# Hospitality Industry, Meet Business Intelligence

Your comprehensive guide to improving your hospitality business with data.

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As hospitality companies recognize competition from disruptive entrants such as AirBnb, rising consumer demands, and geopolitical turmoil, the industry continues to change rapidly. Innovative technologies enable many of these changes, and these systems leave digital footprints in the form of mounds of data that can be exploited to great benefit. The trick is knowing where and how to look.

We have created this comprehensive guide to help you do just that.

# Who is this guide for?

- Hospitality business owners and managers who want to start making sense of the data their organization collects.
- Data analysts wanting to understand the key issues in the hospitality industry, as well as possible data-driven resolutions.
- Hospitality professionals who want to better leverage the data maintained by their organization to help advance their career.

# Executive Summary

Here's a quick summary of what you'll find in this guide. (Chapter headings are clickable links.)

## Introduction - Why Hospitality Needs BI

Without business intelligence, hospitality industry companies like hotels, restaurants, cruise vacation lines, and resorts will struggle to stay competitive. This introduction provides an overview of business intelligence and the types of data available to hospitality companies. It explains how BI helps hospitality companies meet today's unique market challenges—and conquer them

**Section 1: The Non-Expert's Guide to Working With Hospitality BI**

## Chapter One - Asking the Right Questions

Every data story begins with a question. This chapter will teach you to how to formulate questions that you can then explore with BI as your guide. You'll learn how to build questions within the givens, constraints, relationships, and goals of your company. You'll also learn how to make observations that can lead to answers, with an introduction to descriptive and diagnostic analytics.

## Chapter Two - Searching for Answers

Once you've formulated a question and observed your business environment, it's time to create a hypothesis you can test. In this chapter, we'll discover how to formulate one or more plausible hypotheses to explain your problem. Then, we'll discuss how to test a hypothesis to see whether it holds up.

## Chapter Three - Presenting Your Findings

Visual analytics provide ways not only to present data but to explore it with a click of the mouse or a tap of the finger. This chapter explains why certain graphs are better for

different types of presentations and how you can share the visuals you create, depending on the collaborative capabilities of your BI software.

**Section 1: The Non-Expert's Guide to Working With Hospitality BI**

## Chapter Four - Boost Sales and Marketing

Business intelligence can transform the way you market your business by providing a granular understanding of your ideal customer and how that customer chooses to book with you, hopefully repeatedly! In this chapter, you'll learn to build an ideal customer profile and map out your company's unique sales funnel.

## Chapter Five - Create Unforgettable Guest Experiences

Hospitality businesses are differentiated by the quality of their guest experiences. With BI software, you can analyze the experience you're providing and align it with customer expectations. Learn how to entice guests to book, care for them while they're with you and keep in touch with them long after their stay is over—so you can turn them into repeat customers.

## Chapter Six - Happier Employees, Happier Guests

Employee quality is the biggest factor in whether customers choose to rebook with your business. This chapter will discuss how BI can help you recover efficiencies within your payroll while enabling you to invest in your employees, so you can solve problems for your guests and grow promotable talent for your company's future.

## Chapter Seven - Inventory & Supply Chain Management

Today's hospitality businesses source from all over the world. Whether you're procuring staple products or planning for a big one-time remodel, you need an efficient, reliable supply chain to support your business. In this chapter, we'll take a look at how BI can build a backbone of efficiency within your core ordering, improve delivery timing and efficiency and make your warehousing less costly.

## Chapter Eight - Build a Maintenance Powerhouse

From changing light bulbs to maintaining a ski lift to remodeling a property, your maintenance crew members are the unsung, behind-the-scenes heroes who keep guests happy. Managing maintenance requires efficient, cost-effective parts ordering, distribution and storage. It also requires smart crew deployment and work order management. From this chapter, you'll learn how BI can help with these processes as well as support the most important covenant you keep with your technicians: safety.

## Chapter Nine - Conduct Fact-Based Strategic Planning

In today's business world, competitive advantage is temporary at best. You have to outfox the competitors you know—and the new business models you never anticipated. You also have to stay on the cutting edge of changes in technology while competing in a global economy. BI, as you'll learn in this chapter, can help you make strategic decisions about the future of your hospitality business. Most importantly, it can help keep your company culture and values consistent as you navigate an uncertain but exciting future.

**Section 3: The Technical Side of BI in Hospitality Businesses**

## Chapter Ten - Data Sources and the Data Warehouse

One thing's for sure: you'll never have too little data. Since technology has enabled businesses to harness the power of unstructured data, information is everywhere—and in overwhelming quantities. In this chapter, you'll learn where hospitality businesses find their data, how they organize it and how they store it. You'll also learn the importance of backing up data and having a recover and restore plan after a business disruption.

## Chapter Eleven - Data Security and Governance

Failure to comply with regulations can lead to data breaches and hefty fines from regulators. Although we can't cover everything you need to know about security and governance, this chapter offers some common-sense security measures and provides a starting place for keeping data safe.

## Glossary of BI and Hospitality Terms

Introduction

# Why Hospitality Needs BI

A hotel that grows revenue by adjusting room prices in real time, based on weather, local events and the customer's ability to pay.

A ski resort that performs predictive maintenance on its lifts and equipment, knowing when seemingly routine work orders indicate hidden mechanical issues.

A cruise ship that offers unique spa, recreational activities, on-shore excursions and meals for each cruise, based on the demographic characteristics of each passenger list.

What makes these businesses so flexible, able to respond to real-time events and even prepare for events that haven't happened yet? They use business intelligence (BI) to compile, analyze and act on the treasure trove of raw data within their enterprises.

BI does more than gather data and generate reports. It helps businesses understand the past, present and future of their operations. It turns bits of information into decision-making power.

- **Gain better hindsight.** Uncover why certain events happened, both big and small, from one-time equipment failures to months-long revenue slumps. Discover past changes that led to unexpected growth. Reveal seasonal and demographic patterns.
- **Unlock real-time agility**. Respond to declining inventory, anywhere along the supply chain, before running out of essential items. Redeploy employees to improve coverage based on in-the-moment customer demand.

- **Anticipate the future**. Hire for next season based on predicted customer volume and potential skills gaps. Change the room mix at your B&B before the season starts, optimizing layout, amenities and activities to maximize revenue.

Today's BI software democratizes information and puts it in the hands of everyday employees—no more depending on executives to make low-level decisions that are better made by frontline employees, and no more waiting on IT to run confusingly formatted reports. With the right BI tools for interpreting and visualizing data, every employee can become an analyst. The right BI solution also breaks down silos between departments, unleashing collaboration.

## What is Data?

Data, put simply, is a piece of information. Generally speaking, there are two kinds of data:

- **Quantitative data** are measures or counts expressed as numbers that answer the questions "how many," "how often" or "how much." The number of guests on a cruise ship or the dollar value of total ski packages sold are examples of quantitative data.
- **Qualitative data** provides non-numeric information in answer to a question like "what type." Data such as guests' hometown, their genders and their preferences is considered qualitative.

You can mix and match quantitative and qualitative data. For example, while it's nice to know that your cruise ships book guests from Australia, it's nicer to know the number of Australian guests as a percentage of booked passengers, and even how those percentages change in different regions of the world. Information like this helps you understand present and past situations, diagnose historical issues, and better plan for the future.

## What About Big Data?

A lot of businesses also feel pressure to invest in what's called big data. Let's take a look at what big data actually is and whether or not it's a project your business should invest in.

The term "big data" describes the huge quantity of data generated by today's technologies, including IoT devices, web applications, social media and mobile technology. Big data is characterized by what Ernst & Young calls "the four V's": volume, variety, velocity and veracity.

- **Volume:** Big data quantity is enormous compared to traditional data sources.
- **Variety**: It comes in a variety of forms, spanning the spectrum from entirely structured to entirely unstructured.
- **Velocity**: Big data is generated nonstop, and it's generated fast—50,000 GB per second.
- **Veracity**: Big data comes from a wide range of sources, with varying levels of authority and trustworthiness, which means you can't assume that all the data you collect is accurate and of high quality.

Many businesses mine their internal data, but there's also a world of data outside of company firewalls. The University of Oxford says the top sources for internal and external data break down as follows:

- Transactions—88%
- Log data—73%
- Emails—57%
- Social media—43%
- Audio—38%
- Photos and video—34%

Businesses use powerful computers to churn through these enormous datasets. These machines often use machine learning to identify new patterns, and they also try to use these patterns to make predictions about the future.

## Do You Need Big Data?

Your hospitality business probably already has a *lot* of data whether or not you've invested in machine learning and developed predictive algorithms. In fact, a big data strategy isn't necessary to gain tremendous value from BI. However, they can also work together to help your company make better decisions. The patterns uncovered in machine analysis can significantly affect the way you approach business intelligence.

Let's suppose a big data analysis finds an interesting correlation—customers who have season tickets to a major league baseball park are also more likely to book ski vacations in winter. Armed with this factoid, you can query your own customer database, using BI tools, to find out how many of your ski resort customers are baseball season ticket holders. If you notice a significant number of them are, you may experiment with targeting dedicated baseball fans in your marketing campaigns.

Most organizations that absorb and analyze big data are in the early stages of unlocking its value. They know there's a future for big data, but they aren't necessarily seeing huge results right now, and let's face it—it's a significant financial investment. You can focus on mining your existing data for insights while keeping an eye open for industry-related discoveries big data has revealed. Keep big data at the back of your mind if you aren't already using it, but think of it as a long-term strategy rather than an immediate need.

## *EXPERT TAKE: Can Big Data Kill Your Business?*

*Collecting, managing and analyzing big data requires significant computing resources – think machine learning algorithms chewing through petabytes and even zettabytes to look for patterns Big data is also costly to maintain and protect in accordance with regulations. For many businesses, big data becomes so overwhelming that it ends up getting in the way of making decisions.*

*Nader Mikhail, founder and CEO of supply chain software company Elementum, says that big data is great for connecting unconnected dots. However, analysis of big data doesn't always deliver insights that are timely, true, and relevant to your business. Because you collect much more data than you need, you're more likely to use data that you shouldn't. He doesn't mince words about his opinion; he says big data can kill businesses.*

*Many data experts like Mikhail are advocating a resurgence in what they call "small data." Small data is defined as smaller datasets that contain defined, highly specific attributes. These datasets can be created from the results of big data analysis, but they can also exist independently to chronicle what's happening at the present time.*

*Think of big data working in the background, being digested and interpreted by machines to generate more long-view insights. Think of small data as current, actionable and readily available to deliver business insights. Whether or not you've invested in big data infrastructure and applications, you can still use small data to make decisions about your business. In fact, small data forms the heart of business intelligence.*

## How is Data Used?

Data can consist of numbers, text, sound files or visual information. It's accumulated in both structured and unstructured formats:

- **Structured data** lives within specified fields in a record or file. Customer relationship management (CRM) data, which consists of demographic, psychographic, purchase history and other customer information, is a good example of structured data.
- **Unstructured data** isn't pre-divided into fields or tagged; it's raw and doesn't reside within relational frameworks. Unstructured data can be in forms such as a Word document, an audio file or an image.

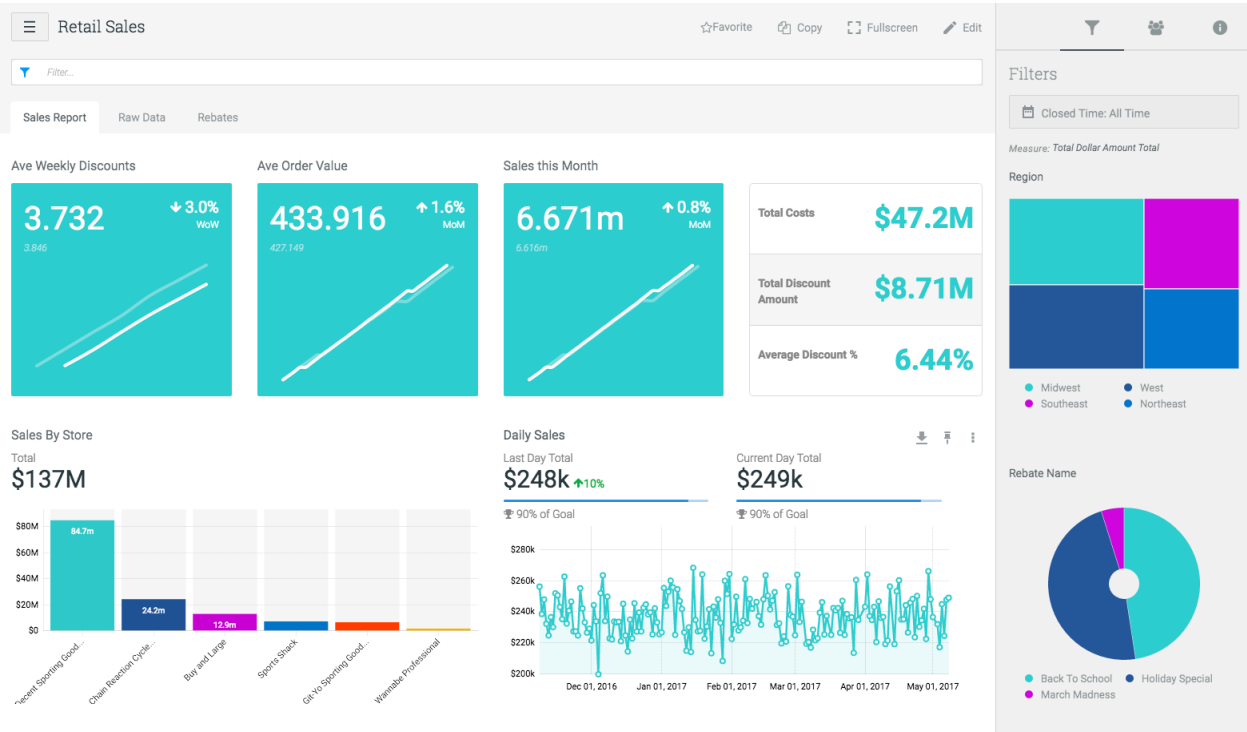
Once structured or unstructured data is acquired, it needs to be assessed for quality and relevance. If it doesn't fit certain criteria, companies may decide not to store it. Once data is deemed relevant, it's cleansed, which involves processes like ensuring it's uniformly

formatted to prevent errors during analysis. It's then stored within a database, often in an enterprise data warehouse.

When in storage and in transit, data has to be governed and protected in compliance with relevant regulatory standards, like Sarbanes-Oxley (SOX), PCI-DSS, and HIPAA. Companies must classify data according to its sensitivity and protect it accordingly, both from outside attackers and from improper internal access.

Additionally, when global hospitality businesses gather and use data, they have to consider 1) the jurisdictional laws of the regions in which they operate and 2) the rules of the countries in which their customers live. A company treats European Union customer data differently than it treats data from the United States, because different regulatory standards govern how companies may use consumer data in each area. So in addition to figuring out how to get value from data, hospitality businesses have to take great care with data storage, governance and protection.

Once data has been cleansed and stored, it's ready for analysis, and that's where BI software comes into play. BI turns databases into reports and visuals that help businesses understand the story within their data.



What's the best time to offer an off-season deal? Could you book more rooms if you offered more double beds instead of single king-sized beds? These are just two of the questions you can answer—and a taste of the opportunities hospitality businesses can generate—by investing in BI.

## Why the Hospitality Industry Needs Business Intelligence

The hospitality industry has responded well as, following the 2008 recession, the global financial picture has improved. Greater employment, higher wages and improved consumer confidence have contributed to greater revenue all over the hospitality industry. Yet as the industry learned in 2008, when unexpected downturns happen, travel and recreation become lower consumer priorities.

Deloitte has identified five main challenges facing the hospitality industry right now:

- **Navigating both the macro- and micro-economies.** The world economic outlook is optimistic but volatile. On an industry level, established brands are increasingly competing with private accommodations providers, like Airbnb. Risk management is more important than ever before, from data breach prevention to preventing foodborne illness. Good news travels fast on social channels – bad news travels faster.
- **Meeting customer expectations**. Social media and online competition has put customers in the driver's seat like never before. They're looking for authenticity, personal experiences and on-demand functionality.
- **Investing in technology**. Hospitality brands have to identify technology investments that deliver both great customer experiences and real value. Mobile tools, artificial intelligence, augmented and virtual reality, and the internet of things are all potential areas of investment.

- **Managing the regulatory environment**. Global hospitality companies are subject to big-picture geopolitical challenges as well as local tax policy and municipal regulations. Changes in one location can affect business on the other side of the world, and it's important to compensate quickly.
- **Connecting with new partners**. Successful hospitality companies are moving beyond their core services and seeing their brands as holistic platforms. Partnerships with restaurants, retailers and local event and activity partners can turn a one-night hotel stay into an unforgettable experience.

Hospitality businesses are already sitting on a treasure trove of structured and unstructured data. Your point of sale records, inventory tracking tools, payroll history, property management systems, support ticketing systems and other sources provide a lot of structured data. You may already generate a lot of reports from your existing data, and these reports can help you see what happened in the past. BI pushes your company to make decisions based on facts rather than guesses, giving you a decisive competitive advantage in a time of rapid change.

The good news is that the challenges of managing data, analyzing it and gathering BI can be far outweighed by the rewards. To understand the past, respond instantly to the present and optimize your future, you need business intelligence.

Chapter One

# Asking the Right Questions

The scientific method isn't just a process for conducting experiments within a lab. It's a rational, framework for finding the answers to most business problems. In case you've forgotten—or you've tried to put high school out of your mind forever—the scientific method involves five basic steps:

1. Ask a question.
2. Make observations.
3. Develop a hypothesis.
4. Conduct an experiment.
5. Draw a conclusion.

You may approach business intelligence (BI) having observed a specific problem you want to solve. Alternatively, you may not even know where to start. If you've observed a specific quandary, great. If you haven't, that's okay, too. We'll start with some ways to brainstorm questions that can help you identify the problems you want to solve.

## Every Data Story Begins With the Right Question

Identifying the problem you want to solve—in most cases, the problem is either figuring out ways to generate higher profits or ways to cut expenses—starts with asking the right question. The traditional 5 W's and H—who, what, when, where, why and how—are a great place to start brainstorming.

- **Who?** Who is involved in each transaction? Who's talking (emails, chat, calls, etc.) about current sales challenges? Who's performing well when it comes to

sales, and who's struggling? Who is your target customer, and who are your best customers right now? Who influences your target customer's decisions?

- **What?** What products and services do your customers buy most? What prices do they pay? What are you spending to deliver what they want? What innovations do you have in the pipeline? What are your competitors doing that you aren't?
- **When?** When are your prime seasons, times of day, etc., for online booking? When are customers more willing to pay higher prices, and when do you cut prices so you don't underbook? When are your sales teams and marketers having the most success?
- **Where?** Where are your top-performing locations, both on a large scale (e.g., cities, countries, regions) and within your properties (e.g., restaurants, most popular activities, top-selling rooms)? Where are your sales teams spending the most time? Where are there opportunities for expansion?
- **Why?** Why did your revenue slump last quarter? Why does a certain special in your restaurant draw in more customers? Why do certain customers prefer certain spa packages? Why are you always running out of supplies?
- **How?** How are you succeeding in growing revenue right now? How have you discovered, capitalized on or missed great opportunities? How could you change your workflows, personnel, supply chain or product development? How can you reduce your expenses?

Imagine you own a hotel or B&B, and you want to make more money by updating your room pricing. You're probably already collecting transaction data, so it's easy to see what customers paid for rooms, on average, over a certain timeframe. It's harder to evaluate your revenue in context to understand how it affects your business.

***EXPERT TAKE: Calling the Question***

*Steve Jones, Global Head of Master Data Management at Capgemini, says that it's pointless to dig into unstructured data around your business problem until you identify the*

*structural elements of your data story. "The first task is to establish the question you're trying to answer," Jones writes in the Financial Times. "Who is my best customer? Why is this product failing?"*

*A Capgemini study showed that 58 percent of executives now utilize unstructured data to make business decisions. But simply trying to search for a needle in a haystack in unstructured data takes a lot of time and yields few answers. "Before you dig into the petabytes of unstructured data available, from emails to employee blogs to voice calls, you must first identify the vital structural elements of the story. The goal is to capture the particular exchanges that can illuminate your problem. But in order to identify who is talking about which topics with whom, you need to start by accurately labelling the 'who', the 'what' and the 'whom.'"*

# Focusing Your Question

Let's start to tackle our hotel pricing with a "how" question: how do we optimize pricing to generate more revenue? Now, let's take our question and make it even more focused than it is now. Each question you ask of your data contains certain assumptions. We divide these assumptions into givens, constraints, relationships and goals.

## Givens

If you remember doing proofs in math classes—even if you've blocked them because the memories are nightmarish!—you remember that a "given" is the starting set of circumstances under which you're solving a problem. For the particular problem you're solving, the given remains unchanged. In a business context, the givens are simply the way things are.

You can generate a list of givens by adding one word to your question: how do we optimize pricing to generate more revenue, given _____? Fill in the blank by listing *the way things are* related to your pricing. Example givens could be:

- We have revenue per available room (RevPAR) data going back no more than five years.

- We have RevPAR data from some locations but not others; our only company-wide RevPAR dataset goes back two years.
- We currently offer static pricing only.
- We have different levels of pricing for different rooms.
- We currently change pricing seasonally according to established rules.
- We sometimes offer certain discounts, such as loyalty discounts or discounts for large parties of guests, and other price-related promotions, such as rooms combined with a spa package or a day trip to a local tourist destination.
- We display pricing on our website and on third-party online booking sites, and we also quote prices to customers booking over the phone.
- Our current room rate includes a bed, heat and A/C, a bathroom with towel service and toiletries samples, cable television access, an iron, a hair dryer and a complimentary breakfast.

Establishing the givens helps you understand the current circumstances surrounding your problem so you can begin to give it context.

## Constraints

"Constraints" are the conditions that your solution must satisfy. In other words, your price optimization solution has to be executed within certain constraints. These are the rules your solution has to follow.

Let's add another block to our question: how do we optimize pricing, given _____, with constraints like _____? Some example constraints may be:

- Your budget for investigating and solving the problem
- The number of payroll hours or additional hires you can allocate to solving this problem
- Your investigation and solution deployment timeframe

- The capabilities of your booking tools and processes
- The amount you can spend on training to implement your solution
- Where you can deploy your solution, and where you can't
- What changes you're willing to make, such as upgrading room quality to command higher prices or offering expanded amenities within your hotels

Another set of constraints involves what you want your solution to look like. Smaller hotels or chains may set yearly price levels for seasons and rooms and roll them out company wide. Chains with more resources may choose a reservation system that uses an algorithm to dynamically determine which prices to display to which customers. You probably also want qualitative constraints on your solution: it should be easy to customers and employees to navigate, it should reflect your branding, it should be available over the phone as well as online and via mobile app, etc.

Your solution may not meet every constraint on Day One. For example, you may deploy dynamic pricing on one online booking site while you figure out how to make it available for employee agents and through your mobile app. However, you want a working definition of your constraints as you go so your solutions stay focused.

## Relationships

Relationships are factors relevant to your problem and to its solution. They're outside factors that influence your problem, and they're things that may change when you deploy your solution. In this case, we know there are certain relevant factors that influence why customers pay particular prices for particular rooms.

*How do we optimize pricing, given _____, within constraints like _____, relevant to _____?*

Relevant factors that influence the prices customers are willing to pay include:

- Season
- Current brand perception and market sentiment

- Property and room quality
- Proximity to desirable destinations and activities
- Proximity to an airport or train station
- Competitor pricing
- Customer's disposable income
- Customer's preferences
- Amenities on the premises or nearby
- Restaurants on the premises or nearby
- Discounts or promotions offered
- Customer's history with your hotel
- Number of available rooms

Relationship factors change all the time. A new family amusement park built near your hotel could make customers more willing to pay higher room prices. Alternatively, a publicity challenge, natural disaster or geopolitical problem could make your hotel less desirable, thus reducing the prices you could charge to book rooms. Keep these one-time influences in mind as you interpret your data.

Think about the other side of the relationship coin: what factors will change when you deploy your solution? Maybe you have a related problem that gets solved with price optimization. On the other hand, your solution may generate a new and unexpected problem, workflow or expense. It's important to consider how all the pieces fit together.

## Goals

Your solution should help you meet defined goals, which are characterized by the SMART acronym: specific, measurable, agreed-upon, realistic and time-based.

- Specific: states exactly what you want to accomplish

- Measurable: can be measured numerically
- Agreed-upon: supported by all
- Realistic: can actually be achieved
- Time-based: has a deadline

In our example, the goal is found in our original question: how do we optimize pricing *to generate more revenue*? However, "generate more revenue" is not yet a SMART goal. Let's transform it into something defined.

- Specific: We want our price optimization solution to increase annual revenue by 3 percent.
- Measurable: We will measure revenue growth from this initiative by tracking revenue changes within the markets and timeframes in which we've deployed optimized pricing.
- Agreed upon: Even though some may want a 5-percent increase, and some say we should shoot for 2 percent, we can compromise on 3 percent.
- Realistic: Based on what other companies have achieved through optimized pricing, we know this increase is possible.
- Time based: Our goal has a deadline because we want to see this increase within one year of implementation.

Now that you've defined your goal, you can now complete the full question block: how do we optimize pricing, given _____, within constraints like ____, relevant to _____, to accomplish _____?

## Making Observations

We've developed a full-fledged question that takes into account our givens, constraints, relationships and goals. The next stage is to make observations by investigating our past revenue performance.

Fortunately, we have plenty of data, from our financial statements to our hotel POS systems to our online booking systems, that tells us how much money we've made over the past few years. We need to identify our key variables to decide which data points will help with our investigation. These variables will clarify what we want to measure, how we want to measure it and how we can view those measurements in context. Let's break down our variables in metrics, measures, KPIs and groupings.

- **Metrics** are the line items you want to quantify, such as average daily rate (ADR), revenue per available room (RevPAR), overall sales or inventory costs. When you present your data in visual form, metrics become the individual or category names of the items you're measuring.
- **Measures** are the units by which you quantify your metrics. They determine the height or proportion of bars, lines and sections of each metric within your data visuals.
- **Key performance indicators** (KPIs) are the summary statistics (e.g., quantity, average, percentage change, etc.) generated by measuring your metrics. They explain the quantity a metric like ADR, represented in a measurement, like dollar amounts.
- **Groupings** gather KPIs into baskets so you can compare them, either against other KPIs or against the same KPIs in other time periods. Instead of seeing the ADR in February at one property, you can compare ADR at one or more properties over the course of the year.

Establishing your KPIs and putting them in groupings helps you see relationships and draw conclusions from your data. It also sets you up to perform statistical analyses. Once you've set your variables, you can analyze data to understand the present and interpret the past. Business intelligence starts with two important types of analytics: descriptive and diagnostic.

- **Descriptive analytics** explain what's happening now or what happened in the past based on available information. Descriptive analytics are often manually accessed on a dashboard or sent out in an email alert.

*Sample uses*: a CRM system that shows how much loyalty program members purchase compared to non-members, a report comparing wastage loss for various food order items, or a comparison of this year's financial performance to last year's.

- **Diagnostic analytics** review past events to explain why something happened. Aggregated data is mined to uncover correlations and potential causal relationships that help businesses understand what caused certain events to take place.

  *Sample uses*: explaining what factors led to increases or declines in sales of a particular package or service, understanding why the company's spending on equipment has increased or decreased, figuring out why customers prefer certain amenities

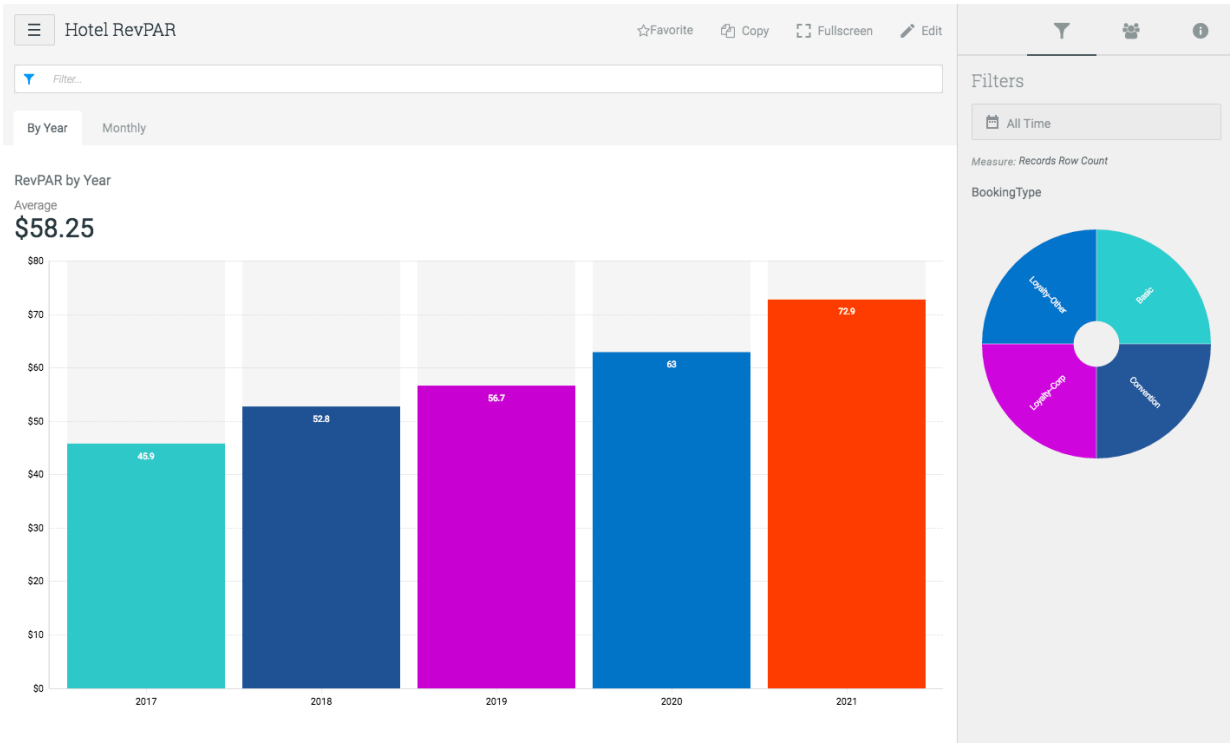
## Making It Practical

To figure out how to boost revenue according to the question we constructed, we're going to choose RevPAR, measured in dollars, as our KPI. Although we're looking at RevPAR in the context of a hotel here, it's a common hospitality industry metric used by lines of business including hotels, B&Bs, cruise ships and resorts.

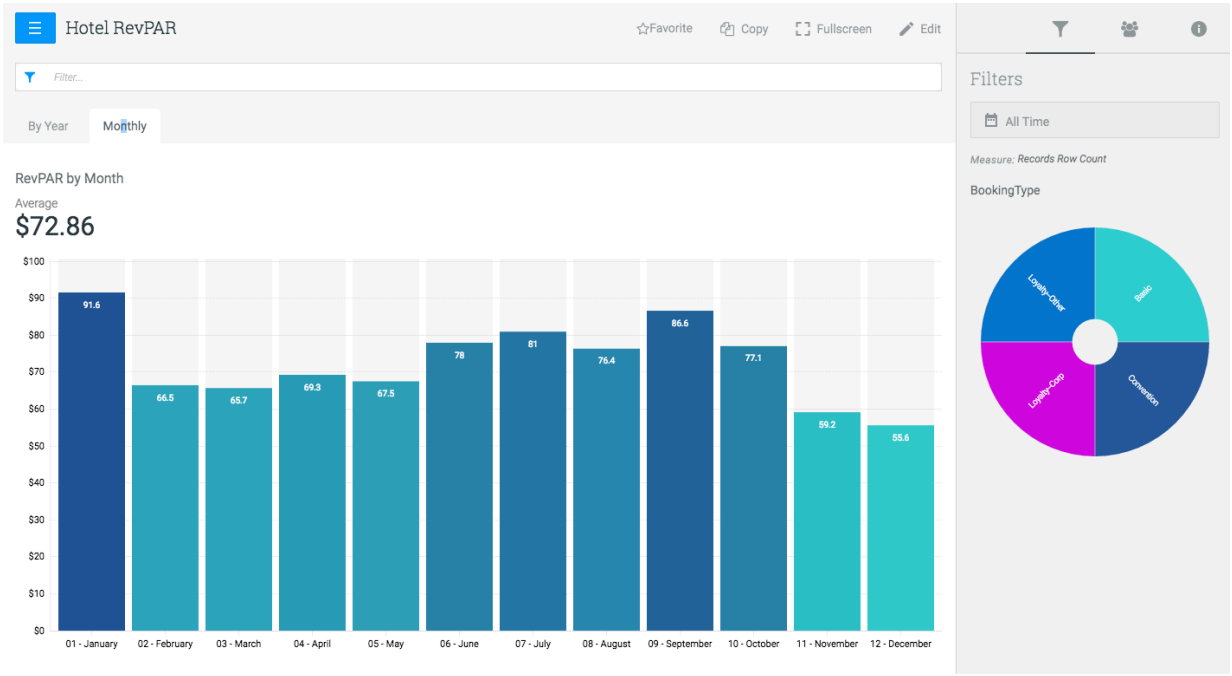
Let's start our analysis by inputting a query that asks your BI tools to tell you your average RevPAR over the past five years.

This initial snapshot only tells you the basics about your RevPAR performance, so dig deeper into your data. Here are some suggestions:

- RevPAR on a monthly or daily basis
- RevPAR per region
- RevPAR per property type (e.g., your premier hotels versus your budget hotels)
- RevPAR per room class




For our purposes, let's look at overall RevPAR on a monthly basis for the last year, assuming all of your hotel properties are within the same geographic area. Let's also assume your properties are of similar quality with similar room and amenities offerings.



Looking at the graph, we can see that revenue spiked in May, stayed high through the summer and dropped significantly in October. Most places have higher booking rates in summer, when weather is warm and families have vacation time. The spike in January is a mystery, until one of your managers remembers your hotels booked a high number of corporate conferences during that month.

You're beginning to see possible variables—seasonality and corporate events—that will factor into how you price your rooms. You can add these variables to the relationships you've already listed. You can also dig deeper, analyzing RevPAR per January corporate convention and discovering how much RevPAR increased this January over previous January levels. Your observations, utilizing business intelligence, will help you form a hypothesis that you can test—and that's what we'll learn to do in the next chapter.

Chapter Two

# Searching for Answers

A business intelligence (BI) report on RevPAR per room type tells you how much revenue a given room brings in during a given time period. It doesn't tell you why customers are willing to pay more for that room or why it's more popular. When it comes to data, seeing *what happened* is simple. Understanding *why it happened* and *what to do about it* is more challenging.

Fortunately, with experimentation and testing based on a plausible hypothesis, you can begin find the answers. These answers can lead to a strategy that will help you achieve your goals.

## What We've Learned so Far

In Chapter 1, we discussed using the five W's and H—who, what, when, where, why and how—to brainstorm questions. Then, we talked about how to add depth to our questions by thinking about givens, constraints, relationships and goals. A quick recap:

- **Givens:** the way things are now
- **Constraints:** the rules your solution must follow
- **Relationships:** relevant components that can both affect your problem and be generated by its solution
- **Goals:** what you want your solution to accomplish

So far, we've talked about the *what*, which you observe through asking questions and recording observations. In this chapter, we'll discuss how to figure out the *why*. It all begins with a hypothesis.

## The Hypothesis: AKA an Intelligent Shot in the Dark

It's easy to think we know why certain changes occur in our business, but time can reveal that our first assumptions aren't always right. Not every guess is a complete shot in the dark; we often have some information that makes our guess seem reasonable. *What you think is happening* may be an intelligent shot in the dark, but it still needs to be tested. BI helps you confirm what you think is happening, your hypothesis, before you accept it as true and use it as a basis for decisions.

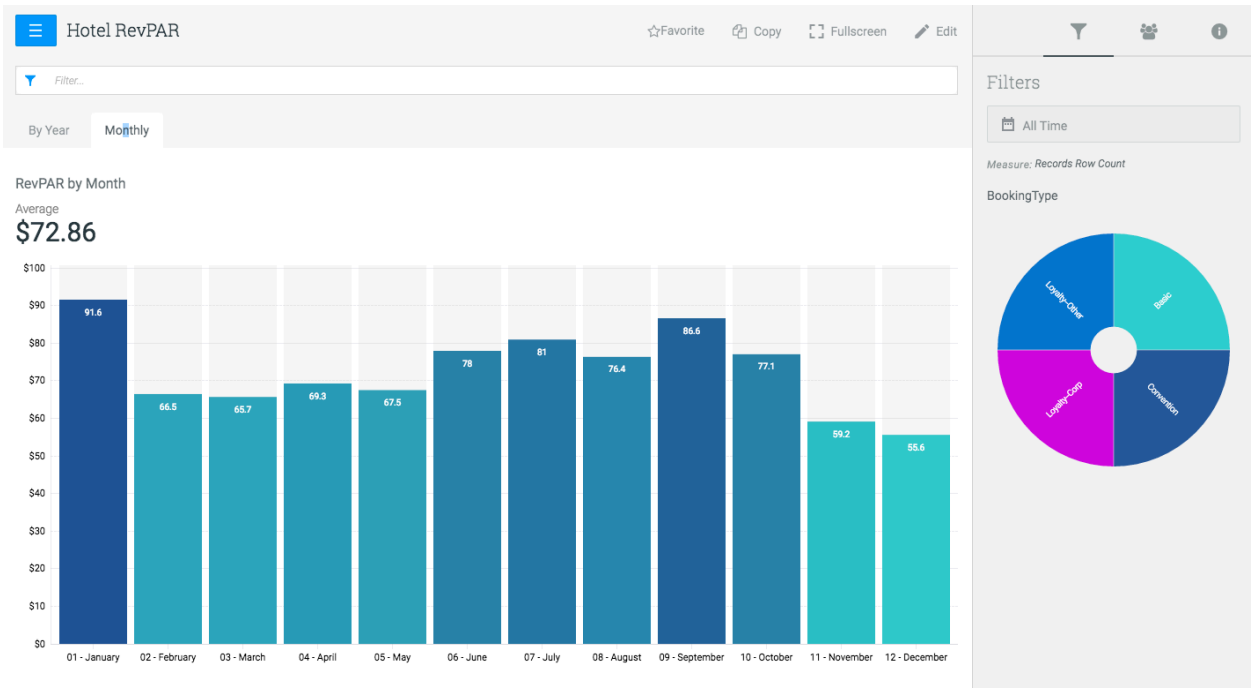
BI also helps you experiment with your hypothesis so you can make sure it still holds true. Let's go back to our revenue per available room (RevPAR) scenario from Chapter 1. To recap, we want to improve our room pricing in ways that increase our RevPAR, in the hopes that increasing RevPAR will boost our overall revenue.

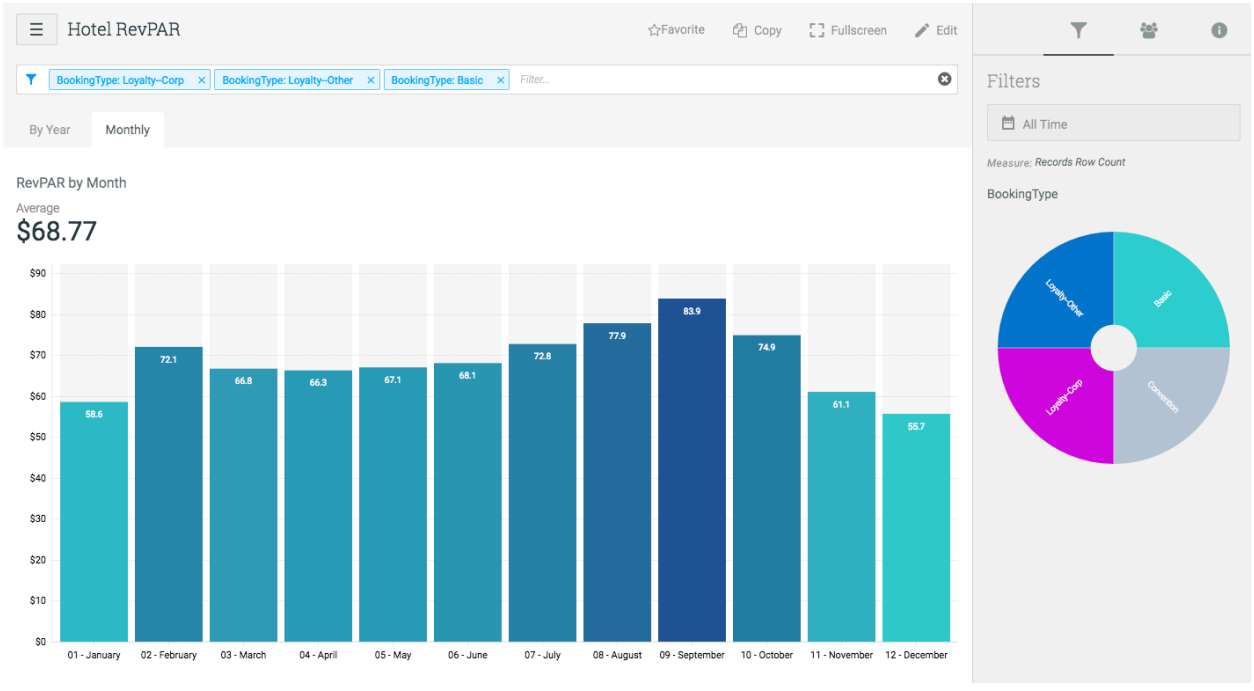
When we reviewed RevPAR over the past year using our BI dashboard, we noticed higher RevPAR in the summer months, but we also noticed an unusual spike in January of that year. One of our regional managers noted that some large corporations had booked conferences within that month. It's easy to assume that the convention bookings boosted our RevPAR, but do we really know that's what happened? We don't know; it's just our hypothesis. To confirm that we're right, we'll have to test it.

It's easy to test our hypothesis by querying our business intelligence tools. To start, let's write out our hypothesis as a specific statement that we want to challenge. We can state our hypothesis like this:

*An increase in corporate convention bookings is the reason our RevPAR was higher in January.*

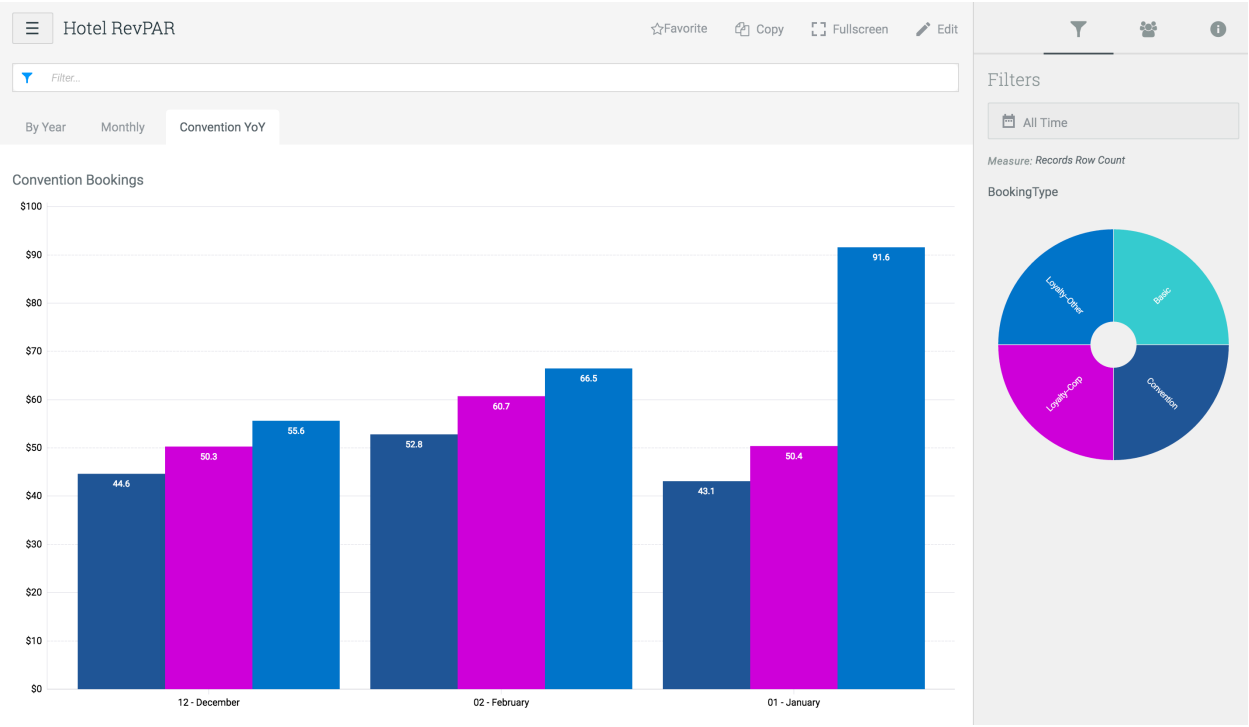
Now that we know what we want to test, it's time to dig into our data. Let's set up a bar graph of overall RevPAR for the past year. Then, let's filter our results to remove corporate convention bookings. (See the two images on the next page.)


Hotel RevPAR
Favorite
Copy
Fullscreen
Edit
Filter...
By Year
Monthly
RevPAR by Month
Average
$72.86
$100
$90
$80
$70
$60
$50
$40
$30
$20
$10
$0
91.6
66.5
65.7
69.3
67.5
78
81
76.4
86.6
77.1
59.2
55.6
01 - January
02 - February
03 - March
04 - April
05 - May
06 - June
07 - July
08 - August
09 - September
10 - October
11 - November
12 - December
Filters
All Time
Measure: Records Row Count
BookingType
Loyalty-Other
Basic
Loyalty-Corp
Conversion


Hotel RevPAR
Favorite
Copy
Fullscreen
Edit
BookingType: Loyalty--Corp
BookingType: Loyalty--Other
BookingType: Basic
Filter...
By Year
Monthly
RevPAR by Month
Average
$68.77
$90
$80
$70
$60
$50
$40
$30
$20
$10
$0
58.6
72.1
66.8
66.3
67.1
68.1
72.8
77.9
83.9
74.9
61.1
55.7
01 - January
02 - February
03 - March
04 - April
05 - May
06 - June
07 - July
08 - August
09 - September
10 - October
11 - November
12 - December
Filters
All Time
Measure: Records Row Count
BookingType
Loyalty-Other
Basic
Loyalty-Corp
Conversion

When we do this, we see that January more closely matches December and February. The corporate bookings have a noticeable effect on RevPAR in January.

Next, we could check to see how December, January and February of the past three years




compared to the most recent December, January and February. In prior years, we see RevPAR was similar for all three months. This year's January spike was unique.

Now that we've performed some BI analysis, we can feel more confident that the corporate bookings increased our RevPAR. Because our hypothesis matches the observable data, we accept our hypothesis.

Suppose the increased RevPAR had stayed the same for January in spite of removing the revenue from convention bookings. In that case, we would reject our hypothesis and search for a new explanation for why RevPAR increased this past January.

## Forming a More Detailed Picture

Since we know that our corporate bookings were the primary factor in our January RevPAR spike, we can now ask another question: if our corporate clients re-book for next year, what could we do to increase RevPAR even more?

This question requires further investigation, so we review corporate event bookings company-wide to uncover the givens under which RevPAR increased so much last January. We discover our hotel in Cleveland had the highest RevPAR, out of all our properties, when corporate events were booked at our hotels last year.

What caused Cleveland to have such great RevPAR performance? How did they get the pricing just right? To dig deeper, we schedule a conference call for our Midwest region, and during that call, we talk with Cleveland's management team. They tell us they increased their room prices during their corporate conventions. They also offered discounted spa packages and meal promotions to convention participants, which may have influenced customers' willingness to pay more for Cleveland's rooms.

You may think we've been handed the perfect solution—but then a manager from Chicago chimes in. He says that increasing prices during conventions was bad for bookings at his hotel. He's had success by offering discounts to corporations to increase the number of rooms booked. The rooms booked at lower prices, but the lower prices convinced the corporate clients to fill his hotel. With fewer empty rooms, the overall RevPAR at his hotel significantly increased.

In Cleveland, RevPAR was higher given higher room prices and added amenities. In Chicago, RevPAR increased given discounted room prices throughout the hotel. We now have four hypotheses for how we could best increase RevPAR:

1. Increasing room prices will increase RevPAR during corporate conventions.
2. Adding spa packages and increasing room prices will increase RevPAR during corporate conventions.
3. Adding meal promotions and increasing room prices will increase RevPAR during corporate conventions.

4. Offering a discount to increase the number of rooms booked will increase RevPAR during corporate conventions.

One of these hypotheses may work best for every hotel in the company. Most likely, one hypothesis will do well in one city, and another will be perfect for another city. Also, we may discover that a certain combination of options, such as Cleveland's combo of increased room prices plus spa packages plus meal promotions, works best at certain locations.

But how do we know which combination to offer in each location? And to make the problem even more confusing, how do we know the perfect price to charge, or the perfect spa package or restaurant promotion to offer? What's the relationship between certain spa packages and the prices corporate customers will pay for rooms?

Constraints are another factor that governs what solutions we can roll out at each location. For example, let's say our hotel in Indianapolis is experiencing quality problems with its current restaurant partner, and they have a new restaurant moving into the building next March.

Until Indianapolis settles in its new restaurant tenant, steering customers toward its current restaurant could lead to unsatisfactory guest experiences. This places a constraint on our solution set. Indianapolis isn't a good place to test our meal promo/increased price hypothesis right now.

*EXPERT TAKE: Real-time Responses*

*So far, we've talked about asking a question related to the past and understanding why things happened. BI gives you another superpower beyond just understanding your past; you can respond to events in real time.*

*In the past, our hotel wouldn't have known whether it was meeting its RevPAR goals during a corporate event until it batch-processed its data at the end of the day or even the end of the week. Today, you can use BI tools to pull up reports or dashboards that show you up-to-the-minute measurements.*

*Because you can see progress toward RevPAR goals in real time, you get the chance to make quick adjustments to pricing and other strategies:*

- *If the hotel isn't hitting its revenue targets halfway through the day, it can come up with a way to boost sales, whether it's by offering a special spa package or a new restaurant or happy hour special.*
- *Hotel managers can also look forward into the week and adjust pricing to activities already planned. For instance, instead of offering free chips or tokens for slots as part of a casino outing—as long as they hadn't already advertised the chips as being free—managers can offer guests different amounts of chips or tokens at tiered price levels.*

*These kinds of real-time responses aren't necessarily structural strategies for increasing RevPAR over time. They are, however, an example of how BI empowers managers to minimize losses and increase guest satisfaction in the short term.*

## Faster, More Efficient Experiments

We could test one hypothesis at a time at each of our corporate convention hotels, every January, to figure out the perfect strategy. Let's say we have 12 hotels at which to test each hypothesis. It would take four years of testing every January to experiment with one hypothesis at each property.

Then, we could experiment with combining hypotheses—increased price plus meal promo, for example—and then we could test further by charging different prices every year and offering different meal promo discounts every year until we found the perfect combinations for every location. Unfortunately, if we did that kind of step-by-step testing before scaling our solution, we'd be out of business long before we had absolute answers.

That's where two new types of data analysis come into play: predictive and prescriptive analytics. These tools help us model the likelihood of future outcomes, based on past events, and forecast the probabilities that certain actions will succeed.

- **Predictive analytics** project what may happen in the future based on past events. They predict future outcomes based on correlations and causalities in existing data.

  *Sample uses:* understanding which items customers will purchase next based on purchase history, demographics, social media posts or other characteristics; identifying correlations between weather at your resort and what customers will purchase at your gift shops; predicting which rates a customer would pay for a hotel room

- **Prescriptive analytics** help companies decide what to do about the future or what will mostly likely lead to a desired future scenario. They provide probabilities of outcomes that could result from specific actions, helping businesses see decisions in the context of both opportunity and risk.

  *Sample uses:* selecting a new offshore cruise excursion that will provide higher customer satisfaction, deciding what time of day to send marketing emails or post on social networks, creating a supply chain that balances timeliness with cost

What if, instead of experimenting with each hypothesis at a specific location, we could use predictive and prescriptive analytics to construct a room pricing process for each location—a pricing process that delivers perfectly timed price increases, price discounts, spa packages and restaurant promotions based on both the customer and the context in which the hotel operates?

Even better, what if we could fine-tune our room pricing process over time based on what we've learned?

## Building an Algorithm

An algorithm is a process or set of rules followed to solve a problem or deliver an outcome. Think of it as a recipe, in this case, for delivering a room price to every customer in a way that maximizes RevPAR.

One way to approach algorithms is to think of them as a set of balanced if-then statements. You're probably familiar with if-then formulas from Excel spreadsheets: if _____ happens, then do _____. Using predictive analytics, which helps you forecast what could happen based on past events, you can construct prescriptive if-then statements. For example, if big data and predictive analytics have shown that baseball season ticket holders tend to pay more for your hotel rooms, your if-then statement could look like this:

If the customer has season tickets to a Major League baseball park, then raise the room price by $10.

This algorithm, programmed into your online reservation system or displayed to your phone and desk agents in their booking application, provides an easy way to incrementally add $10 to room pricing here and there.

Of course, a sophisticated pricing algorithm contains a lot more than just one if-then scenario. Many "ifs" will factor into the "then" price. Also, each "if" will carry a different weight based on how influential it is in determining pricing.

Let's say that having Major League baseball season tickets leads to a customer paying $10 more for a room 62 percent of the time. Your analysis may have also uncovered a less influential but nonetheless important predictor of room pricing that may also affect the price you offer a customer. For example, you may have learned that women who purchase nail polish monthly pay $10 extra for your rooms 47 percent of the time if you also offer a discount on a spa manicure/pedicure package.

Probabilities can change according to location as well. For example, you may discover that if your hotel is in the same city as a Major League ballpark, the probability of a customer paying $10 more for a room jumps from 62 percent to 87 percent.

Let's say you have a male customer who's logged into your online reservation system and is booking a room at your Chicago hotel. He has season tickets to Wrigley Field, and he's married to a woman who buys nail polish every month. Even without using mathematics, we can see this customer is more likely to pay $10 extra for his room. Because the probability of him paying extra is so good without the need to throw in the manicure/

pedicure discount, our algorithm simply shows him the price increase. If his wife had logged into the reservation system instead, we may have thrown in the spa package to try to get the extra $10.

What if one of these customers wants to reserve a room in Madison, Wisconsin, where there are no Major League baseball stadiums? What if you can tell from the IP address that one of these customers are reserving the room, but you can't tell whether it's the husband or the wife? Your algorithm, taking all potential scenarios into account, will decide what pricing and what promotions to offer. As more and more customers work your algorithm, you can fine-tune your probabilities and update your algorithm accordingly.

That's the potential of business intelligence and data analytics. You test multiple hypotheses and find competitive advantages more quickly—and you take advantage of them at the best possible times.

## You Don't Need to Be a Mathematical Genius

Your company may have data analysts on staff—some hospitality businesses even hire executive-level data officers. But in today's rapidly changing business environment, data analysis can't be confined to IT or the C-suite.

The good news is that you don't have to be an expert in statistics to find the story within your data. With good business intelligence (BI) tools for analyzing and visually presenting data, combined with the solid reasoning approaches we've covered in Chapters 1 and 2, you can unlock your data's secrets and add real value to your bottom line. In Chapter 3, we'll explore the best ways to visually present your BI analysis.

Chapter Three

# Presenting Your Findings

You've gathered data and analyzed it to unlock the story within. Now, it's time to present your data in ways that make it easy to understand.

Most likely, you're not going to hand out hard copies of a relational database divided into rows and columns. You're going to transform your data into a visual story that makes the relationships easy to understand.

Visual representations of data help the human mind grasp relationships quickly and easily. Visual analytics takes charts and graphs a step further by making them interactive. With visual analytics, you manipulate charts and graphs with a mouse click or a tap of your finger to better understand what they're telling you. For instance, you could view a graph of the current year's sales, tap on the bar for February and see a new graph of February's sales, which you could then break down by time period, property or product.

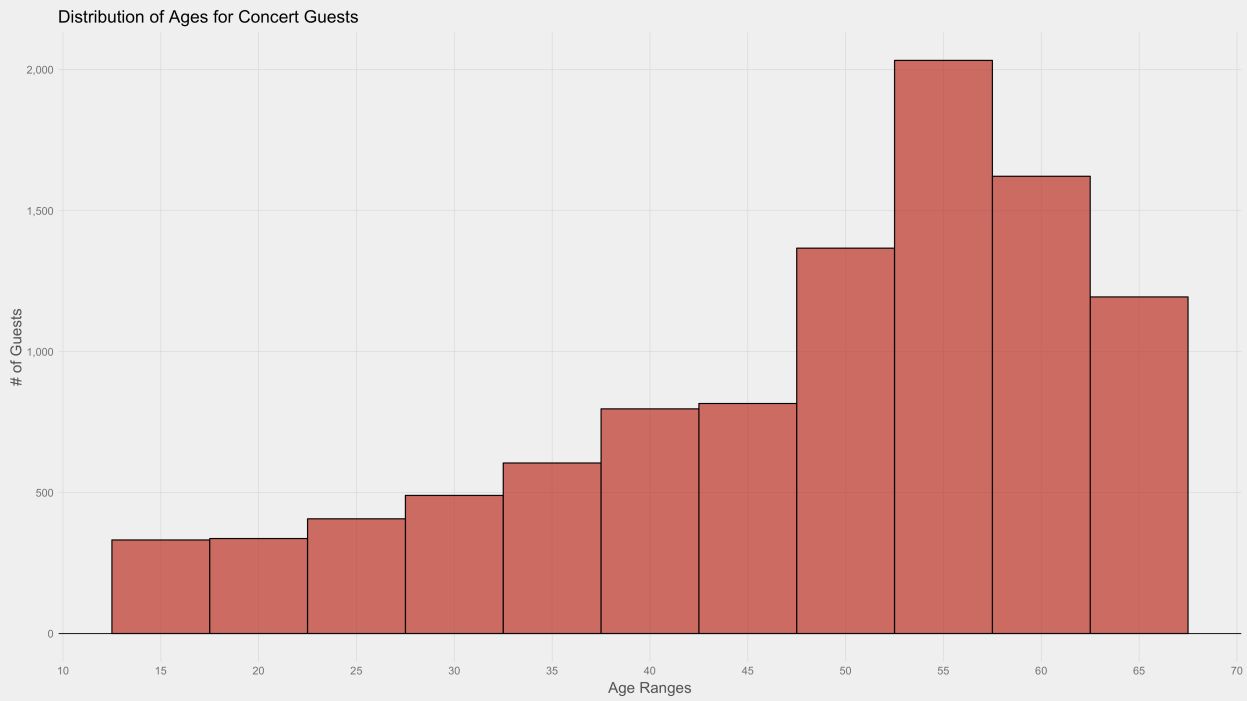
Different visuals are good for showing different types of relationships. Good BI software presents data intelligently, automatically choosing the best visual presentation for the data you're examining. Let's take a look at the different ways your BI software presents data visually. Then, let's discuss how you can share the visual analytics you create with others.

## Ways to Visually Present Data

Although there are a wide range of data visualization options in the world, most BI software focuses on bar graphs, line graphs and pie charts. You're probably familiar with these visuals, but you may not know why one is better than others for certain presentations. We'll look at each one in depth so you can make the best choices for presenting your data.

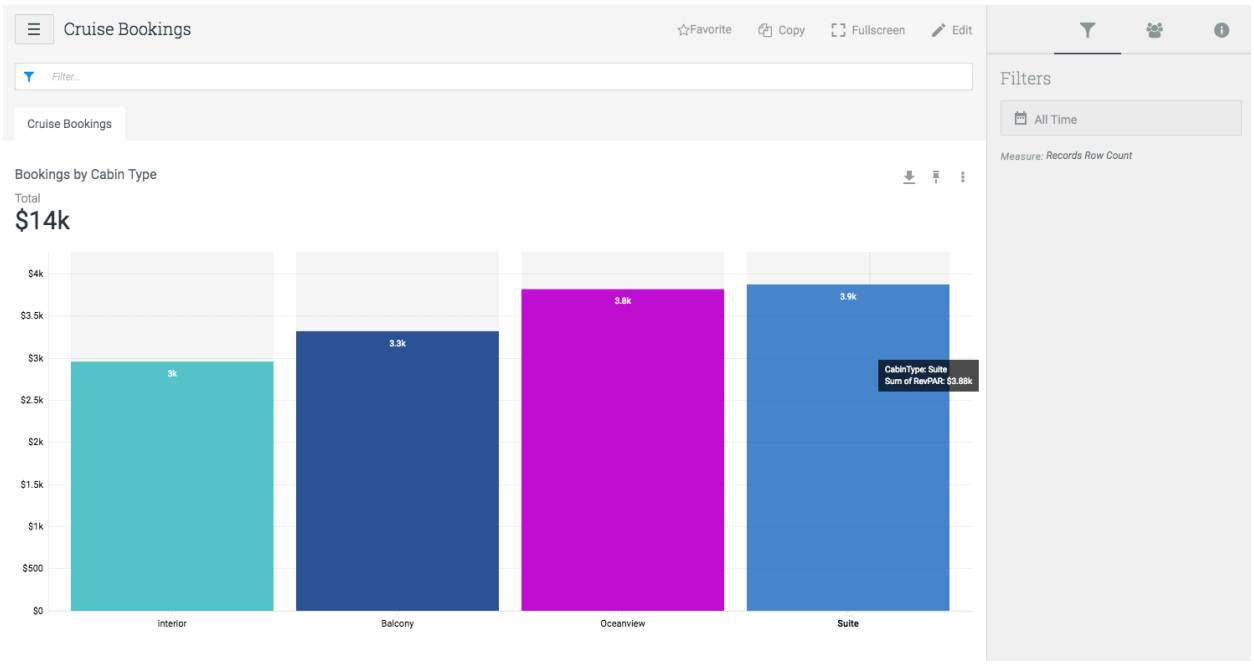
## Histograms and Bar Charts

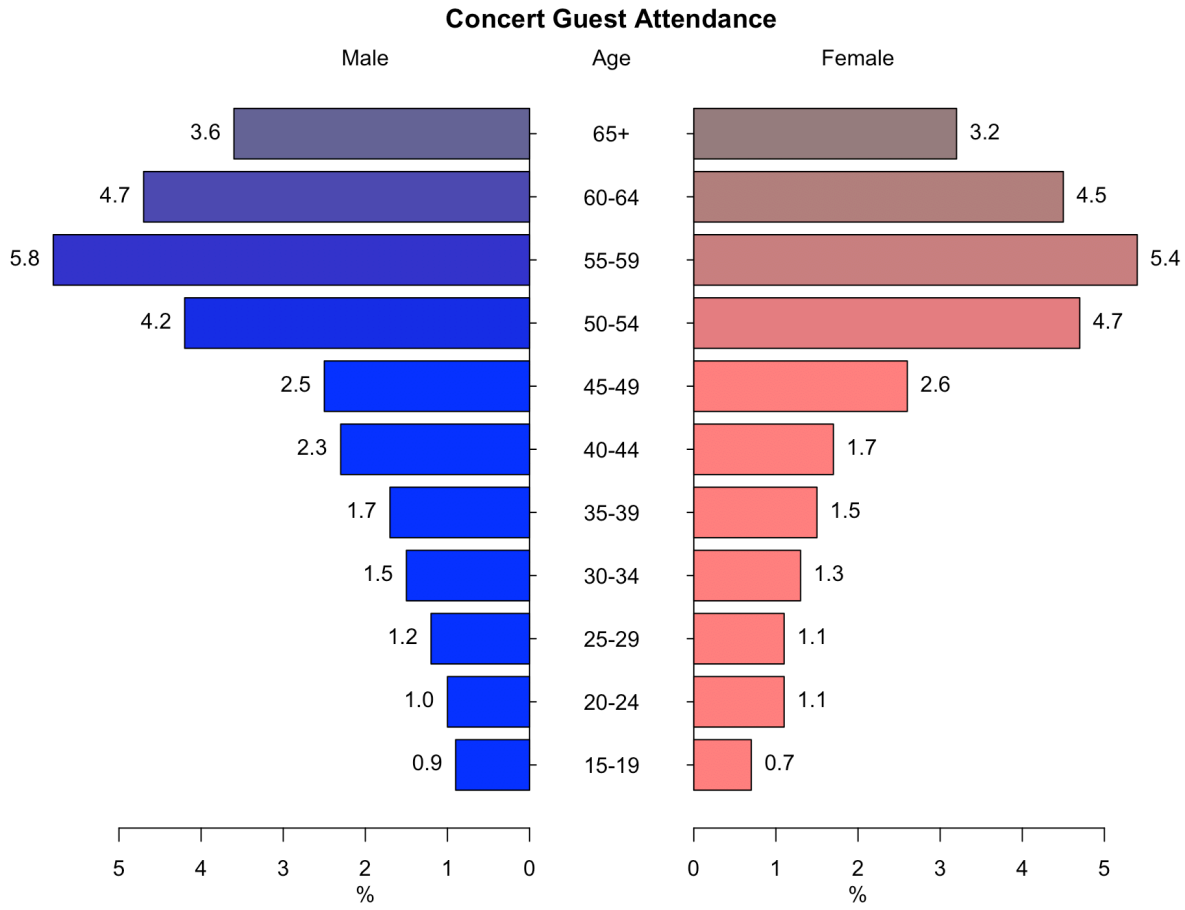
Bar charts and histograms look alike, but they provide different descriptions for your data. A histogram shows data distribution for a single event type over a specified variable. The horizontal axis shows intervals within the range of values for the variable, while the vertical axis shows the frequency (number of data points) found in each interval. A histogram could, for instance, show the distribution of concert guests' ages, quickly informing you that this particular concert attracted mostly older guests.



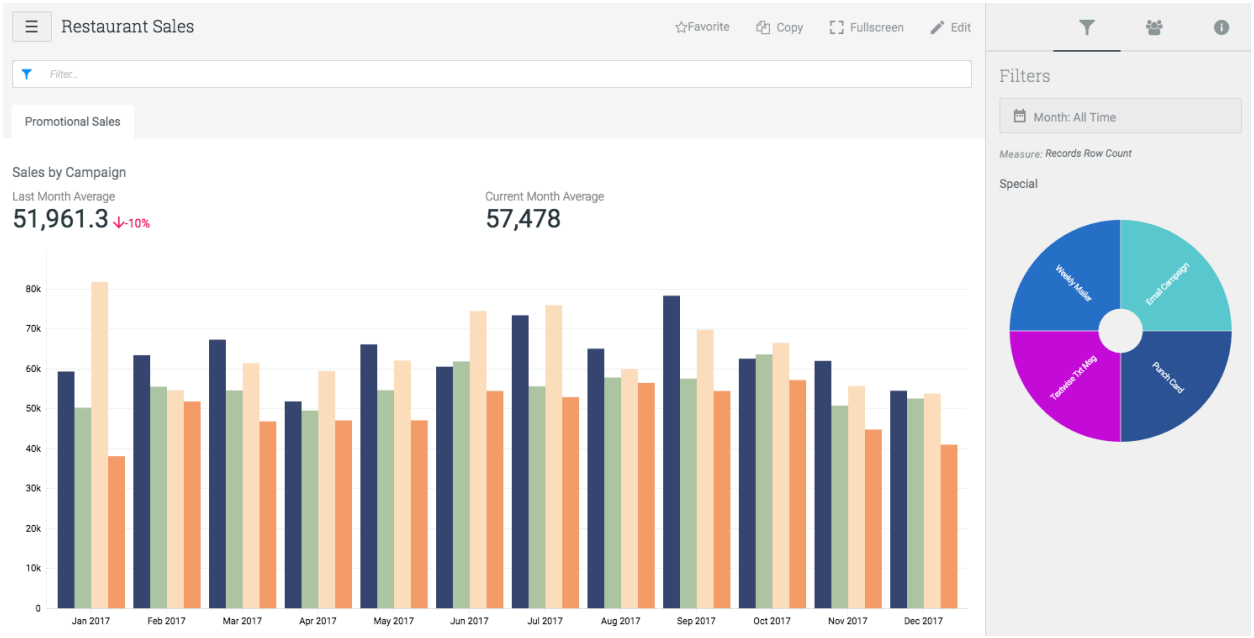

While histograms break a continuous variable into intervals, bar charts compare a specific variable across different categories. For example, a bar chart could compare the RevPAR for different cabin types on a cruise ship. (See next page.)

Histograms and bar charts are great for visualizing how specific variables or services categories compare to one another. You can spot points at which values are concentrated as well as instantly catch unusually high or low data points. Simple bar charts and histograms are formatted with a horizontal and vertical axis. You can also format them as side-by-side comparisons, such as a paired histogram that shows the age distribution of your male and female guests. (Second image, next page.)


Cruise Bookings
Favorite
Copy
Fullscreen
Edit
Filter...
Cruise Bookings
Filters
All Time
Measure: Records Row Count
Bookings by Cabin Type
Total
$14k
$4k
$3.5k
$3k
$2.5k
$2k
$1.5k
$1k
$500
$0
3k
3.3k
3.8k
3.9k
CabinType: Suite
Sum of RevPAR: $3.88k
interior
Balcony
Oceanview
Suite


Concert Guest Attendance
Male
Age
Female
3.6
4.7
5.8
4.2
2.5
2.3
1.7
1.5
1.2
1.0
0.9
65+
60-64
55-59
50-54
45-49
40-44
35-39
30-34
25-29
20-24
15-19
3.2
4.5
5.4
4.7
2.6
1.7
1.5
1.3
1.1
1.1
0.7
5 4 3 2 1 0
%
0 1 2 3 4 5
%

You can also use grouped bar charts to compare “nested” data—in which subgroups are nested within larger groups. A chart like this could compare the sales of your top three restaurant specials over the past twelve months.

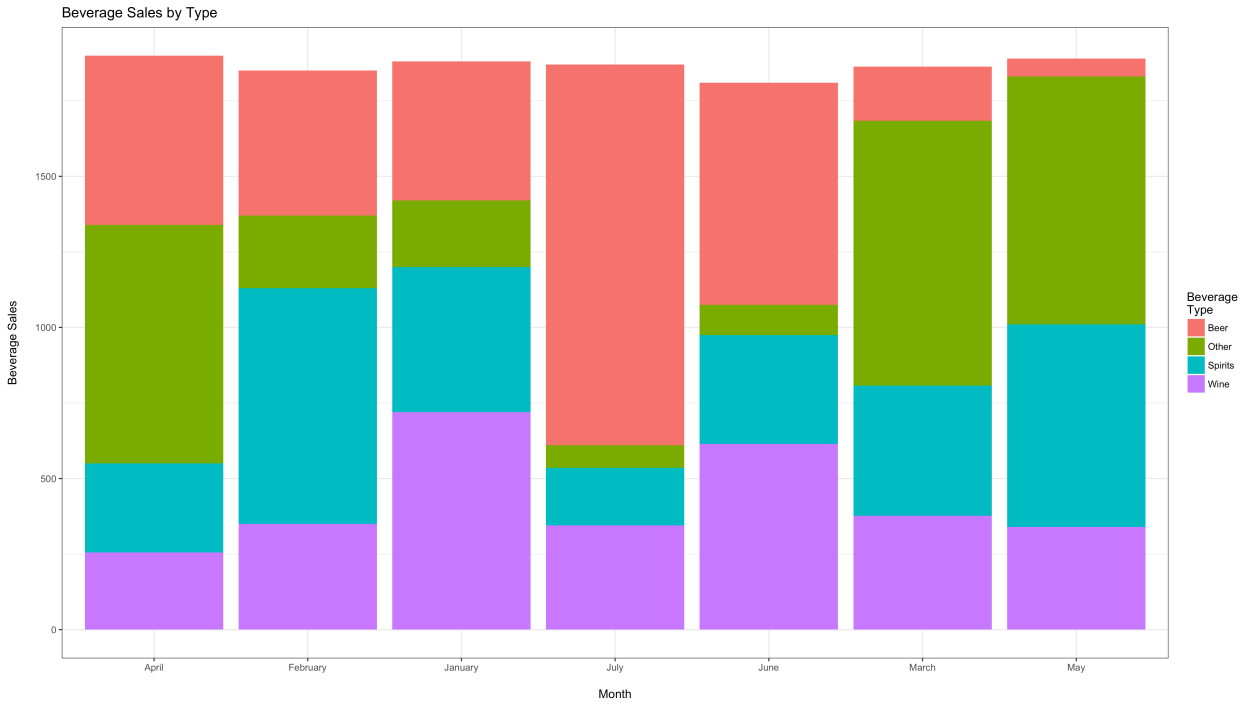


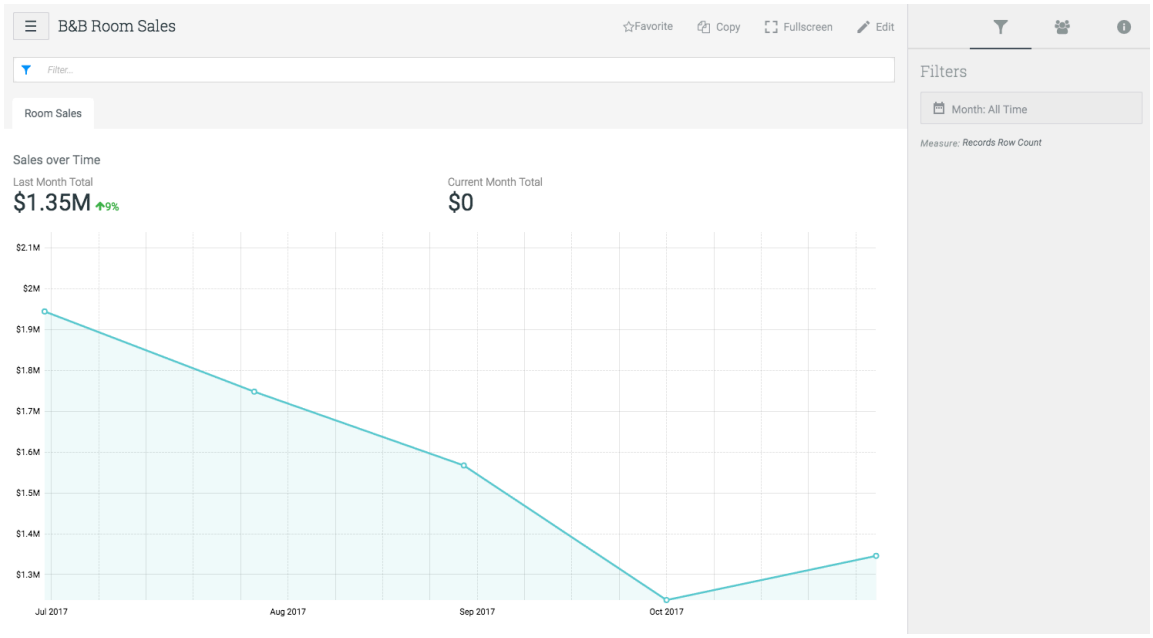

Stacked bar graphs show the proportion of quantities within a single category. For example, a stacked bar chart could compare beverage sales, breaking them into large categories—spirits, wine and beer—and then showing the proportion of specific beverage sales within each category. (Next page.) A quick note: only divide the bars into a few segments, such as your top three beverages within each category. Too many segments make the stacked bar chart difficult to read.

## Line Charts

Line charts show trends over time and explain how trends in different categories compare to one another. If sales in one services category are trending upward, but sales in another category are sagging, it’s easy to see the trend when you view one of these graphs.

In a line graph, the horizontal axis represents an time interval, and the vertical axis represents a numeric measure. A bed and breakfast, for example, could see how total sales of rooms have trended over the past six months. (Second image, next page.)



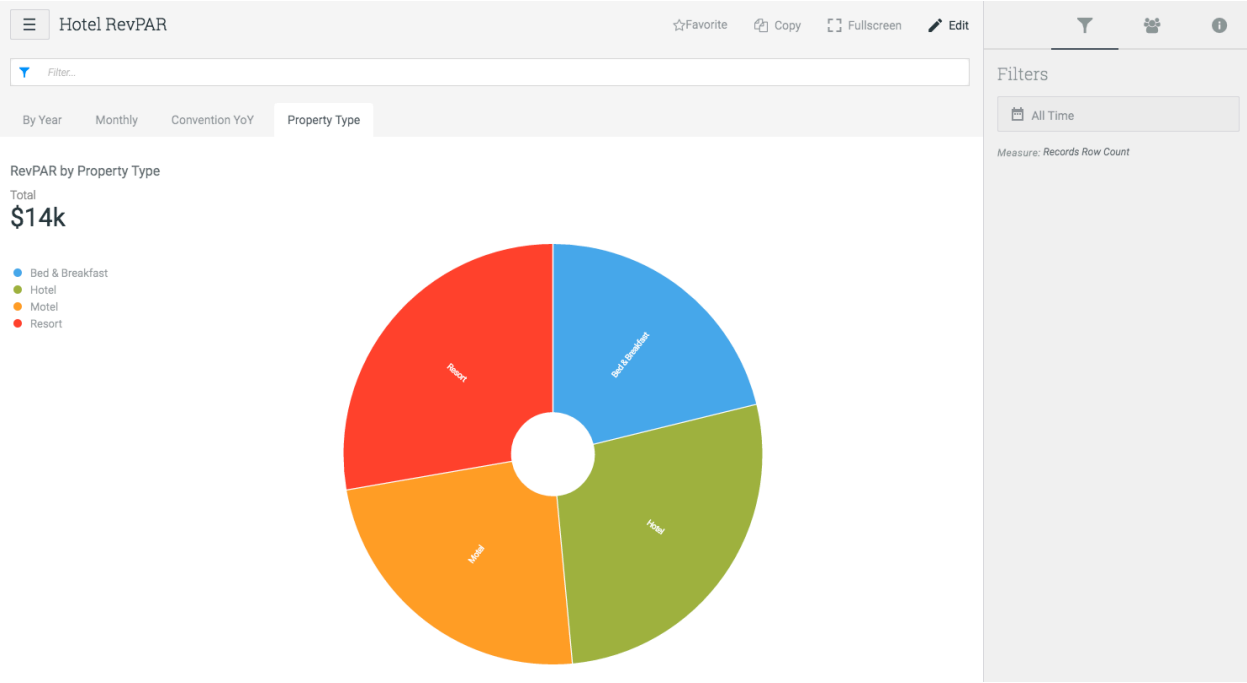




## Pie and Donut Charts

Pie charts split a circle into triangular pieces, comparing proportions to one another. They're great for understanding how much different elements contribute to an overall metric, such as sales or payroll hours. If your hospitality business owns multiple property types, such as motels, hotels, B&Bs and resorts, you could see how much revenue each

property type contributes to your overall profits. With a good visual analytics tool, you can then click on each triangular piece to see how subcategories compare to one another.

Donut charts are essentially pie charts with the middles removed, and usually feel more clean and modern. Their function is identical to that of pie charts, though—they allow the viewer to quickly compare categorical proportions of an overall total.




## Sharing Your Visuals

You've created the perfect visuals for your BI analysis. So what's the best way to distribute them to decision-makers or collaborators? You can either share them as discrete files or, in the case of many cloud-based BI products, you can share insights on the BI platform itself.

You've probably received a report as an email attachment or pulled it up from a file storage solution. You may have also shared it using a file-sharing service like Dropbox. You may have downloaded the file, printed it out and then physically handed it to other people. The best BI solutions let you create interactive reports and share them with others in your organization. Instead of sending email attachments or links, your BI software notifies the people you select that your file is available. You set permissions,

such as whether your visuals are read-only or whether collaborators have the power to edit them.

Sticking with this form of file sharing, as opposed to using email attachments or consumer file sharing software, has big security benefits. A good BI solution only allows data to be shared with people who are authorized to view it. It also tracks everyone who has access to the data in case changes to access privileges need to be made. This workflow eliminates the possibility of accidentally sharing data with someone who shouldn't have access to it. It also protects your business from violating regulations and data privacy rules.

The two-dimensional graphs you may be used to sharing? Those are so 20th century. Thanks to BI tools with visual analytics, you can share interactive visuals, giving collaborators the opportunity to explore your data. Even better, with cloud-based BI software, they can access your visuals 24/7—using any authorized device, anywhere in the world, at any time.

***What Slows Down Your BI?***

*For your employees to get the most from BI, you can't give them a slow-loading mess that moves more slowly than users can come up with questions.. BI has to speed up their decisions, not slow them down.*

*The hospitality industry faces some unique BI software performance challenges. At a midtown hotel in New York, it's not hard to get good network performance. But what about at a ski resort on a remote mountainside—or in a cruise ship on the open ocean?*

*If your dashboards are slow to load, the most likely culprit is poor database performance. Connectivity issues may also play a role, including slow internet connection.*

*When you purchase your BI software solution, ask your vendor about average speeds and speed guarantees. Also, try deploying BI software on a small scale in different settings—for example, your hotel in Manhattan and also your hotel in rural Kentucky—to see the difference in performance at each location and to come up with plan for improving your*

*infrastructure. If you need to locate some data closer to the users in certain locations, figure out how to make it happen. Cloud software offers amazing advantages for your business, but you still need speedy connections for those solutions to be viable.*

### Communicating With Stakeholders

We view visual analytics to understand our data for ourselves, but we also use our visuals to present information to others. When it's time to present to a decision-maker, like a manager or an investor, your BI software helps you make your case.

Instead of printing reports, copying them and putting together binders full of information, you can share reports and graphs with your audience before the presentation starts. This gives them a chance to explore the data independently before you deliver your recommendations. As you present, they can access the reports you shared on their own laptops, smartphones or tablets. When you tap a section of a pie chart to dig more deeply into a key performance indicator (KPI), they can do the same thing.

You can verbally explain financial results or try to make an argument for a business decision. When you add visual analytics, decision-makers see that there's evidence behind your arguments. They understand the problem you're analyzing, the reasoning behind your hypothesis and the probable outcomes of the solutions you want to implement.

## Conclusion

In Chapters 1–3, we've provided a way for you to approach hospitality industry BI even if you aren't a data scientist. You've learned to construct thoughtful questions, formulate and test hypotheses and present your findings to others.

In the next few chapters, we'll discuss the ways hospitality businesses use BI to improve their daily operations. From marketing to maintenance, we'll see some practical ways to streamline processes, cut costs and increase revenue—and how to use BI to plan for your company's future.

Chapter Four

# Boost Sales and Marketing

Business intelligence (BI) can provide powerful insights into the success of sales and marketing efforts. Used in conjunction with marketing automation software and customer relationship management (CRM) tools, it can help you understand what drives guests to book your hotels, cruise on your ships, and vacation at your resorts.

As marketing and sales go more digital, traditional advertising channels don't have as much power. Although digital marketing requires investment in a wider range of channels—social media, content marketing, pay-per-click ads, search engine optimization, etc.—it also yields a tremendous amount of valuable data.

With BI, your hospitality business can learn which marketing and sales efforts worked best in the past and what wins customers in the present. The data you collect can also become an information stash that you can mine for insights into your marketing future.

## Identifying Your Ideal Customer

Who are your guests? How do they find you? What do they buy from you? These are all important questions, but with BI, you can take them to the next level: how do certain characteristics about your guests correlate with certain purchasing decisions?

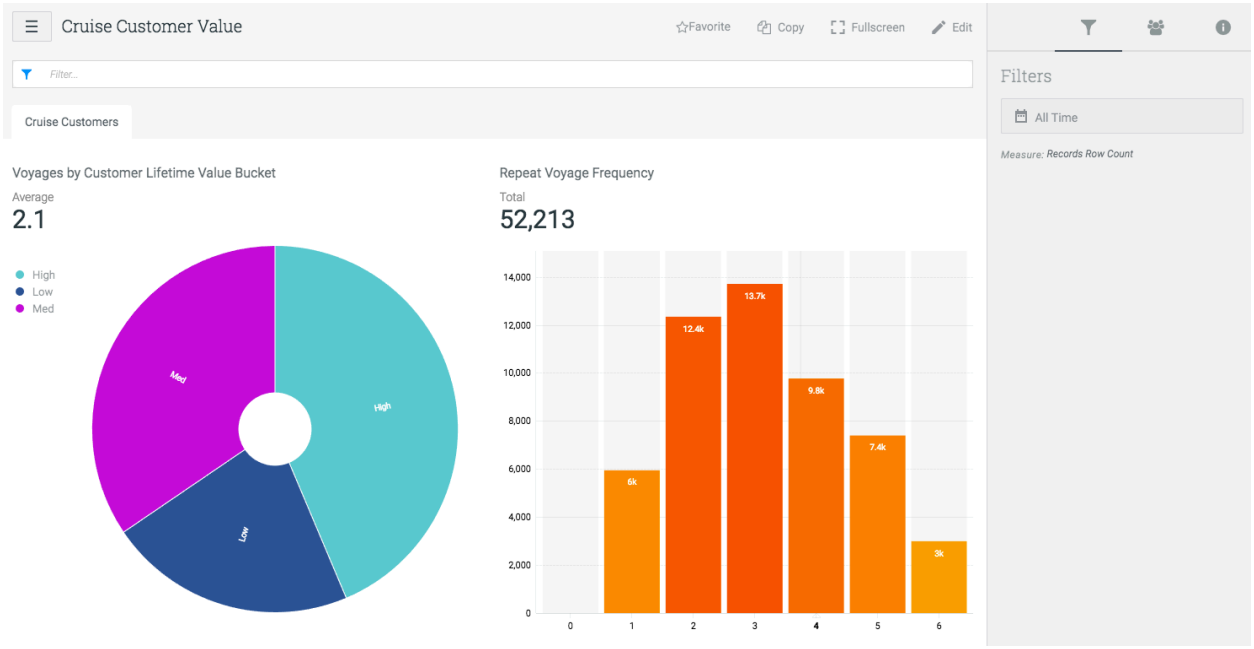
Imagine you own a cruise vacation line that's struggling to stay competitive. Once in the Top Five, you've slipped in the rankings and are struggling to turn a profit. You haven't changed your marketing strategy in years; you still advertises heavily on television and in travel magazines. However, you're now spending a lot more money for every new customer you acquire—and you're not acquiring many new customers.

This cruise line has a question that almost any hospitality business has: how do we win more customers while spending less on marketing and advertising? After defining its unique givens, constraints, and relationship factors, let's say we set a goal of booking 1,000 new customers within the next six months. So what kinds of people do we want to target? BI can help us find out.

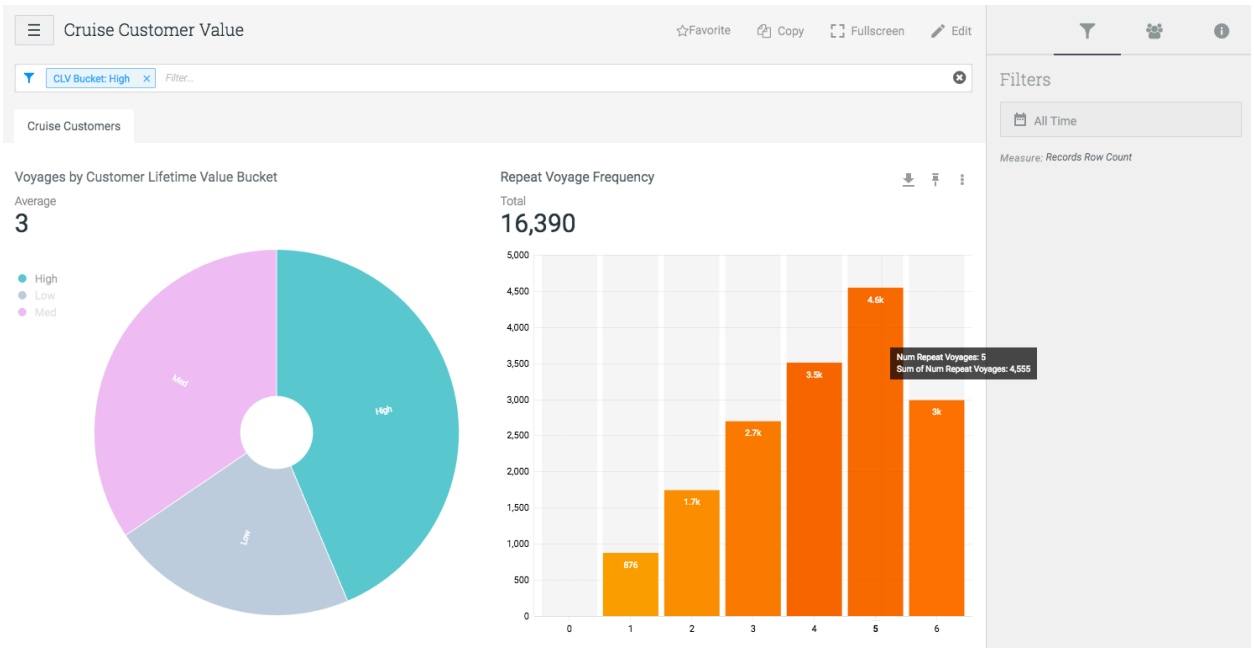
## Who Are Your Current Top Customers?

You're probably familiar with the Pareto principle: 20 percent of your customers generate 80 percent of your revenue. To build a profile of the ideal customer, you need to know who those 20 percent are. Who are the customers that spend the most money right now? Who are the customers who keep coming back? You can your cruise line's customer relationship management (CRM) system data to build a profile of your ideal customer.

Start by using your BI software, querying data to find out which customers spend the most money over a lifetime.




Your team can then perform a second query to see which customers have booked the most repeat voyages. In this intersection—who spends the most and who books the most—lives your current ideal customer. (See next page.)




Starting with this list, your marketing team can build a profile of the ideal customer. This profile will include both demographic and psychographic characteristics, like gender, age, marital status, family size, etc. But looking for random coincidences within these characteristics is an inefficient way to find the ideal customer.

As they explore the data around their current best customers, your marketing team should do more than ask how old they are or if they're married. Lincoln Murphy, founder of Sixteen Ventures and frequent speaker on customer success, suggests thinking of the ideal customer as ready, willing, and able.

Ready means:

- They have a problem they need to solve (e.g., they have a milestone anniversary coming up and need a special gift for their partner).
- They know they have a problem.
- They feel a sense of urgency about the problem.

Willing means:

- There are influential forces driving them to act, such as people or circumstances.
- They're exploring options for solving their problem (e.g., they've been pricing cruise options and reading reviews).
- They're prepared to take action.

Able means:

- They have the means to book with you.
- They have the authority to make purchases.
- Their circumstances align with what you provide (e.g., they can take vacation time available for a trip to The Bahamas).

Qualitative data, such as what marketing learns from surveys, can be a good starting place. For example, if guests respond to surveys saying they booked a cruise because they wanted a vacation, consider data that's predictive of people who are ready, willing, and able to take a vacation:

- **Ready:** perhaps they haven't been on vacation in a while, or they take vacations at predictable intervals.
- **Willing:** they've visited your website multiple times to check prices, booked with you in the past, and given you positive ratings.
- **Able:** they've worked at the same company for a long time, which means they've accrued vacation time, and their income data shows they have money to spend.

All of these answers can be found by filtering through your BI data.

You've built a list of customers who spend the most and book the most. Now, filter that list by one of your ready, willing and able data points; for example, which customers have booked two or more cruises in January, which suggests they vacation at predictable times.

Then, review the list of high-revenue, frequent bookers who have booked two or more cruises in January by income levels. Then, bring in your marketing automation system data to see how often these customers viewed prices before booking a trip. Eventually, you'll see the intersection of many characteristics, and these characteristics will comprise your ideal customer.

***EXPERT TAKE: Customers That Stick***

*Sixteen Ventures' Lincoln Murphy says when constructing your ideal customer profile, don't forget these three things: success potential, customer acquisition cost, and customer lifetime value.*

- ***Success potential****—the potential for the customers to stay with you long term, purchase more over time, and become an advocate for your brand.*
- ***Customer acquisition cost****—what you spend to acquire each new customer, and some net more profit than others. Also, think of costs not only as what you spend on marketing campaigns but also your expenditure in time—and in the opportunity costs you give up to acquire this customer.*
- ***Customer lifetime value****—what a customer will spend over the course of their lifetime with your business.*

*Murphy says that some of these factors relate to what the customer brings to the table, but other facts relate to your business. When it comes to acquisition cost, for instance, you have to weigh whether spending more to expand your capabilities will yield enough return on investment to justify the increase in acquisition cost.*

*In the same way, maximizing a customer's success potential and lifetime value relies on your ability to respond to the ways the customer's circumstances, wishes, and requirements evolve over time. It's a complex relationship—and BI can help you understand every angle.*

# How Do These Bookings Take Place?

Once you've identified a group of your core best customers, ask yourselves how you acquired them. You can revisit their survey answers to the "How did you hear about us?" question, or you can review online data to see how they got to the point of booking a cruise. For example, did they click over from a Google search? Did they click a social media promotion? Did they respond to a marketing email? Answering these questions will help you visualize your current sales funnel.

The sales and marketing funnel probably isn't a new concept to you, but just in case it is, let's give a definition: it's the journey customers take as they go from being leads to becoming guests. Dave Burnett of AOK Marketing visualizes the customer life cycle in four steps.

## Step 1: Contact

A lead encounters your cruise line for the first time or enters your marketing automation system as a lead. Maybe they downloaded a brochure, clicked over from a review site, clicked over from a Google search, or responded to a forwarded promotional email from a referring customer.

## Step 2: Consider

Before they made a booking, your leads weighed the option of booking with you versus booking with competitors or choosing a different form of recreation. Query your BI data to understand the journey they took as they considered booking a cruise.

- How many visited a certain web page or series of pages before booking?
- How many booked from which third-party reservation sites?
- How many called your customer service center before booking?
- How many clicked over from a review post, like USA Today's list of cruise line and destination reviews?

- How many clicked over from a list post on a travel site, such as an article listing the best cruise vacation destinations?
- How many clicked a certain social media promotion, and from which social network?
- How many customers read a social media post or article about an influencer before booking a cruise?
- With what frequency, and over what interval of time, did people interact with you (e.g., clicking or liking social media posts, visiting your website, reading reviews of your cruise line, calling your customer service center about promotions), from the moment they became leads to the moment they booked a cruise?

The Consider stage is fertile ground for BI because you can not only look at which channels customers use to find you, but which specific messages are most effective. You can test elements from the button locations on your web pages to the messages in social media ads to find the secrets to bring your leads to the point of conversion.

## Step 3: Convert

Congratulations! Your lead became a guest and booked a cruise – but what made them make the final decision? Use your BI software to see exactly what happened before your best guests made a purchase.

- How many used a promo code before booking?
- How many clicked a “Book Now” link in a promotional email?
- How many booked from a third-party online reservation site?
- How many clicked an influencer link?
- How many received a direct mail promotion and called your customer service center to take advantage of it?

## Step 4: Care

After a guest has enjoyed a cruise, you want them to book again with you as frequently as possible, and you hope they become advocates for you by sharing their good experience. The Care step of the sales funnel, or customer retention, is a careful balance of giving and asking.

- **Giving** in terms of thanking them for vacationing with you, providing rewards for ongoing loyalty, and incentivizing them to keep coming back with the perfect promotions. It can also involve giving them new information, or even giving them a reason to be proud of you, such as by sharing your corporate social responsibility initiatives.
- **Asking** in terms of requesting that they leave reviews, advocate for you online, and refer others into your sales funnel. When they do something for your business, reward them— you'll make them want to keep helping you out.

BI can help you decide how best to stay in touch with guests after their trip, what encourages them to return, and what additional purchases they might make in the future. It can also help you continually tell guests how much you appreciate them.

***EXPERT TAKE: The Best Uses for Social Media***

*Dave Burnett, CEO of AOK Marketing, says that businesses should focus their social media marketing on the Contact and Care portions of the sales funnel as opposed to using social media for the hard sell.*

*He likens selling on social media to painting with a hammer: you can get it done, but why would you not use a brush instead? Only 10 percent of leads, in his experience, actually convert over social media.*

*"No matter their age, virtually anyone who engages with your brand on social media wants to get to know you. So, don't expect them to buy—expect to build a relationship over time. For existing customers, surprise and delight them with exclusive access to your products,*

*promotions or information they may find relevant."Sixteen Ventures' Lincoln Murphy says when constructing your ideal customer profile, don't forget these three things: success potential, customer acquisition cost, and customer lifetime value.*

- ***Success potential**—the potential for the customers to stay with you long term, purchase more over time, and become an advocate for your brand.*
- ***Customer acquisition cost**—what you spend to acquire each new customer, and some net more profit than others. Also, think of costs not only as what you spend on marketing campaigns but also your expenditure in time—and in the opportunity costs you give up to acquire this customer.*
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*Murphy says that some of these factors relate to what the customer brings to the table, but other facts relate to your business. When it comes to acquisition cost, for instance, you have to weigh whether spending more to expand your capabilities will yield enough return on investment to justify the increase in acquisition cost.*

*In the same way, maximizing a customer's success potential and lifetime value relies on your ability to respond to the ways the customer's circumstances, wishes, and requirements evolve over time. It's a complex relationship—and BI can help you understand every angle.*

## It's Only the Beginning

We started this exercise by looking at our best customers—the ones that spend the most money and book the most trips. The Pareto principle tells us it's smart to know who our top customers are and then to nurture those relationships and try to acquire other customers just like them.

At the same time, don't forget these three important points:

- **Today's 20 percent may not look like tomorrow's 20 percent.** If you could jump into a time machine and look at your ideal customer five years in the

future, they may look a lot different from the profile you just built. BI can ensure you're always adapting, ensuring you're ready to serve tomorrow's ideal guest.

- **You still need to do business with the other 80 percent.** Even as BI helps you target the ideal customer who forms the backbone of your business, you still make incremental revenue from one-time and occasional customers. Allocate some of your marketing time and budget to new ideas aimed at off-profile customers. You never know when you'll make a discovery that could take your business in a new direction.
- **Groups are people, too**. Don't just build a profile of the ideal individual customer. Whether you're reaching out to corporate customers or celebrating individuals at milestone occasions in their lives, like honeymoons and anniversaries, look for ways to acquire big groups of customers for single events in your properties.

Establishing more long-term relationships requires creating an unforgettable guest experience. We'll tackle that project in our next chapter—and we'll discover how BI can help.

Chapter Five

# Create Unforgettable Guest Experiences

Guest experience has always been a critical differentiator between hospitality companies. In today's market, social networks, review sites, forums, and blogs have given customers much bigger megaphones for expressing their happiness—and unhappiness—with hospitality brands. Traditional advertising, in print and television, let hospitality brands set the message. Now, an advertising message that runs contrary to customer experiences gets a flood of online pushback.

Fifty years ago, one unhappy customer might share a complaint with 10 friends. Today, one unhappy customer could write a scathing review seen by millions of people. When customers are unhappy, they're 41 percent more likely to share a negative experience online. Business intelligence (BI) can help hospitality businesses evaluate their current guest experiences, improve them and develop innovative new experiences to keep guests coming back.

We've already talked about BI and marketing—the work that goes into earning that initial booking. In this chapter, let's focus on delivering outstanding customer service—the work that keeps guests coming back.

## Attracting Guests

Every customer values factors like room quality, price, reputation, and location when choosing a hotel. Research from Gallup, however, finds that creating a tailored hotel experience, personalized to your customer and your market segment, is the key to earning repeat guests.

Guests who are fully engaged—in other words, who feel an emotional connection with your brand—deliver a clear financial premium. In the luxury segment, where one-third of guests describe themselves as engaged, they spend an average of $910 per year with their favorite hotel brands.

In the economy segment, however, where only 12 percent of customers say they're engaged, the average customer spends only $176 per year at their favorite hotel. In fact, 1 in 4 economy customers say they're actively disengaged from their favorite hotel brands; in other words, they feel no emotional connection or loyalty. You may initially think, "they spend less because economy room rates are lower," but even when Gallup controlled for pricing, economy guests who described themselves as fully engaged spent more than their disengaged counterparts.

Only 29 percent of companies that collect customer feedback use it systematically to make decisions. Yet businesses with robust, relevant Voice of the Customer (VoC) programs earn year-over-year annual revenue increases 10 percent higher than their less attentive competitors.

Guess what other benefits come from paying attention to your guests?

- 55 percent greater customer retention rates
- 23 percent lower customer services costs
- 292 percent higher employee engagement rates

## How Do Guests Choose Rooms? Depends on Your Market Segment.

Smart brands know a great guest experience begins long before a guest sets foot on your property. The way your staff conducts itself on the phone, online images of your hotel, your booking experience and your brand's overall all affect whether a guest chooses to book with your brand.

- **In the luxury segment, Gallup found that guests rely on their own judgment when choosing a hotel.** Overall brand reputation or word of mouth matter less to them than the look and feel of your hotels.
- In the midscale segment, guests rely on friends and family members for recommendations. Their online research means less to them than the word of people they know.
- **In the economy segment, website quality and your hotel's brand reputation matter more than anything else.** But don't underestimate the value of a quality experience when guests arrive, especially if you want repeat customers.

The more exclusive your property, the more building a relationship with customers matters. BI helps you develop insights into what's most important as you build that relationship.

## BI Use Case: Booking Experience

Let's say you run a chain of hotels, you'd like to increase your bookings over the next three months. Your BI data tells you booking sources break down as follows:

- From your domain: 30 percent
- From third-party websites: 30 percent
- From calls to your customer service center: 20 percent
- From your mobile app: 10 percent
- From a "Book Now" button on Facebook: 5 percent
- From ads and referrals that lead to a landing page: 5 percent

Let's also assume you've taken guest satisfaction surveys, in which you've asked questions about the booking experience you offer. Using BI software, you can assess which booking sources deliver the highest scores on customer satisfaction.

Suppose your BI reports return the following information about whether guests were satisfied or very satisfied with:

- Your website: 60 percent
- Third-party websites: 90 percent
- Your customer service center: 75 percent
- Your mobile app: 98 percent
- Facebook: 95 percent
- From ads: 95 percent

Thirty percent of your reservations come from your website—customers who type in your URL or find you on Google—but only 60 percent of your customers are happy with the experience. Your customer service center also shows some weakness: 1 in 4 guests hangs up having had a *not* great experience. Together, these sources are half your booking volume. How many more bookings could you generate if more guests had positive opinions of them? And how many potential guests have hung up on your customer service agents or navigated away from your website without booking a room?

*How many of your guests are either not engaged or actively disengaged before they get in the door?*

According to iPerceptions research, prices are the top reason guests looking at hotel sites online choose not to book a room. After that, the top two deterrents are booking problems and inability to find information. With BI, you can drill down into the reasons why customers can't complete bookings or find your website hard to navigate. You can create a pie chart that shows you which issues are the most bothersome, so you can set priorities for addressing them.

What you're not doing well is only half the story. Let's examine what you're doing right. For example, look at the satisfaction rate on your mobile app: it's at 98 percent. The Facebook "Book Now" button, along with the ads and referrals that lead to landing pages, are also making your guests happy.

Now you have a new BI query: why are guests who booked via mobile app, Facebook, ad or referral button so much happier? Dig into your data to see what they've said. Just as

you used BI to figure out why customers weren't satisfied with your customer service center and website bookings, use BI to find out why they like your mobile and landing page experiences. Maybe the design and workflow of your app and landing pages is better than the navigation on your website. To improve guest experience, you can both promote mobile booking options and imitate the landing page design on your primary web pages.

## Taking Care of Guests While They're With You

Gallup also found an interesting factoid about luxury hotel guests: they prefer a lobby that communicates energy and enthusiasm when they walk in. They're less likely to stay in hotels where the lobby feels too orderly and businesslike. They're also less likely to stay in hotels with chaotic lobbies that look disorderly.

Also, guests from all market segments think some hotel amenities are unnecessary.

- **Many guests will pay more** for comfortable beds, better internet connectivity, better television sets and cable options, and responsive employees.
- **Many guests would be okay if you got rid of some amenities and charged them less**, such as your hotel retail shops, the hotel bar, in-room bar, bathrobes, valet parking, concierge services, fitness centers and luggage services.

Gallup's insights about hotel guests are industry wide, and they're a great starting place for building a better guest experience. They're no substitute, however, for understanding your own guests' preference. Remember, the key is to create a tailored experience that takes your market segment into account but also honors the unique guests who engage with your brand. BI can help you develop a distinctive guest experience and evolve it as your business changes.

You should use both quantitative and qualitative data for performing a BI analysis related to guest experience. Quantitative data may include numeric ratings on guest surveys and review site ratings, while qualitative data could be social media feedback, customer call recordings and letters from guests. You should be looking for feedback on a wide range of issues, including:

- Condition of the property, including maintenance and housekeeping issues
- Food and beverage quality, room service
- Staff interactions
- Amenities
- Add-on experiences, like tours from a hotel or on-shore excursions on a cruise ship
- Souvenirs and other add-on purchases
- Other experience factors (e.g., noise levels, toiletries, available cable channels and movies, etc.)

BI can help you understand what has pleased guests in the past. Even better, it can help you catch problems and seize opportunities in real time.

For example, your BI dashboard might show you that your hotel, resort, or cruise ship isn't meeting its weekly dining revenue targets. Onsite feedback from guests, along with social listening, may reveal why guests are choosing to dine elsewhere: prices, dining choices, issues with staff, etc. You could then offer a mid-week coupon, serve up a special or conduct some coaching that would make guests happier—and boost lagging sales before the week goes into the books.

## Keeping in Touch After Guests Leave

Guests return to your properties based not only on the experience they had but also on your persistence in maintaining a relationship long after the stay. With BI, you can learn which communications channels guests want to use to stay in touch with you, whether it's via email marketing, social channels, or mobile notifications.

You can use BI to optimize your loyalty program. You can test discounts versus points, analyze the effectiveness of promotions and design even better incentives to encourage guests to return.

***EXPERT TAKE: Intent to Return***

*Mark V. Lomanno, partner and senior advisor at Kalibri Labs, says the most valuable score hotels should look for is a guest's intent to return. He suggests that it's more valuable than the existing one- to five-star scales offered by existing review sites for predicting occupancy, room rate performance and short-term financial performance.*

*As part of a team, he developed a metric called Social Retention Index (SRI) for evaluating guests' intent to return, based on a blend of unstructured qualitative review data collected from customer review sites. First, he suggests building a market SRI baseline based on existing reviews of both your properties and your local competitors'. Second, map your SRI over the baseline average, along with competitor SRIs, over a 12-month period.*

- *If you're achieving a consistently higher SRI, consider raising your rates or boosting your occupancy or RevPAR goals.*
- *If you're achieving a lower SRI than your competitors, dig into your guest feedback to understand why they don't want to return. Address your issues, and use rates and incentives to woo customers back.*

*With 84 percent of Americans saying they make spending decisions based on online reviews, Lomanno suggests going beyond just mapping guest sentiment. Transform it into smart business decisions using SRI.*

Finally, in the online age, reviews are more important than ever. It's about more than racking up gold stars. It's about incorporating guest feedback into your operations. What do your top-booking guests say about you online? Are any of your properties underperforming in terms of guest satisfaction? BI can help you unlock the "why" behind disappointing reviews. Share your findings with your team so you can remediate problems and come up with an action plan for boosting scores.

In the Fortune 100, only 14 percent of companies currently use data and business intelligence to make decisions that affect customers. *Fourteen percent*. It's not hard to see the competitive advantage of harnessing BI to improve guest experience.

## Up Next

Can you guess which factor has the highest positive effect on guest experience? Attentive employees who can help guests solve problems. BI can help with that, too. Check out the next chapter to find out how.

Chapter Six

# Happier Employees, Happier Guests

> *"It is remarkable how much time and money owners and operators will spend considering the tiniest of details of architecture, décor, and operational minutiae relative to the most important asset of all: their people."*
>
> *Joseph Smith, Executive Vice President, Chesapeake Hospitality*

What's the No. 1 thing that makes guests book repeat visits? Employees who have the problem-solving skills to provide world-class service. Guests that are extremely satisfied with the way an employee resolves a problem are twice as likely to have an emotional connection with a hospitality brand.

When guests' problems aren't solved to their satisfaction, they're three times less likely to be fully engaged with the brand or property. Unfortunately, employees only handle 1 in 7 problems to the level of excellence.

If happy customers represent a 23-percent premium to hospitality businesses, and unhappy customers equal a 13-percent discount, you can't cut corners when it comes to hiring talented employees. Capable, satisfied employees unleash revenue and productivity.

- At the Top 10 2014 Fortune Magazine Best Companies to Work For, revenue increased by 22.2 percent, and these businesses hired five times more employees as the national average.
- Happy employees are also 12 percent more productive, and unhappy employees reduce productivity by 10 percent.

Business intelligence (BI) is a powerful tool for building a world-class staff, organizing their schedules and deploying them to create an outstanding guest experience. Let's look at some scenarios.

## Hiring and Developing Talent

How do you define a successful employee? Although the answer differs from business to business, success in hiring is a double-sided coin. On the employee side, the employee excels at the job and finds satisfaction at work. On the business side, the company retains the employee for a good length of time and cultivates them for bigger responsibilities.

BI gives us the tools to dig into our data and develop an ever-evolving formula for success. It answers questions like:

- What qualities make employees excel in a given position?
- What makes employees report satisfaction with their jobs?
- What are the biggest drivers of employee turnover?
- What characteristics do promotable employees possess?

Investing in employees can take a good hospitality business from good to great—and help a business in big trouble change course for the future.

***REAL-LIFE SUCCESS STORY: Southwind Hospitality***

*After the Great Recession of 2008, many Florida hotel properties struggled to stay afloat. Southwind Hospitality was retained by a lending institution to assist with three distressed properties, serving as receiver for a bankruptcy court. In addition to needing physical*

*attention, the properties had other problems, including low employee morale and plummeting guest satisfaction scores.*

*Using business intelligence tools, Southwind looked for ways to increase the properties' profitability. One of their first initiatives was to hire and develop employees with stronger skill sets for guest service. In addition, Southwind's analysis showed the need for a management change.*

*After hiring new associates and training skilled associates who were already on the payroll, and after investing in new managers, Southwind undertook other initiatives, like cutting food and beverage costs, restructuring and repositioning rooms, and established a framework for a better guest experience. The results speak for themselves:*

- *10 percent overall revenue increase*
- *Booking volume increase*
- *Increased hotel visibility in the community*

*By the time Southwind finished its work, the three hotels were ready to be sold by the lender—and well on their way to profitability. Southwind recognized the importance of starting with people first before tackling other initiatives.*

Here are some ways you could use BI to build a profile for employee success, using a ski resort as an example:

- Examine data from recent employee reviews. What was the average score for employees in specific positions on different performance metrics? Did those scores differ between high-performing business units and low-performing units?
- Review surveys related to employee satisfaction. Which benefits and perks went the longest way toward making employees happier? For which benefits and perks would employees be willing to accept lower pay? What constitutes competitive pay in your region, in relation to other ski resorts?

- Analyze data from employee exit interviews. How long did the average employee stay with your resort, and how did retention times differ across departments? What factors most commonly contributed to an employee choosing to change jobs?
- Take a look at employees who received promotions within the last fiscal year. At which performance metrics did they excel? What steps did managers take, such as extra training, to help them achieve promotion?

As you experiment with initiatives to create a successful staff—better hiring, better salary/wage and benefits packages, improved retention and training programs—establish success metrics and monitor them using your BI tools. Continue asking questions; for example, could you get as much employee satisfaction increase from giving employees more time off for skiing as you could from increasing wages? Experiment again and again to create a successful employee profile and improve service for your guests.

## Greater Growth Through Diversity

Don't forget another critical staffing initiative: increasing diversity. Diversity isn't about hitting numbers targets. It's about unleashing innovation within your organization. For example, organizations with gender diversity in their executive teams demonstrate better financial performance. When a team of one ethnicity has a manager of a different ethnicity, teams show a 14-percent increase in productivity.

Just understanding the demographics of your workforce isn't enough. You need to understand the ways women and minority groups experience your company:

- Do women and minorities receive pay increases, in terms of amount and frequency, that are on par with the increases given to non-minority employees?
- How does turnover differ between employees of different genders and ethnicities?
- Does a female or minority employee take a similar path to promotion as a non-minority employee?

As you can see, BI has a significant role to play in building a more effective, happy and productive staff.

## Scheduling

Many hospitality businesses, such as our fictional ski resort, have seasonal cycles. Ski resorts need far fewer staff in the summer than during the winter months. Resorts also have different employee deployment patterns depending on time of day and guest volume. BI helps resorts and other hospitality businesses build cost-effective schedules that ensure the highest levels of customer service.

## Mapping Work Demand

Although some work demands are unpredictable—for example, if a ski lift needs emergency repairs—many of the tasks employees do can be matched to demand. In a restaurant, managers schedule the most wait staff when volume is highest; ski instructors don't work in the off season. Using BI, you can analyze data to understand work demands at different properties.

Work demand can be further segmented by the type of work employees do. At most resorts, employees fall into four rough categories:

- **Customer-facing.** From chalet hosts to bartenders to massage therapists to instructors, many resort employees perform hands-on customer service jobs with high demand variability. For instance, outfitters have little work after dark, but restaurant workers work a variety of morning, mid and evening shifts.
- **Back office**. Resorts need accountants, sales teams and other professionals to perform necessary but behind-the-scenes tasks. Work demand doesn't vary as much in these positions.
- **Physical plant**. Workers who take care of repairs and equipment, as well as maintenance of buildings and grounds, have predictable work demand for many tasks, but they also have to have emergency availability, which can lead to overtime costs. In many cases, physical plant workers move between

properties and sites, so it becomes challenging to track both worker locations and who's working on what tasks.

- **Management**. Ski resorts are busy morning, noon and night, and managers can't expect to work a 9–5 schedule. Like customer-facing employees, work demand can be variable, but because the work week can exceed 40 hours, resorts have to consider overtime costs when scheduling managers.

As you create a scheduling matrix, it's crucial to consider other metrics besides just overall ticket yield and skier visits. BI gives you a more granular view of how many employees to schedule by looking at your 1) budget for paying employees, which is determined by your profit targets, and 2) the volume of skiers you need to assist, which helps you assess how many boots you need on the ground. Here are a few examples:

- **Sales per payroll hour (SPH).** In settings where you're selling items, like ski gloves or restaurant meals, review the amount of sales generated per the cost of hour spent on overall payroll. You can also break this metric down by location or department to see where you generate the highest SPH.
- **Revenue per available skier seat (RevPASS).** RevPASS is equal to total lift ticket revenue divided by comfortable carrying capacity (CCC). In periods of lower RevPASS, you may close certain lifts, which means you won't need employees to operate them.
- **Vertical transportation feet per hour (VTFH).** VTFH is the product of your lifts' vertical rise in feet multiplied by how many skiers they transport per hour. It's another metric that can help you decide which lifts to open according to skier/snowboarder demand, which determines how many employees you need to schedule.
- **Revenue per available room (RevPAR)**. If you offer lodging at your resort, the number of rooms you fill will vary, which will affect how many housekeeping staff members you need to schedule.

With BI, you can analyze average transaction volume by day in different months of the year to design a matrix of ideal shifts. Then, according to employee availability, you can fill

desired shifts, forecasting your payroll spending in advance. When you do this, you're no longer scheduling based on history or gut instinct. You're making data-based decisions and bringing greater efficiency to the scheduling process.

You can measure work demand using metrics like transaction volume or support ticket volume by time interval. For example, you may have five restaurant transactions from 6 a.m. to 7 a.m. and 30 between 8 a.m. and 9 a.m. Customers may purchase more all-day lift tickets on weekends, but you may notice heavy afternoon lift ticket sales on Wednesdays. Over time, you'll notice fairly predictable patterns that vary by hour, day, month, and season.

## Seasonal Shifts

When resorts ramp up for the season, they often hire as many people as they hired the year before, or they choose an arbitrary percentage by which to reduce payroll costs and hire fewer people to fit the budget. Hiring and scheduling should go hand-in-hand with sales and traffic forecasting. BI can help you hire the right number of people, in the right positions, for the right shifts.

Before you decide how many people to hire in different parts of your resort, start by predicting guest volume and setting revenue goals. Using BI, you can look at anticipated ticket yield and guest volume based on the weather, the economy and other external factors. If you know it's going to be a warm winter, you may choose to be more cautious about sales projections, and you may also choose to hire fewer people.

You can also make projections based on historical performance. If your revenue has grown steadily for the past five years, increasing about 8 percent per year, you may experience the same growth this year—as long as you continue to have sufficient space, activities and team members to accommodate a growing number of customers. As you explore your data, you may learn that certain factors are great predictors of sales performance for the coming season. For example, season passes purchased may be a good predictor of overall sales and volume for the upcoming season.

Once you've made forecasts for overall seasonal revenue, BI helps you set goals for SPH, RevPASS, VTFH, RevPAR—whichever metrics are your resort's key performance indicators. You can map out your metrics goals by day or week, helping you understand how many employees you need in each station. You can then divide your payroll budget by the number of employees you think you need to see if your payroll cost targets are realistic.

## Additional Points to Remember

In addition to helping you anticipate work demand and seasonal scheduling needs, BI empowers you to manage payroll in real time. If your RevPASS is lagging behind goal, you can look at your BI dashboard, see which lifts aren't needed, close them, and then either redeploy employees or let them go home early.

At the same time, remember that insights from BI software are only a guide, not the sole framework by which you make a schedule. Hospitality is a very human business, and guests may still need assistance whether they're making transactions or not. It's important, therefore, to design data-based schedules, but also listen to your human instinct. If you're always asking your Thursday mid-shift to stay late, or guests start to complain that no one is available to help them, adjust your scheduling matrices according to what you see on the ground.

## Conclusion

BI gives you the tools to understand the unique calculus of each property, so you can maximize every payroll dollar. It also helps you understand what skills your employees need to have, and what makes them feel satisfied with their jobs, so they can in turn can solve problems for your guests and help your guests feel emotionally connected to your brand.

It's also critical to make sure that your employees and guests have the supplies they need. Our next chapter shows how BI can transform your inventory and supply chain process.

Chapter Seven

# Inventory & Supply Chain Management

Hospitality businesses order a lot of supplies to provide great experiences for their guests. Food and beverage, linens, paper goods, office supplies, toiletries, spa inventory, housekeeping supplies, and parts for maintenance crews are just a small slice of the product catalog your company chooses from every day.

You also face unique issues when it comes to inventory management. Hotels, for instance, may use franchise business models that make it difficult to centralize ordering and distribution practices. A cruise ship passes through many sovereign countries, which means their supply chain involves government agencies, such as Customs and Border Patrol in the United States.

Customers have increasing input into the supply chains of many hospitality businesses. Restaurants, whether they're independent or within larger hospitality facilities, face increasing pressure from customers to explain where their food is sourced. Your company deals with the traditional challenges of procuring at lowest cost, distributing efficiently, and storing goods with minimal waste.

Business intelligence (BI) provides better insights into existing operations and ways to get more value from your supply chain. It helps you look at inventory management from a less transactional perspective and more as a strategic endeavor.

# Procurement

For regional and global hospitality businesses, centralizing procurement to increase order quantity means more leverage to negotiate better prices. It also eliminates inconsistencies in local buying that lead to overspending and waste.

BI helps centralized procurement operations to forecast local supply needs, optimize pricing and source products in ways that minimize distribution costs and waste. It also streamlines ordering so that a sloppy, cumbersome purchasing process isn't costing you money. Let's take a look at some use cases for improving procurement with BI.

## Save Money on Core Products

Every hospitality business has certain strategic suppliers with whom it does business year after year. When you run a restaurant, for example, you have to have customers' favorite sodas on hand, and their core preferences rarely change. Pinpoint the core supplies within your chain that deliver established products to you over and over again. Then, use BI to determine whether you can negotiate directly with the manufacturer instead of using a distributor.

Restaurants, resorts, hotels and cruise ships all need core supplies like light bulbs. Because fixtures rarely change, light bulb ordering is static and predictable. Is it more cost-effective to go to one manufacturer for all light bulb needs or order different brands of light bulbs from local distributors? BI can help you answer this question. You can analyze:

- Which types of bulbs you order
- Which light bulb brands you buy most
- Which light bulb brands currently offer the lowest unit costs for the different bulbs you order
- How often you order and replace bulbs

- Which light bulb brands correlate with less frequent order quantity, indicating their products have a longer useful life
- How much you're spending on shipping by ordering from multiple vendors

Once you've done some analysis, you can go directly to a light bulb manufacturer with the inventory you need and the quantities you usually order. You can then agree to order a large quantity of bulbs at predictable intervals in exchange for product discounts and lower shipping costs. If you decide to stay with your current vendor, you can show them your research and use your influence to get them to stock your preferred light bulb brands. Either way, you've now added long-term value into your supply chain by reducing spend on a product you constantly order.

## Create a Standardized Product Catalog

How many times have you received an order only to discover that someone ordered multiple packages of the same item, but in different sizes? The person looked at one item in its 12-ounce size and saw that you had zero on-hand, so they ordered 100 of that item —not realizing you already had 150 8-ounce bottles in stock. it's If it's a perishable item, you're now overstocked, and you'll have to scramble not to let it go to waste. If it's non-perishable, you now have to store something for which you may or may not have room.

With BI, you can develop a standardized product catalog to cut unit prices and prevent maverick ordering. You can analyze, for example, the different brands, sizes, and box quantities of garbage bags you order and discover which combination yields the best unit pricing. Then, you can consolidate the number of SKUs you make available throughout your business.

When your managers use your online ordering system, only show one brand and quantity instead of giving them multiple options. You eliminate over-ordering and waste, and there's an added benefit—you're again ordering a large quantity of a particular good from a particular manufacturer, which gives you the opportunity to negotiate better pricing.

## Source More Strategically

When you're ordering commodities that vary widely in price, or ordering products for which demand varies, it's harder to make order frequency and quantity guarantees, and therefore harder to get static pricing from a vendor. If you're not working to predict demand, anticipate market fluctuations and build supplier relationships, you're subject to day-to-day ups and downs.

Hospitality companies that do strategic sourcing go well beyond understanding the commodities market for a particular line item. They understand how changes to one commodity price affects other market segments. A drought that causes a shortage of corn, for example, doesn't just affect the price and availability of corn. Corn is a major feed component for animals. If farmers can't afford feed, they may decide to liquidate their herds, pushing more meat into the market and temporarily lowering prices. Also, their future herds become smaller, which can lead to less meat availability and higher prices. Corn shortages can also affect dairy yields, leading to higher prices for milk, cheese, and butter.

If you're looking at your supply chain in a transactional way, you're only thinking about getting the best price in the moment for your goods. With BI, you can anticipate market fluctuations and forecast how they may affect procurement. Ahead of a drought, even though you may not purchase much corn, you can:

- Contact meat and dairy suppliers to lock in favorable pricing before the market starts to fluctuate.
- Look for a different supplier that won't be affected by the drought and form a relationship with that supplier.
- Form new relationships with local farmers who are eager to stay in business.
- Leverage available storage to order early while prices are still low.

# Distribution

Once you've ordered goods at optimal value, you have to distribute them to all your locations. Whether you're sending a truck to a restaurant or ensuring a shipment awaits one of your cruise ships at port, you're responsible for ensuring your goods arrive on time and ready to use. Too many procurement departments focus on unit price as the core metric of the supplier relationship. Part of a supplier's value is in reliability, which means always having product in stock and delivering it as promised.

With BI, you can analyze your distribution processes in addition to monitoring prices. You can find ways to reduce landed cost—the unit price of your product plus transportation, taxes, fees, duties and insurance—instead of just relying on source pricing as your key performance indicator (KPI). Between 7 and 10 percent of landed cost comes from transportation and delivery. Using BI to cut distribution costs all over your supply chain delivers big savings on inventory costs.

## Build Better Transportation Networks

Optimizing your transportation network starts with understanding your current baseline. Use BI to query your data for the answers to important questions:

- What's the optimal lead time for certain supplies? In other words, which products do you need as soon as possible, and which can you order well in advance? You can save money by investing in fast delivery for the right products and allowing wait time for others.
- From where do your deliveries arrive? If you have many shipments that come from a single city, is there a way you could consolidate shipments to save money instead of paying for multiple deliveries? Or could you improve service by switching to a delivery service that has more distribution centers so faraway locations aren't waiting a long time or shipments?
- Instead of relying on multiple vendors' transportation options, could you require them to work with a third-party delivery service provider that match your

needed delivery times for specific supplies with the lowest cost-transportation option? How would that lower vendor pricing, and would the cost savings more than pay for the outsourcing?

- Where does it make sense to obtain delivery direct from a manufacturer instead of waiting for deliveries to go to the supplier and then to you?

## Improve Delivery

If a cruise ship docks for a re-supply, and the delivery isn't there, it leaves port without everything the crew needs to deliver a good guest experience. Missed deliveries may have to be routed to another port, or a smaller vessel may have to be dispatched to meet the cruise liner. In addition to major transportation cost increases, adding an extra leg to the journey leads to unanticipated taxes, fees, and duties. It can also cause delays if supplies have to be cleared and inspected by government agencies, and perishable supplies may be lost during the delay.

In other hospitality businesses, deliveries are scheduled within certain windows to ensure a crew is there to receive it. When you don't get the deliveries on time, you pay people for hours when they're not needed, and then you have to pay them more to stay late and process the delivery.

With BI, you can monitor different suppliers to see who delivers accurately, efficiently and on time for you and who doesn't. Look for metrics like:

- **On-time delivery percentage**, which measures the number of on-time deliveries against the total number of orders shipped.
- **Fill rate**, which is orders completely filled as a percentage of total orders shipped.
- **Order accuracy percentage**, a measurement of error-free orders as a percentage of total orders shipped.
- **Order cycle time**, to measure how long it takes between the time you order supplies and the time they arrive at your property.

From the distribution center down to the driver, Bi unlocks who gets there on time with an accurate, undamaged delivery. Based on what you learn, you can work with the company either to reorder their delivery route—or even to send a different driver who gets the job done. You can also compare delivery guarantees against your contract guarantees, using the information to negotiate better pricing or to note breach of contract and go elsewhere.

## Warehousing

Every hospitality business receives supplies and also stores them, whether it's in a linen closet, cooler or centralized warehouse. To prevent inventory shrink, this process has to be managed when supplies enter the warehouse, while they're stored and when they're removed. With BI, you can see your inventory journey end to end. You can lower shrink, improve turnover, and ensure you're only ordering what you need.

Many of the products your hospitality business orders have an expiration date. Even when freshness isn't an issue, you need products to arrive from the supplier in usable condition. Loss is a part of the inventory process, but BI can help keep it to a minimum.

With BI, you can analyze which suppliers most often deliver damaged goods or suppliers whose perishables don't fulfill their expected shelf life. You can then take this analysis to suppliers to ask for performance improvements, or you can make the decision to switch suppliers or distributors. BI also helps you see inventory in real time. If you have an overage of certain supplies at a particular location, you can redistribute them between your properties to cut warehousing costs and prevent waste.

Damage and expirations aren't the only causes of inventory loss. Shrink happens when what you receive doesn't match the delivery bill of lading and when your physical inventory doesn't match your digital inventory. It can happen because of clerical errors, picking errors or because supplies are lost or stolen.

With BI, you can review data around delivery shortages or overages and trace the problems back to their root causes. You can also track which product types most often

disappear from your physical inventory and investigate why that happens. Important metrics include:

- **Inventory accuracy percentage:** the number of actual SKUs divided by the number of SKUs in the system (the percentage difference measures shrink).
- **Damaged inventory percentage**: value of damaged inventory as a percentage of total inventory value.

## Build A More Resilient Supply Chain

When a disrupted supply chain causes you to have insufficient inventory of certain products, you risk making your guests unhappy. Hospitality companies source supplies from all over the world, and factors like natural disasters and geopolitical unrest can disrupt ordering and distribution.

When you use BI software, you can enhance resistance and improve recovery times. Start by performing a thorough risk assessment on your supply chain to determine potential weaknesses. Analyze your data to find out what disruptions have occurred and how they affected business in terms of lost dollars or productivity. A missed shipment of ski lift parts could mean the shutdown of one or more ski lifts. An error-ridden food order, or an order of perishable items that don't last as they should, can lead to anything from the need to change a restaurant's specials to a complete kitchen shutdown.

After analyzing past events, make a list of potential supply chain risks and forecast how they would affect your business. As you work on your list, remember that your vendors have their own supply chains. A drought that wipes out Brazil's sugar cane crop could have a big effect on your food vendor's costs, affecting what you pay for everything from granulated sugar to baked goods to sodas.

Supply chains require two strengths to thrive: resistance and recovery. Resistance means the ability to prevent disruption through both avoidance and problem containment. Recovery means the efficiency at which you stabilize problems and return to normal functioning. Use BI dashboards to:

- Monitor supply chain issues and spot problems as close to the source as possible.
- Come up with contingency plans for disrupted shipments, doing your best to contain disruptions to as few locations as possible.
- Identify secondary suppliers from whom you can order in case of disruption, or shift inventory from one property to another.
- Map out how new decisions, such as switching to a spontaneous prix fixe menu after a shipment of dairy goes bad, could affect the rest of your food inventory usage.

From procurement to distribution to storage, BI can help your hospitality company build a resilient, cost-effective supply chain.

## Coming Up Next

One of the biggest business functions for which you order supplies is maintenance. Find out how BI can get your property and equipment maintenance on track, improve safety, and reduce maintenance costs.

Chapter Eight

# Build a Maintenance Powerhouse

Whether you're managing one building, multiple properties, a fleet of ships, or a resort consisting of both buildings and equipment, your maintenance crew keeps everything up and running for you and your guests. They handle preventive maintenance, repairs, and major projects, and they deserve the right tools to keep everything on time and on budget.

In most companies, maintenance is entrusted to both paid staff and third-party contractors. For your furniture, fixtures, and equipment (FF&E), from ski lifts to shuttle fleets to ocean liners, business intelligence (BI) empowers you to manage complex maintenance tasks and track who's doing what, and when.

## Preventive Maintenance

Consistent preventive maintenance prolongs equipment life and keep operations seamless. Seasonal tasks, from landscaping to snowmaking, keep your property looking fantastic year round. You handle some tasks like clockwork, but others seem to always fall behind. You may even do some tasks more often than you have to, which leads to inefficient use of labor and materials. BI will change the way you operate.

### Improve Safety

Safety is your biggest maintenance priority, both for guests and your crew. Besides being the right thing to do, safety inspections keep you compliant with OSHA and other guidelines. They prevent serious liability issues related to worker or guest injury.

If you're already using a digital maintenance workflow that includes a ticketing system and mobile work order tracking, you can connect BI software and review your existing data to get your safety program on track. For example, you can:

- Review your inspection history at a glance to see where you've fallen behind.
- Analyze repair, injury, and inspection data, along with your inspection records, to see where inspection is most needed, so you're addressing priority areas first.
- Blend inspection into your regular work orders instead of delegating hours of manpower to inspecting everything at once. For example, when someone completes an electrical repair, they can also inspect the generators, so you're no longer setting aside a large block of hours to inspect the entire facility.
- Pull up inspection data for managers and government agencies to demonstrate compliance.
- Track technicians' safety training and certifications to ensure everyone's credentials are up to date and to set training priorities as needed.

## Extend Equipment Life

Certain repairs are like canaries on a coal mine; they're signs of bigger problems. For instance, if you notice the tread coming loose on the wheels of your ski lift, it could be a sign of a bigger problem, such as incorrect wheel tilt.

By combining the manufacturer's recommended preventive maintenance schedule with your own data and experience, BI can help you get more from your equipment throughout its useful life. Your BI dashboard and reports can help you:

- Track how you're lowering costs over time by investing in preventive maintenance instead of waiting for equipment to break down.

- Budget for parts and other supplies related to preventive maintenance, securing the best prices, the right order quantities, and most cost-effective delivery options.
- Optimize the way you deploy crew members. Instead of standing by waiting for repair calls, employees can complete preventive maintenance tasks that match their skill sets.
- Analyze how your equipment performs compared to manufacturer promises and industry expectations, so you can make informed purchasing decisions down the road.
- Detect correlations between equipment performance symptoms and major breakdowns, so you can address everything at once and prevent extended downtime.
- Identify times when customer traffic is thin and take advantage of lighter workloads to schedule preventive maintenance tasks.

Build your maintenance workflows around proactive safety inspections and preventive maintenance, instead of around reactive responses to repairs. This approach helps you get more from your equipment, ensure regulatory compliance, schedule your crews more effectively—and most important of all, keep guests and workers safe.

## Non-Repeating Projects

Every day in the life of the maintenance crew involves something unexpected, no matter how good your preventive maintenance program is. Using BI gives you the tools to keep costs down and minimize downtime when you're completing unexpected repairs. Some metrics to watch include:

- **Mean time to repair (MTTR).** MTTR measures how long it takes from the minute you receive a call or a work order until the issue is resolved.
- **Average downtime** and **cost of downtime**. Use BI to track how much downtime you experience from different types of equipment or facilities areas,

and track how much downtime costs you, both in terms of repair expenses and missed revenue opportunities.

- **Cost of repair**. Use BI to bring costs down by improving parts acquisition, matching the right crew members to the right tasks and holding crew members accountable for labor hours standards.

With a cloud-based BI dashboard, you can see parts inventory at other properties in real time, and you can decide whether it's more cost-effective to transfer parts or order them from a supplier. You can also monitor crew deployments and payroll hours, reassigning crew members as needed to avoid overtime costs associated with non-repeating projects.

## Smart Work Order Management

With a digital support ticket system, you can track every repair, the time required to complete it and who completed the task. You can identify issues that lengthened MTTR and raised costs, and you can ensure crew members are where they're supposed to be.

Start with a review of your historical data. You can use data from your current work ticket management system, spreadsheets, and/or invoices—wherever you're tracking tasks and expenses. Then, query your data to see where your crew members are spending the most time and money on repairs.

- Do certain mechanical problems keep repeating themselves? Is there a relationship between these problems that suggests a deeper root cause?
- Does repair history show that you get the same quality and length of service, and save some money, by not always ordering original equipment manufacturer (OEM) parts? Or do you need to switch to OEM parts in certain cases because generic components are failing more often?
- Which equipment failures cause the most downtime, and the highest downtime costs, and how can you adjust preventive maintenance to improve these metrics?

- Are some of your crew members more efficient than others? What skills gaps are there, or how could you deploy them more effectively?
- Can you get more efficiency from your crew by scheduling tasks together? For example, could you send a crew member to one property to complete a repair and also take care of outstanding preventive maintenance while they're on-site? Could crew members travel together to adjacent sites instead of using separate vehicles?

With BI, you can set realistic goals for trimming costs, MTTR and downtime, and you can track your progress. Start basing decisions on facts instead of doing things the way they've always been done.

## Major Project Management

A build or remodel, as you know, starts long before you hammer the first new nail into the wall. BI software helps you efficiently source and order warehouse supplies, track project progress, and monitor expenses in real time.

Even better, BI ensures you're in lockstep with procurement so that you're containing costs, optimizing scheduling, and aligning with business initiatives. For example, if you're replacing furniture in a cruise ship dining area, you can use BI data to weigh the costs of procuring from different furniture vendors, taking into account shipping, warehousing, and payroll costs to design the optimal project. You may decide, for example, to order furniture from an international vendor near your onshore excursion port. Then, you avoid major shipping costs by picking up the furniture locally, and you use payroll efficiently by having your crew complete the changeover while guests are onshore.

## Capex and Contracts

A lot goes into both deciding whether to repair or replace equipment and choosing the right vendor for the job. BI brings together preventive maintenance and repair data along with other critical information, such as budget availability, depreciation tracking, and contract terms. You can plan more effectively for capital expenditures, evaluate outsourcing options, and renegotiate contracts based on valuable BI insights.

## Anticipate the End of Equipment Life

The worst time to make a major equipment lease or purchase decision is when the old equipment breaks down. If it's something that brings operations to a halt, or if it severely impacts guest experience, you're going to pay too much to make the pain go away. With historical data, your BI software can show you how long different equipment has functioned in the past and time its replacement before you're caught in a jam. You can weigh related factors, such as the tax benefits of repairing versus replacing and analyzing the cost of replacement compared to the cost of risked downtime.

Once you've forecasted the optimal useful life of your equipment, you can set a more informed capex budget, buying and leasing new equipment at exactly the right times. With BI, you can also weigh how certain factors, such as bulk discounts, affect the overall financial picture, which may change the timing of your replacement decision. You can also negotiate leases that match your business needs instead of being stuck with only what the vendor offers.

## Decide Whether to Outsource

Different equipment issues have different solutions. In some cases, you rely on the equipment vendor to complete repairs. In other cases, your crew does the work; in still other cases, it makes sense to outsource.

Hospitality businesses have different drivers behind decisions about whether or not to outsource. Outsourcing can lower costs and enable you to redeploy in-house personnel for more efficient payroll usage. It can also make up for skills gaps within your current crew, and it can ensure repairs and installations match local codes and meet other regulatory standards. With BI, you can weigh outsourcing against the costs of seasonal hiring, or you can evaluate the cost of outsourcing versus the cost of employee training.

When you're negotiating a contract with a vendor, BI ensures that you know exactly what your break-even point is between doing it yourself and outsourcing. Instead of looking only at equipment and labor costs for particular tasks, you can make decisions within a bigger context. Query your BI data to find out:

- Which repairs cost the most and take up the most payroll hours
- What your crew skills currently are versus what you actually need

If you decide to outsource, use BI to track their performance to ensure you get your money's worth.

- Monitor how your current outsourcing partner performs compared to expected financial and MTTR targets as well as industry metrics.
- Track unexpected expenses related to your outsourcing partner, such as damage done to your property or billing for unscheduled visits.
- Compare what vendors say they spend on parts and supplies to actual market costs—you want to know you're getting charged fairly.
- Budget payroll hours to conduct follow-up inspections for outsourced work, ensuring that it meets your quality standards.

## A Leaner, More Effective Operation

With BI software, maintenance becomes less of a cost center and more of a strategic partner in getting great financial results. You create a more guest-centered process by boosting safety, preventing downtime and solving problems quickly when needed—in addition to making smarter purchasing decisions and negotiating more advantageous contracts.

Chapter Nine

# Conduct Fact-Based Strategic Planning

So far, we've talked about using business intelligence (BI) to improve the way your hospitality business runs today. We've discussed ways you can improve sales and marketing, deliver a better guest experience, hire and retain the right people, optimize your supply chain, and streamline maintenance processes and costs.

Now, it's time to discuss where your business is going. Where do you see your organization five, 10, or 20 years from now? BI can help you map out a realistic course for your company's future, delivering a strategic plan for getting you where you want to go.

## Where You Are Now

Let's move out of thinking about your company's operations and take an overhead snapshot of where you are. BI provides a fact-based analysis of many factors, including:

- Reports on your performance, including reports on financial performance and intangibles, like brand sentiment
- Comparisons of your performance to your competitors
- Analyses of superstar properties or revenue segments against those that are underperforming
- Snapshot of your current customer mix and their feedback about your company

- Map of your current employee matrix, including skill set analysis to help you see who's promotable
- Current market conditions in which you operate
- Visible trends—is your financial performance getting better or worse?

***EXPERT TAKE: A Fact-, not Feeling-Based SWOT Analysis***

*You're familiar with the concept of a SWOT analysis. It's a list of the strengths and weaknesses of your business along with a snapshot of opportunities you could seize and threats that stand in your way.*

*Enda Larkin, founder of Dobiquity and longtime hospitality industry consultant, says that SWOT analysis is often a useless process. That's because people gather around a table and make a list of what they think their company's strengths, weaknesses, opportunities, and threats are instead of gathering facts and using them to build the analysis.*

*Larkin suggests taking BI reports and using them to drive deeper questions. When you look at your current customer mix, for example, make sure you know what motivates them to book with you, whether it's related to price, location, or experience. Also, in addition to looking at the economy at a global or national level as well as near the properties you operate, know how the economy is trending in the places where your customers live. Analyze how your customer base is changing; for example, it may be aging if you're failing to bring in customers from younger age bands.*

*With information like this, you can develop a fact-based SWOT analysis for strategic planning based on what you know, not on what you think. Perhaps you operate an economy-class business in which bookings are largely price driven, and the economy is deteriorating in your customers' home regions. Now, you have facts indicating that your customer outlook presents a threat to the future of your business. "Compiling a SWOT based solely on opinions, or 'group-think' is of little value," Larkin writes. "Do your research first and then pr*epare the SWOT based on hard evidence."

# Where You're Headed

In Chapter 2, we defined SMART goals. These are the specific, measurable, agreed-upon, realistic and time-based goals toward which your company can move. When it comes to creating SMART goals for your future, start with some human intelligence before diving into business intelligence reports. Where you're headed has to balance where you want to go and where you can realistically go.

## Where You Want to Go

A real strategy starts with knowing your company's authentic values. Does your business have a vision or mission statement? Is it something you actually abide by, or is it something you made into a sign and then never looked at again? Your mission statement may be something you'd like to rededicate yourself to—or something you'd like to rewrite for a new reality. For example, do you really want to be the world's largest cruise vacation company, or are you better off operating a more focused regional operation?

As you think about your vision, define your values and your culture related to:

- **People.** What do you aspire to be in relation to your guests and your employees? What do you expect from your leaders?
- **Places**. Where do you want to operate in the future? Is your strength in being a regional company, or do you really have the desire to go international?
- **Possibilities**. If you had no constraints on future direction, where would you go? Would you open a new restaurant in Dubai? Would you buy out your competitor to double your property size?
- **Priorities**. What matters most to you as a business? Do you care about employee satisfaction? Guest experience? Profitability? Environmental responsibility? What are you about?

Once you've mined your human intelligence to understand your culture and values better, you can dive into BI to establish SMART goals. Perhaps it's your vision to be a global

leader in the hotel industry by delivering unmatched guest experiences with a commitment to sustainability and employee satisfaction. Your vision statement provides four areas around which to develop SMART goals: global leadership, guest experiences, sustainability, and employee satisfaction.

## Where You Can Realistically Go

It's vital to set goals that consider the context in which your business operates. You may not be able to achieve all elements of your vision to the degree that you'd like. That's because your business operates within certain constraints, both internal and external. If you currently have little cash and poor credit options, for example, you can't invest in a major technology initiative, even if you see technology as a key component of unmatched guest experiences.

Business constraints may keep you from fulfilling your aspirations to their highest level, but you can still make progress toward a realistic point. Maybe you can't afford to install digital check-in kiosks in every hotel lobby, but you can afford to develop a mobile check-in app. Once you've aligned your vision with your reality, use BI to create SMART goals.

Maybe, to meet your sustainability vision, you want to cut water usage at your hotels by 50 percent over the next five years. Perhaps you'd like to reduce your current 35 percent employee turnover rate to 20 percent in three years, or open a hotel in Canada within two years. BI puts your vision in context, based on your current condition, the competitive landscape and market projections, so you can move toward the goals that matter most.

## How You'll Get There

Once you've set your goals, it's time to map out how you'll achieve them. Let's examine the sample goal of cutting water usage by 50 percent at our hotels.

Using our BI software, we can analyze current water usage and identify which activities consume the most water. Our data may show that caring for landscaping consumes a

significant amount of water. We can explore several initiatives for curbing water usage outside, including:

- Optimizing our landscape usage by adding xeriscape plants, which require less water.
- Starting a greywater initiative to redirect used water from showers, sinks, and washing machines and utilize it in landscape care.
- Collecting rainwater in rain barrels or adding works of art that double as water collection receptacles.
- Installing in-ground sprinklers for irrigation so we waste less water.

Once you settle on ways to reach your goal, you have to break each initiative into measurable steps. Create action plans, and review them quarterly, to see how you're doing. An action plan names tasks, designates a responsible person or group for each task, and sets a deadline for the task's accomplishment. For our water preservation goal, you may designate Cindy to talk to procurement about contracting with a new landscaping company and ask her to report her findings at next Friday's manager's meeting.

## How You'll Know You've Arrived

It's important to stop at defined intervals and assess your progress. BI helps you monitor expenses, timelines, and other markers of progress as you move toward each goal. Sometimes, the progress path is linear and predictable. At other times, goals have to be altered or scrapped altogether based on conditions on the ground. You'll know you've arrived when you hit the remaining SMART goals you set up earlier.

Once you've arrived, in business and in life, it's usually time to start all over. Do you want to continue improving your operations? Do you want to expand to new locations or new lines of business? Would you like to sell your company and move onto your next adventure? No matter what you decide, BI can help you develop a fact-based, realistic path forward.

# Getting Technical

You've learned how to approach business problems with business intelligence, and you've explored use cases for marketing, guest experience, employee management, inventory, maintenance, and strategic planning. The next chapters will discuss where hospitality business find data, how they store it, and how they protect customer privacy in compliance with regulations.

Chapter Ten

# Data Sources and the Data Warehouse

"Big data" gets a lot of buzz these days, and it's easy to understand why. Twenty-five years ago, the world generated about 100 GB of data each day. Today, data increases at a rate of 50,000 GB per second. That's 2.5 quintillion bytes of data, accumulating every day.

So where do hospitality businesses find all this data, store it, and wrangle it into something useful? Most use a mix of internal data, which lives (and is often created) within their firewalls, and external data, which is taken from sources outside the business firewall.

Let's take a look at both the internal and external data sources that businesses use, how businesses gather it, and how they structure it. In the next chapter, we'll discuss how to take care of customer data in compliance with regulations.

## Where Hospitality Businesses Find Data

Whether you're at the beginning stages of building a data warehouse or whether you're already using some BI tools, you'll probably gather data from one or more of these sources:

**Existing archives:** You've probably archived a significant amount of data in structured databases, but you may also have a stockpile of scanned documents, print stream files, archived emails, archived instant messages, and other archived files to mine for information.

**Current business documents:** You can retrieve data from documents stored on your own servers, or you can gather data from documents stored in Google Docs, Office 365 or file-sharing applications like Dropbox. Retrievable files include DOC, PDF, XLS, PPT, XML, CSV, HTML, and many more.

**Log and event data:** A range of applications, from website analytics tools to network monitoring systems, record logs and data regarding specific events. In addition to recording the event, they often record relevant secondary data such as time, associated user ID, and IP address. They may also record the order in which events happen, such as the order in which a customer clicks through web pages.

**Sensors:** The use of internet-of-things (IoT) devices is exploding across industries, and the hospitality industry is no exception. Sensors collect and transmit valuable data for everything from ski lift maintenance to cruise ship kitchen refrigeration—and as sensors have multiplied, so has the quantity of data generated.

**Visual and audio media:** Images, videos, live streams, and audio files can provide valuable data. They can be retrieved from internal applications, such as call recording applications, or from external sources like social networks.

**Business applications:** You probably pull a lot of data from existing systems, such as your CRM, POS, help desk ticketing, inventory tracking, payroll, online booking, and CMS applications. You can also gather data from external sources, such as weather applications, that can influence business decisions.

**Mobile apps:** You can gather structured data from your own mobile applications, such as your mobile check-in or reservation application, as well as third-party data from mobile partners.

**Social networks:** Gather data from your own social followers as well as demographic and interest data from channels that offer social media advertising. You can integrate it with your CRM database for enhanced marketing or use it for more general purposes, like sentiment analysis.

**Public web:** Scour review sites, such as TripAdvisor and Yelp, as well as forums like reddit for sentiment about your company. You can also discover unusual correlations, such as Google search trends that correspond with certain business outcomes.

Compiling the data from all of these sources can be time-consuming and expensive, depending on the size and complexity of the data you'd like to store. Some modern BI platforms provide tools for "ingesting" data from a wide variety of sources, allowing you to store the data long-term for analysis in a "data warehouse." Ingestion into a data warehouse is typically accomplished using one of three methods:

- **Upload and importing files.** You can upload CSV and XLS files, for example, in which data has been placed in columns and rows and each column has a name. A properly formatted file can be uploaded directly into the platform or transferred through a cloud storage source.
- **Use an API.** Several platforms allow you to send data to the platform using a standard Application Programming Interface (API). Following a defined format, users can "push" data to the BI platform using a programming script. APIs can be used as a part of a scheduled script that runs automatically at certain intervals, and they may help you bypass manual upload file size limits.
- **Use data connectors.** A BI platform may include connectors that integrate with data sources like Google Analytics or QuickBooks. While they're not as customizable as an API, they're able to refresh data automatically and setup is a breeze.

As you decide what data is worth collecting and storing, keep a few things in mind:

- **Timeliness.** You can collect data from every IoT sensor in your ecosystem and store it forever, hoping you'll extract mysterious value by analyzing it later. But you benefit more from understanding the value of data as it comes in so you can act on it quickly, if needed.
- **Latency**. Vital applications need immediate access to data; less critical applications can sacrifice some speed. Store data for important, high-usage

applications as close to the user as you can, or invest in expanded bandwidth to ensure fast access.

- **Regulatory compliance and privacy**. When you collect data and store it, ensure you're compliant with regulations that govern your industry. Also, make sure you follow the data privacy guidelines relevant to the appropriate jurisdiction, which becomes a complex challenge for global businesses.

## Storage: Creating Your Data Warehouse

A data warehouse is a central point for accessing an organization's data. Creating a centralized warehouse, instead of housing data in different contained silos, makes data accessible and transparent for everyone.

A data warehouse improves data quality, reduces report inconsistency and improves data sharing between departments and business partners. It can also ensure faster reporting, better integration of data from multiple sources and appropriate merging of current and historical data.

Data can be warehoused on premises in a data center, in cloud storage or in a combination of both. Cloud storage has advantages in terms of scalability and can help you control expenses by ensuring you only pay for the storage you use. On-premises storage may sound more secure; after all, the data is in one place that simplifies security. Cloud storage, however, may provide more than sufficient security as long as you work with a reputable provider.

- Cloud providers have expertise in securing their resources. Your organization may or may not have security experts on the payroll.
- If you manage data that's subject to regulatory compliance, look for a cloud provider that guarantees compliance with PCI-DSS and other regulatory frameworks.

***EXPERT TAKE: Data Warehouses vs. Data Lakes***

*Warehoused data is generally cleansed and transformed before users can access it, either through automation or by human data analysts. A data lake collects any and all data that may be relevant to a company, but the data remains raw until someone identifies a use for it.*

*Forbes contributor Dan Woods recommends viewing your data the way you view your supply chain: what you bring in has a beginning, middle and end. Having a data warehouse strategy, as opposed to a data lake, requires you to plan how the data you collect is found, explored and transformed. It means you've curated data worth storing. You're not just storing everything you can get your hands on—an expensive proposition—without knowing it's going to deliver value. You're not also vacuuming in data in a way that puts you at risk for regulatory and privacy violations.*

## Organizing and Accessing Data

Databases are designed for storing and retrieving data. Most of the databases used in your company are relational, which means data is stored in separate "tables" with specified relationships. Each transaction is all or nothing, which means changes to data show up at the same time; multiple users always see the same data. Relational databases also optimize queries, which means they sort out the best ways to run queries even if your query structure is less than optimal. Because they've been around for several decades, they're a stable technology with lots of available support documentation.

Relational databases are good for traditional datasets, like structured transactional data, but they have two main disadvantages. First, they only scale upward, which means you can't add extra hardware when you need more storage for the database. Instead, you have to deploy a higher-capacity server and migrate the entire database onto the larger unit. Relational databases simply weren't designed for the massive amounts of data being collected and analyzed by modern organizations. These systems are very efficient at storing large amounts of data, but tend to be very slow at information retrieval. It is not uncommon for a modern database engine to process a single query for many hours before returning the requested information.

Second, relational databases are not optimal for unstructured data. You can query a series of transactions given in dollars and cents, but you can't query to uncover the customer sentiment in social media video uploads. Non-relational databases solve the problem of dealing with massive datasets and providing access to unstructured data.

Non-relational databases, or NoSQL databases, utilize object-oriented storage. For example, the database creates a key, and when users input the key, they gain access to an associated value or document. Documents can also be indexed within each database, making it possible to retrieve data without the key, which increases speed.

Most NoSQL databases use distributed storage, which means updates populate not just in one place, but across many servers. Disaster recovery improves because even when one server fails, another has additional copies of the data, and the supported application stays up and running. NoSQL databases are easier to manage because replication is automated, which reduces the data management burden. Non-relational databases also scale out instead of up, which means it's easy to boost performance with additional commodity hardware or cloud resources.

You can manage your database workloads on premises, or you can run them on cloud infrastructure. An even easier option is to use a software-as-a-service (SaaS) business intelligence tool to collect and cleanse your data, manage your databases, run queries and create reports. SaaS BI tools are accessible for multiple users, using both desktop and mobile devices. You get anywhere, anytime data access for a predictable monthly cost, and you can share reports and collaborate easily.

Finally, NoSQL databases are great for running fast, high-performance real-time queries that generate descriptive analytics. For large-scale batch processing—the kind that generates predictive and prescriptive analytics—you'll need data management tools that ensure cooperation between your NoSQL-based data warehouse and data processing applications like Hadoop. If you choose an SaaS solution, look for a provider who can help you design an integrated data management strategy.

## Business Continuity and Disaster Recovery

Your business intelligence application isn't the only software that accesses your data warehouse. When your systems can't access the warehouse, your business can experience service interruptions and downtime. According to Eaton, a data center power management vendor, downtime costs the average data center user $471,000 per hour. Although preventive maintenance and a sound information security strategy can prevent a lot of downtime, no business can anticipate every interruption. After all, no preventive maintenance strategy is good enough to prevent severe weather or natural disasters.

It's absolutely vital to keep business going, even when you have a service interruption. You also need to restore normal functioning as soon as possible. Talk to your IT department about your existing business continuity and disaster recovery plans. When you do, here are some key questions to ask:

- Have you identified our organization's most critical data, the data without which we can't function?
- Is our critical data backed up in a separate location? Can our properties or vessels connect to that alternate location?
- What's our data backup plan? How frequently do you backup different tiers of data: instantly, overnight, weekly, monthly?
- What's the order of operations for getting systems back online after a disaster? How quickly can you get our applications up and running?

# Conclusion

Building a data warehouse gives you a great chance to have critical conversations about business data. In addition to finding more data, cleaning it up and storing it, the process opens a discussion about business continuity and disaster recovery.

It also opens another conversation around data: security policy and data governance. We'll explore both of these issues in our next chapter.

Chapter Eleven

# Data Security and Governance

Rolling out business intelligence (BI) solutions to your team is a rewarding process, particularly when you work with a software-as-a-service (SaaS) provider that has a lot of the workflow and infrastructure already in place. But let's be honest: any new process comes with growing pains. Let's take a look at some of the most common challenges businesses face when they implement BI.

## Protecting Data

When you gather and warehouse data, you have to protect your data and ensure that it's only accessed by the appropriate parties. You, your customers, your business partners, and the regulators who oversee your company all have an interest in keeping data secure.

Hospitality businesses are subject to a range of regulatory frameworks. Things get even more complicated for companies that operate in multiple countries. Here is a partial list of regulations that affect hotels, cruise ship operators, B&Bs and resorts.

- **Payment Card Industry Data Security Standard (PCI DSS).** If you accept credit cards, you're responsible for protecting credit card information and personally identifiable information according to PCI DSS requirements. These requirements affect payment systems, reservation portals and any retail or dining transactions within your business. It can also affect your customer service call centers.

- **Health Insurance Portability and Accountability Act (HIPAA).** HIPAA isn't just for hospitals and doctor's offices; it's for hospitality business human resource departments, too. It's also for spas, fitness centers, and other amenity providers within your facilities that may possess guests' personal health information.
- **Sarbanes-Oxley Act (SOX)**. SOX regulates records retention, the timely disclosure of financial information, protection of records from alteration or deletion, and the collection and protection of financial information.
- **General Data Protection Regulation (GDPR)**. Europe's new law surrounding data privacy requires companies to obtain explicit consumer consent for many types of data processing and profiling. It also sets up requirements for data breach notification, and it requires businesses to retrieve all of an individual's data, let them view it and remove it upon the consumer's request.

Ignoring data protection can have major financial consequences. These can come in the form of costly regulatory fines, drops in share price after a data breach, or expensive court-ordered security remediation programs. These public cases can have a range of consequences, from lost bookings to executive team shake-ups. That's why it's critical to protect your data and comply with regulations.

What kinds of data do remote attackers want to steal? According to security firm Trend Micro, passwords, health information and Social Security numbers are the most vulnerable, along with scanned images of identifying documents like passports or driver's licenses. Attackers also target proprietary items, like patented technologies or trade secrets. Any of these data types are worthy of special protection.

***EXPERT TAKE: Data Privacy***

*Mitzi Hill, an an attorney at Atlanta-based Taylor English Duma LLP, specializes in cases involving data privacy and security. In a Lodging Magazine article, she discussed the increasing pressures that hospitality businesses are facing, even from organizations without a direct mandate to regulate data usage.*

*Since 2000, Hill says the U.S. Federal Trade Commission has pursued over 50 privacy claims. Although the FTC doesn't have explicit authority to pursue privacy claims, it does have a mandate to oversee "deceptive" or "unfair" consumer practices. After one international hotel group experience three remote attacks, resulting in identity theft and fraud cases involving hundreds of thousands of customers, the FTC decided to sue the company.*

*In the hotel's privacy policy, it claimed it used "reasonable" and "industry standard" practices to protect its customers' data. Although it disputed the charges, the company eventually settled with the FTC, agreeing to a comprehensive and transparent overhaul of its security practices. It's always better for a hospitality business to establish security policy on its own terms, not under the oversight of a regulatory agency. This hotel group will remain under the FTC's watchful eye for over a decade—a cumbersome consequence for a lax security policy.*

# Common-Sense Security Measures

Take advantage of your IT team's expertise and don't hesitate to involve third-party security consultants. These are some common-sense security steps that can protect your enterprise data warehouse—but they're no substitute for a comprehensive information security strategy.

## Role-Based Access

Not everyone who uses your BI tools needs access to every item in your data warehouse. People should only access data they need to perform their job roles. Every username within your organization should be attached to a job role, with clearly defined parameters governing the person's access to data.

You may choose to manage access through Active Directory, within your Google Apps administrator tools or via AWS Identity and Access Management. Alternatively, your BI SaaS solution may include its own access management tools. With so many cloud-based software options to deal with, most companies end up with a lot of password

management headaches. That's where single sign-on (SSO) can greatly benefit your organization.

SSO means one set of credentials for all applications within your company, from Office 360 Excel spreadsheets to BI software. With SSO, employees have one username and password to remember, you have one company-wide access management tool and you can sharply reduce the volume of password reset calls to your help desk.

In addition to setting up employee data access when someone starts working for your company, or when you implement your enterprise data warehouse, you should review employee credential status periodically. You should also delete employee access privileges when they exit your company. If an employee gains administrator privileges briefly, and then those privileges are no longer needed—but IT fails to return the employee's job role to its original classification—the employee still has access to higher-level data, which puts that data at unnecessary risk.

## Device Usage Policies

Today's hospitality employees do a lot of work remotely, using a combination of workplace computers, home computers, and personal mobile devices like smartphones and tablets. It's good for employees to be able to access BI software and the enterprise data warehouse remotely. It's not so good when you lose control over where your company data lives.

Whether you issue company mobile devices to your employees or let them connect to your network with their own phones, you need an enterprise mobility management (EMM) solution to manage how those devices access company data. Your concerns go beyond what would happen if an employee's device is lost or stolen. You need to worry about whether apps on the employee's phone could gain access to your data.

EMM gives you a centralized solution for managing employee mobile devices. Depending on your security needs, you can partition employee phones and tablets to segregate personal and company data. You can also locate lost devices, and you can remotely lock

or even wipe them if they can't be retrieved. Businesses also use EMM to govern the applications employees can access with their devices. Some solutions even track business usage for billing purposes. Evaluate your risk and choose the level of mobility management that seems right for you.

In addition to managing devices while in use, protect your data when you dispose of old devices at the end of their useful lives. You can degauss or destroy old hard drives and tapes before you recycle your electronic devices. Ensure old mobile devices are wiped when either you or your employees get a new device.

As for tools like USB drives, you're better off implementing a secure file-sharing solution and prohibiting employees from saving data to a thumb drive. These drives are easy to lose and steal, hard to track, and impossible to wipe remotely.

## Data in Transit, Data at Rest

Your company data can be vulnerable both when it's at rest and when it's traveling between devices on your network. A good security policy addresses both data at rest and data in transit.

Data is at rest in your data warehouse, when it's stored within certain applications, on desktop and laptop computers, and on mobile devices. Data can also rest outside your firewalls when employees choose to work from home. If a human resources employee accesses employee health data at home and stores it on a personal laptop, and then that laptop is stolen, you have not only a data breach but also a potential HIPAA violation.

Encryption is a solution for protecting your most important data. Attackers or rogue employees may be able to download data, but when it's encrypted, it's harder for them to read and use. Health data, personally identifiable information and credit card data, for example, should be stored in encrypted form. You should also consider encrypting trade secrets, patents and other sensitive proprietary data types, and you should encrypt employee sign-on credentials.

Data is in transit when employees access an on-premises or cloud-based enterprise data warehouse while they're at work. It's also in transit if an employee working from home accesses your data remotely. You need to see to the security of your own networks, and you need to educate employees about the risks of accessing data remotely. Data that transits over a non-secure public Wi-Fi network, such as those commonly found at libraries or cafes, or through a non-secure employee home Wi-Fi router is at risk of being hijacked by remote attackers.

One solution for protecting data in transit is a virtual private network (VPN). If your employees have access to sensitive data, it's vital to implement VPN technology before allowing them to work remotely. A VPN routes remote traffic through a dedicated server and creates a tunnel between employee devices and your company network. The packets of data traveling over the connection are encapsulated and encrypted, decoded only once they reach their destination. Data becomes impossible to read as it travels, which keeps it safer while it's in transit.

## Privacy Policies

Your hospitality business may operate out of multiple countries all over the globe. As such, you're subject to the data privacy regulations of the countries in which you do business.

You may also be responsible for data based on not where you do business, but on your customer's country of origin. An E.U. customer's data, for example, is subject to GDPR even if they're staying in an American hotel or cruising in the Bahamas. It's up to you to work with governing authorities to ensure you're following municipal, state/provincial and national data privacy regulations.

In addition, it's important for you to be transparent about how you use customers' data. If your privacy policy says you use "reasonable industry standards" to protect your customers' data, and you then experience multiple data breaches, you could expose yourself to costly litigation—and a loss of customers' trust.

### Employee Education

No matter how much you harden your systems, never ignore the human factor in data security. Employees lose data, send it without protecting it, and click on phishing links—it's just what they do. You can reduce the number of human errors in your organization by maintaining an ongoing employee education program.

- Issue security bulletins via email or through your company intranet to keep employees aware of the latest threats.
- Make sure employees know about the regulations that govern data use.
- Share stories of security failures and their consequences; for example, tell them about fines and other consequences that similar businesses experienced when they failed to protect data.
- Conduct exercises to help them spot suspicious email and text messages.
- Establish office hours when employees can come by to perform security-related tasks, like setting up their VPN or adding a new device to your EMM records.

## A Note About Third Parties

Employees aren't the only parties with access to your enterprise data warehouse. If you're using a CRM solution, like Salesforce, you're giving a business partner or SaaS provider access to company data. In many cases, attackers gain access to company data through a third party by hacking into their systems and then using their credentials to access your data.

Regulations like HIPAA hold business partners financially liable for how they treat customer information. Ultimately, it's up to you to ensure that business partners, SaaS providers, and cloud services providers have strong measures in place to protect your data—and to cooperate with you when there's a breach.

# Glossary of BI and Hospitality Terms

**Algorithm**—process or set of rules followed to solve a problem or deliver an outcome

**Application programming interface (API)**—a system that manages protocols and interactions with operating systems, databases, and other applications

**Area chart**—expands a line graph by comparing the proportional value of each category the line represents

**Average daily rate (ADR)**—the average daily revenue generated by a paid-for, occupied room

**Bar chart**—compares a specific variable across different categories

**Batch processing**—the processing of multiple jobs, such as transactions, in a group, usually when systems are largely idle

**Big data**—high-volume, high-variety, and high-velocity information sets that can deliver enhanced insights and better decision-making, but is hard to process using traditional methods

**Business continuity**—process for maintaining business services in the event of an emergency or unexpected disruption

**Business intelligence**—the process of using data mining, processing, querying, and reporting to analyze a company's raw data

**Cloud infrastructure**—remote resources that perform IT services, such as compute, storage, and network

**Cloud storage**—tools for storing data on remote servers accessed via Internet

**Constraint**—the limits on a solution to a problem

**Content management system (CMS)**—programs that manage the creation, publication, and distribution of digital content (e.g., WordPress, Drupal, Joomla!, ExpressionEngine)

**Correlation**—a measurement of interdependence between two or more variables

**Customer acquisition cost (CAC)**—money spent to onboard a new customer

**Customer lifetime value (CLV)**—amount spent by a customer over the duration of a business relationship

**Customer relationship management (CRM) system**—applications that help businesses track customer behavior throughout the customer lifecycle by tracking, organizing, and managing customer interactions

**Damaged inventory percentage—**value of damaged inventory as a percentage of total inventory value

**Data cleansing**—the process of repairing or eliminating incomplete, inaccurate, improperly formatted, or duplicated records

**Data lake**—centralized repository for raw data in its original format

**Data mining**—the process of analyzing large datasets to discover patterns or yield new insights

**Data modeling**—the analysis of data objects to understand how they relate to one another; one of the initial steps in database design

**Data warehouse**—a central repository for data collected and analyzed by an organization

**Database**—a framework for organizing and retrieving data

**Demographics**—statistical characteristics of human populations (e.g., age distribution)

**Descriptive analytics**—summarizes raw data to describe what's currently happening or what happened in the past

**Diagnostic analytics**—summarizes raw data to explain why something happened in the past

**Disaster recovery**—the process of restoring systems following a disruptive event

**Distributed storage**—data stored in multiple locations, often redundant

**Donut chart**—a pie chart with the center removed; allows the viewer to quickly compare categorical proportions of an overall total

**Downtime**—period of time in which systems are nonfunctional or only partially functional, which impairs business operations

**Enterprise mobility management (EMM)**—a solution for governing the use of mobile devices on a company's network

**External data**—data stored outside your company's firewall

**Fill rate**—orders completely filled as a percentage of total orders shipped

**General Data Protection Regulation (GDPR)**—extensive requirements for the use and protection of data about European Union citizens

**Given**—information that describes current circumstances in which a problem must be solved

**Goal**—the ultimate success metric for a given endeavor

**Groupings**—organized sets of key performance indicators (KPI), designed for comparison

**Health Insurance Portability and Accountability Act (HIPAA)**—regulations providing requirements for safeguarding personal health information

**Histogram**—shows data distribution for a single event type over a specified variable; the horizontal axis shows intervals within the range of values for the variable, while the vertical axis shows the frequency (number of data points) found in each interval

**Hypothesis**—a proposed explanation for a situation, which then has to be investigated and tested to determine whether it's correct

**Internal data**—data stored within your company's firewall

**Internet of things**—refers to a network of connected devices, like sensors, that transmit information to each other as well as to local area and wide area networks

**Inventory accuracy percentage**—the number of actual SKUs divided by the number of SKUs in the system (the percentage difference measures shrink)

**Key performance indicator (KPI)**—summary statistics generated when metrics are measured

**Line graph**—shows trends over time and explains how trends in different categories compare to one another

**Loyalty program**—a system through which customers are rewarded for repeat business

**Mean time to repair (MTTR)**—average time lapsed between the submission of a work order ticket and the completion of a repair

**Measures**—units by which metrics are quantified

**Metrics**—items you want to quantify

**Non-relational database**—enables storage and retrieval utilizing means other than the tabular structure of relational databases; enables faster querying and infinite scalability

**NoSQL**—programming language used to manage and perform operations in non-relational databases

**Object storage**—storage model, often distributed, that stores the metadata and location of a file

**On-time delivery percentage**—number of on-time deliveries divided by total number of orders shipped

**Order accuracy percentage**—error-free orders as a percentage of total orders shipped

**Order cycle time**—duration between the time supplies are ordered and the time they arrive at a property

**Pareto principle**—a principle based on the work of economist Vilfredo Pareto which states that 20 percent of customers generate 80 percent of a company's revenue

**Payment Card Industry Data Security Standard (PCI DSS)**—standards governing the protection of credit card and personally identifiable information

**Pie chart**—a visual that splits a circle into triangular pieces, comparing proportions to one another

**Point of sale (POS) system**—systems that process monetary transactions between businesses and customers (e.g., cash register or mobile payment system)

**Predictive analytics**—an analysis of data that detects relationships between past and future events to help forecast what may happen in the future

**Prescriptive analytics**—data analysis that yields probabilities of future outcomes of specified events; provides decision support for what to do about the future or how to create a future scenario

**Probability**—likelihood of a given outcome

**Property management system**—an application used for managing business operations for a property, such as a hotel

Qualitative data—nonnumeric data

**Quantitative data**—measures or counts expressed as numbers

**Query**—a request for information from a database

**Relational database**—collection of data sets organized by tables, columns, and records; easy to organize, but slower to query

**Relationship**—the direct and indirect ways variables affect one another

**Revenue per available room (RevPAR)**—total room revenue divided by the number of available rooms; not dependent on whether or not the rooms are occupied

**Revenue per available skier seat (RevPASS)**—total ski lift ticket revenue divided by comfortable carrying capacity

**Sales funnel**—the process by which customers transition from leads into paying guests

**Sales per payroll hour (SPH)**—sales generated divided by payroll costs for one hour of operation

**Sarbanes-Oxley Act (SOX)**—regulates records retention, the timely disclosure of financial information, protection of records from alteration or deletion, and the collection and protection of financial information within a business

**Small data**—actionable, contained dataset, either in raw or analyzed form

**Strategic planning**—the process by which a business quantifies and maps out its desired vision for the future

**Social return index (SRI)**—metric quantifying a guest's intent to return, based on comparing one company's customer review performance to competitors over a period of time

**Software-as-a-Service (SaaS)**—a licensed application, accessed via Internet, which is managed remotely by the vendor

**Structured data**—data that can be organized into tables and easily incorporated into a relational database

**SQL (structured query language)**—programming language used for managing and performing operations within a relational database

**Supply chain**—the system of organizations, activities, information, and people involved in moving products from suppliers to customers

**SWOT analysis**—a list of a company's strengths, weaknesses, opportunities, and threats

**Unstructured data**—information that exists without predefined organization or models

**Variable**—data item that can be measured or counted

**Vertical transportation feet per hour (VTFH)**—product of a ski lift's vertical rise in feet multiplied by how many skiers it transports per hour

**Virtual private network (VPN)**—routes remote traffic through a dedicated server and creates a tunnel between employee devices and a company's network

**Visual analytics**—interactive charts and graphs for exploring data query results

**Voice of the customer (VOC) program**—a system through which businesses collect customer feedback and analyze it to generate insights

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