rules, expectations, plan, resources, and scope.

Random sampling: When data are collected from a population with an equal probability of selecting any point in the population.

Sample size: The quantity of individual datapoints collected from the population.

Seven forms of wastes: In Lean, the classification of waste into the traditional categories of defects, transport, inventory, motion, waiting, overproduction, and overprocessing.

SIPOC diagram: A depiction of the Suppliers, Inputs, Processes, Outputs, and Customer of a process or supply chain.
Six Sigma: A methodology focused on reducing the variation of outputs and outcomes from processes, driving toward consistency and conformance.
Standard deviation (σ): A measure of the variation or spread of a set of data.
Statistical significance: A statistical suggestion that results are not due to chance.
Statistical process control (SPC): A framework used in Six Sigma to determine the degree to which a process behaves within control limits and to understand variation of said process.
Test of conformance: An assessment of a sample's conformity within a set of requirements or standards (typically defined by control limits).
Test of proportions: An assessment of whether a sample from a population truly represents the entire population in proportion.
Total quality management (TQM): A systematic approach to quality management that emphasizes assurance, control, and continuous improvement.
Variation: The difference between an ideal and an actual situation.
Visual management tools: Visual templates or stations that indicate by sight where objects are placed or how motions must be conducted.

References

An Introduction to 6S. (n.d.). Retrieved from http://www.vitalentusa.com/learn/6s_article.php

Ask 'Why' Five Times About Every Matter. (2006). Retrieved from https://www.toyota-myanmar.com/about-toyota/toyota-traditions/quality/ask-why-five-times-about-every-matter

Bouzakraoui, M. S., Sadiq, A., & Alaoui, A. Y. (2019). Appreciation of customer satisfaction through analysis facial expressions and emotions recognition. In *Proceedings from 2019 4th world conference on complex systems (WCCS)*, Ouarzazate, Morocco.

Deming, W. E. (1986). *Out of the crisis*. Cambridge, MA: The MIT Press.

Gershgorn, D. (2019, May 21). Facial recognition is making its way to cruise ships. Retrieved from https://qz.com/1623799/facial-recognition-is-coming-to-cruise-ships/

Hayes, A. (2020). Empirical rule. Retrieved from https://www.investopedia.com/terms/e/empirical-rule.asp

Hirano, H. (1995). *5 Pillars of the visual workplace: The sourcebook for 5S implementation*. Portland, OR: Productivity Press.

Horridge, K. (2015, October 19). How do casinos spot and catch card counters? Retrieved from https://www.casino.org/blog/how-do-casinos-spot-and-catch-card-counters/

Ishikawa, K. (1968). *Guide to quality control*. Tokyo: JUSE.

Knoster, T. (1991). Factors in managing complex change. Material presentation at TASH conference, Washington D.C. The Association for People with Severe Disabilities.

Kothari, D., & Kothari, A. (2017). Business analytics in hospitality industry. *International Journal of Innovative and Emerging Research in Engineering*, *4*. 10.26769/IJIERE.2017.4.9.191498.

Lean Six Sigma Definition. (n.d.). Retrieved from https://www.leansixsigmadefinition.com/glossary/dmaic/

Ohno, T. (1988). *Toyota production systems: Beyond large-scale production*. Cambridge, MA: Productivity Press.

Project Management Institute. (n.d.). Retrieved from https://www.pmi.org/

Quality Resources. (n.d.). Retrieved from https://asq.org/quality-resources

Schwab, P. (2019, May 5). Customer satisfaction: Can it be measured based on facial emotions? Retrieved from https://www.intotheminds.com/blog/en/customer-satisfaction-can-it-be-measured-based-on-facial-emotions/

This page intentionally left blank

Index