2018

# Strategies to Maintain Adequate Hotel Water Supplies

Deborah R. Popely
*Walden University*

# Walden University

College of Management and Technology

This is to certify that the doctoral study by

Deborah Popely

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Erica Gamble, Committee Chairperson, Doctor of Business Administration Faculty

Dr. James Glenn, Committee Member, Doctor of Business Administration Faculty

Dr. Lisa Kangas, University Reviewer, Doctor of Business Administration Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2018

Abstract

Strategies to Maintain Adequate Hotel Water Supplies

by

Deborah R. Popely

MA, North Park University, 2002

BA, Carleton College, 1978

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

October 2018

## Abstract

Hotel guests can use 2 to 3 times more water than community residents. Hotels are water-intensive businesses, and water scarcity presents a pressing problem for managers who rely on an uninterrupted supply of water to meet guests' needs and maintain profitability. Using the resource-based view (RBV) as a conceptual framework, the purpose of this qualitative multiple case study was to explore strategies that hotel managers used to successfully maintain adequate water supplies in the Spanish Canary Islands, an historically arid site and a tourism destination. Data were collected from semistructured interviews and hotel water usage reports. Yin's 5-step approach of examining, categorizing, tabulating, testing, and recombining evidence to draw conclusions guided the data analysis. Four key themes emerged from the findings: value water as a strategic business resource, mitigate risks of natural resources scarcity, promote water efficiency and conservation, and sustain supplies through corporate water stewardship. This study may contribute to positive social change by illuminating processes that hotel managers, employees, guests, and partners, can take to improve environmental stewardship and align their practices with sustainable water governance.

# Strategies to Maintain Adequate Hotel Water Supplies

by

Deborah R. Popely

MA, North Park University, 2002

BA, Carleton College, 1978

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

October 2018

# Dedication

This study is dedicated to those who are working to ensure that there is an adequate and equitable supply of water for people, planet, and communities around the world.

Acknowledgments

I would like to thank my family and friends for their support through the long and arduous process of researching, writing, and editing this study. I am especially grateful to my husband Rick and my son Joe for their forbearance and encouragement. I also would like to thank Susan Tinnish, Ph.D., Alice Jackson, Ph.D., Aurora Reinke, DBA, Roberto Moreno, Ph.D., and Agueda Benito, Ph.D., for their moral support and technical assistance at various crucial junctures along the way. In addition, I am grateful to my chair, Erica Gamble, Ph.D. for advocating on my behalf throughout the process and for the perceptive feedback of my second committee member, James Glenn, Ph.D. and URR representative, Lisa Kangas, Ph.D. Finally, I would like to thank the people of the Canary Islands for welcoming me, supporting my research, and providing such a wonderful laboratory for exploring issues of water use and conservation in the hotel industry.

Table of Contents

List of Tables

List of Figures

# Section 1: Foundation of the Study

Environmental degradation and depletion of resources are gaining attention as important business management issues. The scarcity of natural resources can disrupt supply chains and produce unnecessary risks for businesses. Water scarcity is emerging as a critical problem for water-dependent businesses such as agriculture, meat, beverages, and tourism. Tourism and hospitality businesses, particularly hotels, rely on a sustainable supply of high-quality water. In this qualitative multiple case study, I explored strategies that hotel managers used to maintain adequate water supplies in limited water conditions. By revealing exemplary water supply strategies used by hotel managers in arid regions, the findings of this study could help other managers become better prepared to address threats to their water supply.

## Background of the Problem

Water is arguably one of society's most valuable resources, as well as one of the most constrained (Savenije, Hoekstra, & Van der Zaag, 2014). Experts agree that population growth, economic development, overexploitation of reservoirs, and climate change are linked to increasing water scarcity (World Economic Forum, 2015). Organizations in the tourism industry consume large amounts of water, and those amounts are likely to increase with industry growth (Gössling, 2015). Hotel managers need adequate supplies to satisfy guest water needs, which can require two to three times more water than the population at large (Barberán, Egea, Gracia-de-Rentería, & Salvador, 2013; Kasim, Gursoy, Okumus, & Wong, 2014). Hotel managers employ a variety of strategies to maintain adequate water supplies To achieve cost savings and marketing

benefits (Becken & Dolcinar, 2016; Bruns-Smith, Choy, Chong, & Verma, 2015). Still, gaps persist between best practices and their adoption at the facility level (Styles, Schoenberger, & Galvez-Martos, 2015).

## Problem Statement

Hotel managers need adequate water supplies to maintain profitability and customer satisfaction (Gössling et al., 2012; Kasim et al., 2014). The water needs of hotel guests can be two to three times more intensive than those of residents (Barberán et al., 2013; Kasim et al., 2014; Styles et al., 2015). The general business problem is that water scarcity negatively affects hotels, resulting in operational and marketing challenges, especially in arid regions. The specific business problem is that some hotel managers lack strategies for maintaining adequate water supplies in arid regions.

## Purpose Statement

The purpose of this qualitative multiple case study was to explore strategies hotel managers used to maintain adequate water supplies in arid regions. Hotel managers on the Island of Gran Canaria in the Spanish Canary Islands, a historically water-stressed tourism location, provided data for this study. The targeted population consisted of nine managers from three hotels that had successfully implemented effective water management strategies. Findings from this study may help hotel managers contribute to positive social change by improving hotel water stewardship and aligning hotel water supply strategies with sustainable water governance, and by influencing employees, guests, and other partners toward water conservation. Identifying new strategies for

water supply management could have implications for a more equitable distribution of water among stakeholders.

## Nature of the Study

There are three research methodologies: qualitative, quantitative, and mixed methods. Yin (2015) asserted that qualitative methods allow researchers to investigate phenomena that require further exploration to increase understanding. Qualitative researchers use interviews to obtain insights on values, opinions, behaviors, and social contexts (Oltmann, 2016). The qualitative methodology was appropriate for this study because the goal was to explore the multidimensional issue of water use in hotels. In contrast, quantitative research methods use statistics to quantify correlations between measurable variables (Thorne, 2016). Given the diversity of conditions and responses to those conditions by hotel managers, identifying and quantifying explanatory or causal variables for a quantitative study on this topic would have been difficult (Baskarada, 2014). Because causal variables had not been identified or measured, a mixed methods approach was also inappropriate.

I considered three research designs for a qualitative study on hotel water supply strategies: phenomenology, ethnography, and case study. Because narrative research and grounded theory are inappropriate for applied business research, I did not consider those methods. Phenomenology is suitable for studies that seek to describe the essence of a lived phenomenon (Landrum & Garza, 2015). Because hotel water supply maintenance is an ongoing problem for hotel managers, a phenomenological design was not applicable. Ethnography seeks to describe and interpret behavior patterns of a culturally

homogeneous group (Lopez-Dicastillo & Belintxon, 2014). Strategies used by hotel managers to maintain adequate water supplies are not culturally bound, nor open to cultural interpretation. Additionally, extended time in the field was not feasible for answering the research question. A case study design permits a researcher to investigate processes, variables, and contexts as they occur in real life, capturing the complexities within a bounded system (Baskarada, 2014; Stake, 1995; Yin, 2017). The case study is ideal for studying a current, ongoing, and complex problem such as hotel water supply. A multiple case study design allowed me to explore the phenomenon across several locations and contexts. Exploring multiple locations and contexts can produce insights that are more compelling and robust than a single case study design (Baskarada, 2014; Hancock & Algozzine, 2017; Yin, 2017). The inclusion of multiple sites enriched my results. A case study design also offered practical benefits in the form of benchmarking against other organizations and cases and obtaining a rich description of the phenomenon (Baskarada, 2014).

## Research Question

What strategies do hotel managers use to maintain adequate water supplies in arid regions?

## Interview Questions

Study participants answered the following questions:

Q1. What strategies do you use to maintain adequate water supplies at your hotel?

Q2. What are some of the challenges related to strategies for maintaining adequate water supplies?

Q3. How have you addressed the challenges in maintaining adequate water supplies at your hotel?

Q4. Which of your strategies do you think are most effective for maintaining water supplies at your hotel?

Q5. What challenges did you face working with local communities to implement these strategies?

Q6. Where did you receive technical support or knowledge needed to implement these strategies?

Q7. What else can you tell me about the hotel's water supply assurance strategies?

## Conceptual Framework

The conceptual framework for this study was the resource-based view (RBV), which emerged in the 1980s to explain how possession of scarce resources could be a source of above-average profits (Barney, 2001). RBV theorists also proposed that under competitive conditions, efficient and effective routines could confer a competitive advantage to firms (Enriquez de la O, 2015). The RBV involves rivalry for comparative advantage through the acquisition of tangible and intangible resources (Bell, Mollenkopf, & Stolze, 2013). Competition for scarce resources could lead managers to conserve as a hedge against future price increases and regulation (Bell et al., 2013). Constrained resource supplies encourage managers to pursue competitive advantage by developing efficiencies, new competencies, and innovative solutions (Hunt, 2015).

Bell, Autry, Mollenkopf, and Thornton (2012) proposed a typology for explaining the RBV under conditions of natural resource scarcity (NRS). Understanding NRS

typology can catalyze strategies for managers based on whether the resource is renewable or nonrenewable and whether the balance of supply and demand is abundant or scarce either locally or globally. These strategies fall into three broad categories: *employment approaches*, such as avoidance, logistics, allocation, or sustainment, *conservation approaches*, such as resource recovery and resources base protection, and *mitigation approaches*, such as substitution and importation. Although economists expect substitution and innovation to offset the risks of NRS, Bell et al. (2012) proposed that traditional economic assumptions could have limited value when demand for critical natural resources increases while availability decreases. Given the risks of increasing scarcity, hotel managers could look to NRS theory to help expand their knowledge of water supply strategies.

## Operational Definitions

*Arid and semiarid regions*: Regions where the availability of water limits vegetative growth (García-Rodriguez, García-Rodríguez, & Castilla-Gutiérrez, 2016).

*Corporate water stewardship (CWS):* Voluntary involvement by corporate water-users in the management of water allocation (Sojamo, 2015).

*Natural resource scarcity (NRS)*: Depletion of natural resources needed to satisfy demands for future products (Bell et al., 2012).

*Resource-based view (RBV):* A firm-level effort to efficiently leverage internal resources to gain a sustained competitive advantage (Enriquez de la O, 2015).

*Stakeholder:* Any individual or group who may be impacted by an organization's actions (e.g., shareholders, customers, employees, suppliers, and community members).

In the context of water governance, stakeholders include a broad range of public and private actors engaged in competition for and decisions about allocation of resources (Harrison, Freeman, & de Abreu, 2015).

*Sustainable water use:* Water use that does not destroy the natural cycle and allows the resource to regenerate itself (Savenije et al., 2014).

*Water footprint*: A measurement of direct or indirect water use by a consumer or producer (Hoekstra, 2015).

*Water governance:* Management of water resources that considers social, governmental, commercial, and domestic uses (Marques, Pinto, & Miranda, 2016).

*Water scarcity*: Constraints on water availability arising from the complex interactions between humans and nature. Water scarcity can occur as a result of hydrological, biophysical, technological, socio-economic, governmental, and other forces or combinations thereof (Jaeger et al., 2013).

*Water sustainability:* Ensuring the sufficient and equitable supply of water in a way that does not threaten the survival of the resource base (Damkjaer & Taylor, 2017).

## Assumptions, Limitations, and Delimitations

### Assumptions

Assumptions are beliefs guiding the research that cannot be verified (Hancock & Algozzine, 2017). In this study, I assumed that participants would be forthcoming and answer research questions honestly and accurately. Moreover, I assumed I could interpret participants' statements with minimal bias or unwarranted assumptions. I used member checking and supporting documentation that included objective data to help

mitigate any potential inaccuracies or misinterpretations. A further assumption was that the case study was the most appropriate research design to answer the research question concerning a complex problem such as water supply. The case study is appropriate for studying a current, ongoing, and complex problem (Yin, 2017).

**Limitations**

Limitations are possible weaknesses in a study outside the researcher's control (Hancock & Algozzine, 2017). All studies have limitations, and researchers should avoid making extravagant claims of generalizability or conclusiveness (Marshall & Rossman, 2014). The first weakness pertinent to this study was the sampling method used to recruit participants. All participants were managers at different units of the same hotel group and therefore more inclined to provide reinforcing rather than contradictory information. Also, an inherent self-selection bias existed because these managers were volunteers who were eager to talk about their accomplishments. Diefenbach (2009) observed that in organizations subordinates might have difficulty in diverging from the views of upper management. A second weakness was that departmental managers could have felt compelled to align their statements with those of superiors at each hotel, despite assurances of confidentiality. Fortunately, documentation provided important methodological triangulation to offset potential positive bias in the findings.

**Delimitations**

Delimitations reflect the boundaries of a study (Hancock & Algozzine, 2017). The case that is the subject of the research is a *bounded system,* which may consist of an individual, group, program, or department (Yazan, 2015). I chose to focus on water

supply because it is an increasingly critical issue for water-dependent businesses such as hotels. The process involved posing seven research questions about water supply strategies to nine managers in three hotels of different sizes and types in an arid location in the Spanish Canary Islands. I did not interview these managers on other hotel management issues, such as energy consumption or marketing, because of the level of complexity such questioning would have introduced. A phenomenon can occur at multiple levels (De Massis & Kotlar, 2014), and I explored water supply strategies in different departments and management levels within each hotel. However, I limited participation to managers who dealt with water supply as part of their function. I did not interview managers' subordinates in food and beverage, housekeeping, facilities, or individuals in other departments for their views on hotel water supply strategies. Finally, it was beyond the scope of this study to focus on water supply at the destination level or in other tourism businesses such as restaurants or attractions.

## Significance of the Study

### Contribution to Business Practice

In this qualitative, multiple case study, I sought to contribute to effective business practice by identifying strategies that hotel managers used to address issues related to water, an increasingly scarce but essential natural resource. Economists predict that water scarcity will be among the leading business risks in the coming decade (World Economic Forum, 2016). The tourism industry heavily depends on water supply, especially in the hotel sector, which consumes water to accommodate, feed, and entertain guests (Barberán et al., 2013). Hotels are more than likely to face water shortages because they tend to be

located in warm climates, in coastal areas and on islands where there are inherent water challanges (Styles et al., 2015).

Water scarcity increases costs and complicates marketing for hotel managers in these regions (Barberán et al., 2013). To maintain adequate water supplies, hotel managers typically employ water conservation, water reuse, and resource recovery strategies, producing potential cost savings and marketing benefits (Becken & Dolcinar, 2016; Bruns-Smith et al., 2015). Therefore, by identifying effective water supply strategies used in a historically water-challenged tourism environment, hotel managers could reduce costs, increase profitability, and ensure the ongoing availability of water resources when supplies are uncertain or limited. These strategies may also produce marketing benefits, as consumers increasingly expect hotels to reduce resource consumption and limit environmental impacts (Bruns-Smith et al., 2015).

**Implications for Social Change**

The results of the study may also contribute to positive social change by helping align hotel water supply strategies with sustainable water governance. Water use is increasing globally, and demand is projected to exceed sustainable supply by 40% by 2030 (World Economic Forum, 2015). Tourism's contribution to water consumption is increasing because of increasing travel, rising expectations for accommodations providers, and growing popularity of water-intensive diversions (World Tourism Organization, 2016). The resulting economic and social tensions could jeopardize hotels' licenses to operate and damage the reputations of hotel brands in many locations (Styles et al., 2015).

Responsible conduct related to water use and conservation by all stakeholders is essential for sustainable development (Marques et al., 2016). For this reason, water efficiency and water conservation goals typically appear in hotel environmental and social responsibility policies (Carroll & Buckholtz, 2015). Therefore, hotel managers may use the findings from this study to become better environmental stewards and align hotel water management with sustainable water governance. Also, identifying new water supply strategies could have implications for a more equitable distribution of water among tourism destination stakeholders.

## A Review of the Professional and Academic Literature

The purpose of this study was to explore strategies hotel managers used to maintain adequate water supplies in arid regions. In this literature review, I synthesized the economic theories and management concepts about resource acquisition and exploitation and analyzed how these theories and concepts influence water supply strategies in the hotel industry. The literature review involved a thorough search of scholarly journals, seminal works, and reports, beginning with a query in ProQuest on the topic of water use in the hotel industry. Many of the studies described water use and scarcity in the tourism industry, with hotel-focused studies comprising one of the largest categories. I used Google Scholar, Walden University's library, EBSCO, and ProQuest Central to review economic concepts and management theories on how businesses acquire and exploit resources to gain a competitive advantage. This search led to further exploration of research on how resource scarcity or disruption impacts business performance. I explored water resources as a vital input to business and the ways private

sector entities such as hotels ensure adequate supply in a resource-constrained environment.

The literature review contains critical analysis and synthesis of these topics organized into three parts: (a) the conceptual framework, (b) the topical foundation, and (c) the analysis of the topic in relation to the conceptual framework. Part 1 covers the conceptual framework and includes the following subsections: historical literature, knowledge, capabilities, natural resources, resource scarcity and firm performance, and criticisms of the RBV. Part 2 covers the topical foundation, water and industry, and includes the following subsections: water economics, water supply and demand management, and water scarcity and industry. Part 3 covers the topic in relation to the conceptual framework and includes the following subsections: resources and hotel competitive advantage, tourism, hotels and water resources, hotel water use, and strategies for maintaining water supplies in hotels. Figure 1 illustrates the structure of the literature review and lists the topics covered in each part.

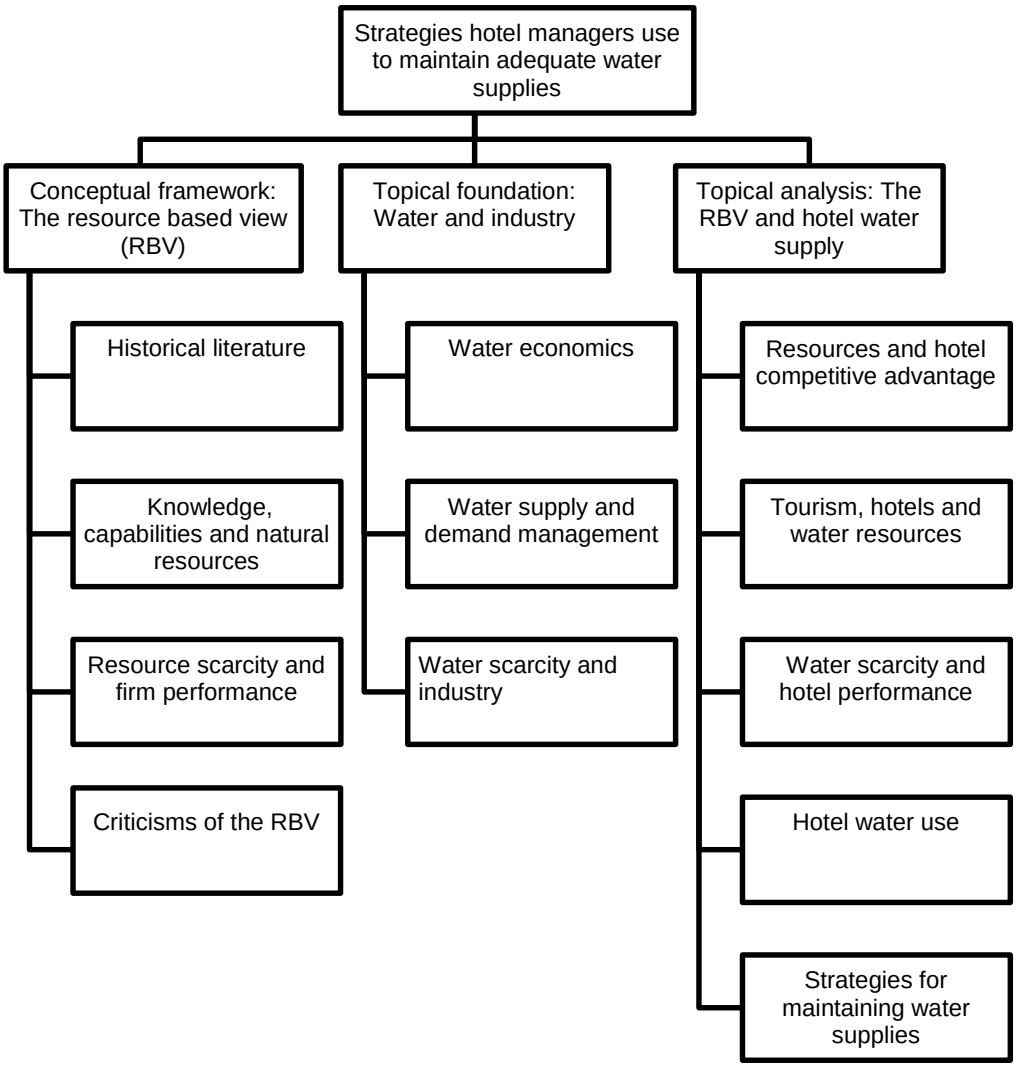


*Figure 1*. Literature review structure for strategies hotel managers use to maintain adequate water supplies.

The search included five databases and the following key words: *hotels*, *water*, *hotels and water*, *hospitality and water*, *tourism and water*, *water scarcity*, *climate change*, *water supply*, *water demand*, *water management*, *natural resources*, *resource efficiency*, *resource conservation*, *water valuation*, and *water management*. I used the Boolean operators AND OR to maximize results. Review of over 190 peer-reviewed articles and seminal sources yielded 131 sources for use in the study, of which 117 (85%)

were from the past five years (2014-2018), 114 (88%) were peer reviewed articles, 8 were government reports (6%), 6 were seminal works (books) (4.5%), and 3 (2.5%) were industry websites. Of the 83 references employed in the literature review, 73 (88%) were from the past 5 years (2014-2018), 77 (92%) were peer-reviewed articles, 5 (6%) were government reports, 1 (1%) was a book, and 2 were industry websites (2%). The frequency of sources appears in Table 1.

Table 1

*Frequency of Study Sources*

| Sources | Within 5 years | Older than 5 years | Total |
|---|---|---|---|
| Peer-reviewed journals | 97 | 17 | 114 (88%) |
| Government reports | 7 | 1 | 8 (6%) |
| Seminal works (Books) | 5 | 1 | 6 (4.5%) |
| Industry websites | 3 | 0 | 3 (2.5%) |
| Total | 112 (85%) | 19 (15%) | 131 |

**Conceptual Framework: The Resource-Based View (RBV)**

The purpose of this study was to explore strategies that hotel managers used to maintain adequate water supplies in arid regions. The conceptual framework for the study was the resource-based view (RBV), a widely discussed topic in the economic and strategic management literature. RBV theorists argued that by optimizing internal resources and capabilities, firms could achieve a sustainable competitive advantage (Enriquez de la O, 2015). Resources fall into the classifications of tangible, intangible,

and human (Barney, 2001). Valuable, rare, imperfectly mobile, and nonsubstitutable (VRIN) resources confer the greatest strategic advantage (Enriquez de la O, 2015).

Classical economists observed that when supply is limited or fixed, possession of scarce resources may produce above-average profits. Not all resources confer the same degree of advantage. A firm might achieve competitive parity by exploiting valuable but common resources and capabilities, or an organization might achieve a temporary competitive advantage by obtaining and leveraging a valuable, rare, or inimitable resource (Leonidou, Leonidou, Fotiadis, & Zeriti, 2013). Changes in industry structure or the external environment could easily eliminate such an advantage. Thus, the existence of a competitive advantage might also depend on a company's knowledge and capabilities to adopt effective and efficient processes for responding to change (Leonidou et al., 2013). Resource scarcity presents unique challenges for managers. Bell et al. (2012) argued that when faced with scarcity, a manager might be forced to practice postponement, substitution, or innovative solutions. How these concepts relate to hotel managers and the various water supply strategies they employ is covered later in this literature review.

**Historical literature.** The RBV emerged in the 1980s and described how the exploitation of resources could produce a competitive advantage for businesses. Wernerfelt coined the term in 1984, laying the foundation for a theoretical framework that has dominated the literature for more than 30 years (Božič & Cvelbar, 2016). The RBV framework involved looking at the firm as a broad set of resources rather than a collection of products (Salazar, 2017). Scholars credited Barney (1991) with establishing

the link between the RBV and competitive advantage, differentiating among various types of resources and identifying the interactions between them as drivers of firm performance (Salazar, 2017). The RBV is consistent with several other theories for explaining why some firms outperformed others, including structure-conduct-performance (SCP), neoclassical economics, and evolutonary economics (Barney, 1991). The assumptions that shaped these other resource-based approaches were similar to those of the RBV; for instance, all the approaches described long-lasting differences in the ways resources and capabilities might be distributed across firms (Barney, 2001).

Resources that enable a firm to efficiently or effectively produce and market products that create value by satisfying one or more market segments may come in the form of assets, capabilities, processes, attributes, information, and knowledge (Barney, 2001). The RBV encompassed both tangible and intangible resources. Tangible resources included financial or physical assets, while intangible resources included factors situated in the firm's human, intellectual, and relational capital (Božič & Cvelbar, 2016). One critical premise was that only VRIN resources could produce a long-lasting competitive advantage and lead to above-average returns (Barney, 2001). Value, according to Barney (2001), is a function of information asymmetries as to the future value of resources in strategic factor markets. In other words, valuable resources are those that can be attained at below market rates (prices) and generate above market-rate returns (Salazar, 2017).

According to Barney (1991), rarity relates to how many competitors can access a resource. The fewer who have the opportunity to leverage an asset, the greater the

competitive advantage for those who possess the resource. However, rarity alone does not confer an advantage; rather, returns depend on the ability of the firm to operationalize the rare resource (Salazar, 2017). An inimitable resource is one that is costly to copy or imitate. This observation is closely related to Porter's (1980) idea that firms achieve competitive advantage through differentiation based on one or more unique characteristics. Similarly, Barney (1991) asserted that possession of resources for which there are no strategic substitutes could provide a competitive advantage.

**Knowledge, capabilities, and natural resources.** As the RBV theory developed, scholars pursued three main areas of inquiry within the RBV framework, organized around three specific forms of resources: knowledge, capabilities, and natural resources (Božič & Cvelbar, 2016). Each type of resource was pertinent to the competitive advantage of firms. Each resource applied to the strategies used by hotel managers to maintain adequate water supplies.

Grant (1996) recognized that operational and strategic knowledge could confer a competitive advantage because it was hard to imitate. This area of RBV research focused on intangible resources such as human resource practices, managers' and employees' skills, intellectual and social capital, relationships, and organizational culture. Bromiley and Rau (2014) described how management techniques, even those that were not unique, could help a firm gain a competitive advantage. In numerous studies across multiple industries and geographic regions, researchers found that knowledge of and ability to implement fundamental management techniques explained firm performance, at least in part. Bromiley and Rau (2014) applied the premise to simple and obvious practices, such

as operational efficiency measures, as well as more complex processes such as mergers and acquisitions.

Capabilities were a distinct type of resource related to competitive advantage (Lin & Wu, 2014). Capabilities consisted of skills related to market orientation, innovation capacity, managerial ability, and network capital (Božič & Cvelbar, 2016). According to Helfat and Petraf (2015), capabilities were necessary to put other resources to productive use. Leonidou et al. (2013) proposed that resources alone did not confer a competitive advantage; rather, they must be collected, organized, and coordinated to meet demand. The configuration of resources with routines and assets is what gives resources value (Salazar, 2017), and a firm's business routines could be considered valuable resources in and of themselves (Nelson & Winter, 2002). Under competitive conditions, efficient and effective routines could confer a competitive advantage to firms, and failure to abandon less efficient and effective routines could jeopardize the firm's survival (Enriquez de la O, 2015).

RBV theorists Teece, Pisano, and Shuen (1997) developed dynamic capabilities (DC) to emphasize how a firm's capabilities enabled it to deploy resources in response to the external environment. DC theory developed in response to criticism that the core propositions of the RBV were static and did not accommodate variations in the external environments (Salazar, 2017). DC researchers focused on maintaining competitiveness in changing markets by combining, developing, and rearranging internal and external resources (Borland, Amborsini, Lindgreen, & Vanhamme, 2016) and on sensing and

seizing opportunities and rearranging resources, stakeholders, customers, and supply chain partners to take advantage of those opportunities (Helfat & Peteraf, 2014).

In responding to market forces, the conduct of managers (including decisions concerning resource use) could determine performance and profitability (Ralston, Blackhurst, Cantor, & Crum, 2015). This idea built upon Porter's (1980) classic theory of strategy, asserting that a company's success depended on its response to competitive forces that are largely defined by industry dynamics. Industry dynamics included buyer and supplier pressure, product differentiation, vertical integration, and barriers to entry. These factors defined the rules of competition as well as the strategies potentially available to the company. Suppliers of critical resources exert pressure on businesses that affect costs, prices, and profitability (Porter, 1980).

Another stream of RBV research pertained to natural resources and a firm's related policies and practices. RBV scholars traditionally embraced the static view of the natural environment in which the process of selling a product and making a profit began with the acquisition and exploitation of raw materials and ended with the disposal of waste (Borland et al., 2016). This view evolved to incorporate knowledge and capabilities related to natural resource management and conservation, such as environmental and corporate social responsibility policies, and managers' attitudes towards environmental protection (Božič & Cvelbar, 2016).

Managers' dynamic capabilities could influence the success or failure of environmental and social responsibility initiatives. In a study by Del Mar Alonso-Almeida, Buil-Fabregà, Bagur-Femenías, and Aznar-Alarcón (2017), managers employed

DC to better respond to external changes, including fluctuations in resource availability. Managers' use of DC also played a critical role in building cooperation, teamwork, and commitment among stakeholders, ensuring the success of sustainable development efforts as well as the long-term success of firms. The researchers identified a stronger connection between managers' DC and social responsibility than DC and environmental commitment. Borland et al. (2016) argued that the natural environment was an external manifestation of the firm's ecosystem, and thus the firm and the natural resources upon which it depended were part of one dynamic system.

**Resource scarcity and firm performance.** The economic theories of Adam Smith, John Stuart Mills, Alfred Marshall, and Alfred Weber encompassed resource scarcity, location, and quality (Bell et al., 2012). Firms operate in a constant state of rivalry to achieve a comparative advantage through the acquisition of resources that are valuable, rare, and imperfectly mobile (Hunt, 2015). These resources may be tangible or intangible. Under these conditions, competitors attempt to acquire, imitate, substitute, or innovate to neutralize or outflank one another, creating a continuing state of disequilibrium (Hunt, 2015). Competition for scarce resources may lead managers to conserve as a hedge against future price increases and regulations (Bell et al., 2013). Under constrained resource conditions, managers seek competitive advantage by developing efficiencies, new competencies, and innovative solutions.

Table 2

*Supply Chain Risk Mitigation Strategies*

| NRS Status | Supply vs. Demand Balances | Conservation Approach | Employment Approach | Mitigation Strategy |
|---|---|---|---|---|
| Global degeneration | Renewable GS < GD<br>Renewable LS < LD | Resource base protection | Avoidance | Fortification |
| Local degeneration | Renewable GS ≥ GD<br>Renewable LS < LD | Resource base protection | Logistics | Mobilization |
| Global depletion | Nonrenewable GS < GD<br>Nonrenewable LS < LD | Resource recovery | Avoidance | Discretion |
| Local depletion | Nonrenewable GS ≥GD<br>Nonrenewable LS < LD | Resource recovery | Logistics | Compilation |
| Local munificence | Renewable GS < GD<br>Renewable LS > renewable LD | Resource base protection | Allocation | Cultivation |
| Global munificence | Renewable GS ≥ GD<br>Renewable LS ≥ renewable LD | Resource base protection | Sustainment | Perpetuation |
| Local abundance | Nonrenewable LS < GD<br>Nonrenewable LS ≥ nonrenewable LD | Resource recovery | Allocation | Utilization |
| Global abundance | Nonrenewable GS ≥ GD<br>Nonrenewable LS ≥ nonrenewable LD | Resource recovery | Sustainment | Preservation |

*Note*. GS = global supply. GD = global demand. LS = local supply. LD = local demand.
Adapted from "A Natural Resource Scarcity Typology: Theoretical Foundations and Strategic Implications for Supply Chain Management," by J. E. Bell, C. W. Autry, D. A. Mollenkopf, & L. M. Thornton, 2012, *Journal of Business Logistics, 33*, p. 160. Copyright 2012 by John Wiley & Sons, Inc. Adapted with permission.

Bell et al. (2012) identified NRS as an operational and supply chain risk factor, driven by population growth, flattened demand curves, and depletion of critical inputs such as water, petroleum, food, and metals. Supply chain risk occurs when physical

supply and demand for a resource are out of balance in a location (Bell et al., 2012). According to Bell et al.'s (2012) typology for mitigating the impact of NRS on the supply chains, how firms interact with natural resources depends on two key factors: renewability and scarcity. Bell et al. (2012) proposed strategies for managers based on whether the resource was renewable or nonrenewable, combined with the balance of supply and demand as abundant or scarce either locally or globally. These strategies fell roughly into three categories: *employment approaches,* such as avoidance, logistics, allocation, or sustainment, *conservation approaches,* such as resource recovery and resources base protection, and *mitigation approaches,* such as compilation and mobilization (see Table 2).

In cases of local degeneration of supply, a mobilization strategy might require managers to augment resources from outside sources and participate in efforts to restore the resource base. A manager might address local depletion by using a compilation strategy to increase local availability. Compilation would involve acquiring outside supplies, practicing postponement, and using methods such as recycling and resource recovery (Bell et al., 2012). A formerly renewable resource can become nonrenewable because of environmental damage, and a resource can become scarce when a business seeking resource advantage exploits the highest quality resource, leaving future producers with options that are lower quality, more difficult to acquire, or more polluting. Bell et al. (2012) cautioned that use of NRS typology depended on an accurate assessment of a resource's status as to quantity and quality. Supply chain disruptions might occur when managers make false assumptions about the availability of a resource or its quality or fail

to adjust to changing conditions of supply and demand. Bell et al. (2013) remarked that economists typically expect substitution and innovation to mitigate resource scarcity-based risks but contended that substitution and innovation might have limited value when there is increased demand for and rapid depletion of critical natural resources.

**Criticisms of the RBV.** Scholars criticized the RBV for its complexity and lack of practical solutions. Božič and Cvlebar (2016) observed that isolating the resource that provides a competitive advantage is difficult given the interrelationship of various resources with one another and with external forces. Salazar (2017) criticized the RBV for restricting the discussion of resources and capabilities within organizational boundaries. RBV researchers often focus solely on intangible resources to the exclusion of tangible resources, and vice versa, obscuring how the interaction between these resources might influence outcomes (Božič & Cvelbar, 2016). Further criticism was that the RBV theory does not account for negotiating power and agreements between important stakeholders, such as owners, managers, and employees, who shape firm performance.

Furthermore, limited empirical data exist regarding the RBV. The absence of reliable measurement scales for sustainable competitive advantage is one impediment to empirical testing (Božič & Cvelbar, 2016). Throughout the early 2000s, multiple researchers attempted to measure the impact of one or more resources or capabilities on a firm's performance. The majority conducted large quantitative studies using sizeable samples from different companies. Scholars criticized these studies for failing to generate a holistic understanding of the RBV and proposed that researchers conduct more

case studies to better understand the interactions between various resources and firms' competitive advantages (Božič & Cvelbar, 2016).

In summary, the RBV was a useful conceptual framework for this exploration of strategies that hotel managers used to ensure adequate water supplies. The RBV has dominated management literature for more than 30 years to describe how exploitation of resources could produce a competitive advantage for firms (Božič & Cvelbar, 2016). The RBV focuses on how organizations optimize internal resources to maximize firm performance (Barney, 2001; Enrique de la O, 2015). These resources may include assets, capabilities, processes, attributes, information, or knowledge. Furthermore, access to or possession of VRIN resources may lead to above-average returns (Barney, 2001). VRIN resources can take the form of knowledge, capabilities, or natural resources. Although researchers often separate these resources into different streams of inquiry, many scholars argue that they are interdependent (Enriquez de la O, 2015; Helfat & Petraf, 2015; Leonidou et al., 2013).

The configuration of knowledge and capabilities with physical assets may be what gives resources value, and a criticism of the RBV is that it fails to take such a holistic view (Salazar, 2017). Dynamic capabilities are also important given environmental change. Firms must acquire new knowledge, skills, and resources and configure them in new ways in response to market forces (Helfat & Petraf, 2014). Thus, access to or possession of natural resources alone may not confer competitive advantage. Rather, competitiveness depends on managers' strategies for acquiring and exploiting resources, and the knowledge and capabilities that support those strategies (Božič & Cvelbar, 2016).

Under unusual conditions, there is an increase in the rivalry for valuable, rare, and imperfectly mobile resources and managers must develop efficiencies, new competencies, and innovative solutions in response. Bell et al. (2012) illustrated this phenomenon in an NRS typology. Managers could adopt *employment approaches*, such as avoidance, logistics, allocation, or sustainment, *conservation approaches*, such as resource recovery and resources base protection when local or global degeneration or depletion impacts supplies, or *mitigation strategies*, such as compilation and mobilization of substitutes.

This multiple case study explored how hotel managers operating under arid conditions employ various strategies for maintaining water supplies. In Part 2 of the literature review, I focus specifically on water resources and how the economics of supply and demand shape the response by business and industry fluctuating levels of availability.

**Topical Foundation: Water and Industry**

Throughout history, water has been recognized as a private good for individual consumption as well as a public good for meeting a range of human and nonhuman needs (Jaeger et al., 2013). In 1977, the United Nations (UN) declared water to be a basic human right, and in 2014, the UN's sustainable development goals integrated water as a human right (Martins, Quintal, Cruz, & Barata, 2016). Human interests and values shaped both consumptive use of water and humans' ethical commitments to stewardship, equity, and fairness, and concerns for the water needs of future generations (Jaeger et al., 2013). Water differs from other resources in that it uniquely encompasses technical,

social, economic, and symbolic aspects (Bjornlund, Xu, & Wheeler, 2014). For this reason, water supply depends on a complex web of environmental, socio-political, and economic factors (Casadevall, 2016).

**Water economics.** Water is a key resource for economic development, and cheap, abundant fresh water is an important driver of economic growth (Savenije et al., 2014). Classical economists thought water had little economic value due to its abundance and relative ease of access. However, under some circumstances, the lack of fresh, reliable water could reach the level of life-and-death importance (Jaeger et al., 2013). Variations in water availability produced wide differences in how managers in different industries and locations valued water resources.

Neoclassical price theory indicated that supply and demand affected the price of resources and thereby impacted business strategy. Historically, microeconomists proposed that when demand for a resource was high, prices also rose, and subsequently so did supply (Enriquez de la O, 2015). However, economists also acknowledged that certain resources differed because they may need a long period to develop, there is no clear way to develop them, and they cannot easily be bought and sold (Barney, 2001). For instance, when the water supply pollution, drought, or other social uses constrain water supply, managers may not be able to maintain adequate water supplies at a reasonable price or not at all.

Classical economists defined the value of resources primarily as a function of the marginal cost to produce, and the marginal value consumers place on it. Allocation of a resource was efficient when the marginal value (minus acquisition or transaction costs)

was the same for competing uses (Jaeger et al., 2013). Water differed from other resources because the producers did not bear all the costs of production (Jaeger et al., 2013). Water suffered from the problem exemplified in *the tragedy of the commons*. This classical concept posed the question of how to prevent depletion of a natural resource held in common while at the same time allowing users to maximize supply.

Other characteristics added to the complexity of water valuation: The cost to transport or store, the variability and uncertainty of quantities due to mobility, evaporation, seepage, and transpiration, the interdependency between users, and the importance for public purposes. Diversion of water from third-party benefits such as residential use, flood control or power generation imposed an unaccounted-for cost on the public. For this reason, government agencies, trade groups, and property owners greatly influenced water economics.

**Water supply and demand management.** As the primary supplier of water resources, governments establish pricing and tariffs to recover costs and promote the efficient allocation of water (Marques et al., 2016). In comparison to market-based systems, institutional solutions are costly, imperfect, and introduce numerous inefficiencies into water allocation decisions (Jaeger et al., 2013). Despite these drawbacks, Wohlers, Mason, Wood, and Schmaltz (2014) remarked that regulatory and policy interventions were necessary due to the finite nature of groundwater resources. Water pricing must be regulated to balance the interests of utilities and ratepayers. Policymakers may apply both rationing (water restrictions) and pricing strategies to reduce demand under scarce conditions, but bans and taxes are unpopular with

stakeholders. In a study of the impact of policy instruments to address the severely depleted Alto Guadalentín aquifer in southeastern Spain, Martínez-Granados and Calatrava (2016) confirmed that incentives such as buybacks of water rights and subsidization of desalination received greater support than bans and taxes.

Manage the demand for water in response to scarcity stimulated the development of new instruments (Molinos-Senante & Donoso, 2016). Pricing became an acceptable tool for managing water demand. Policymakers throughout the world, notably in Israel and Mexico, proposed innovative rate designs reflecting the true scarcity value of water. Molinos-Senante and Donoso (2016) pointed out that Australia, Austria, Denmark, Finland, and the United Kingdom successfully implemented tariff structures with fixed and variable components to accommodate different users.

Policymakers used a variety of tariff structures with varying strengths and weaknesses (F. S. Pinto & Marques, 2015). Still, they faced the challenge to design tariffs that achieved multiple and potentially conflicting goals of providing an equitable, affordable water supply while at the same time promoting water efficiency and conservation (Molinos-Senante & Donoso, 2016). Water pricing, according to Gutiérrez-Martín, Borrego-Marín, and Berbel (2017), might be a less effective means of combatting water scarcity than fiscal instruments, setting standards, institutional cooperation, and water markets when applied to agricultural use. Affordability is a particularly critical issue in underdeveloped and developing countries (Martins et al., 2016). In the 2015 *World Water Development Report*, economic access to water (i.e., affordability) was

cited as a critical worldwide problem (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2015).

In newer models, water managers placed greater emphasis on water sustainability, which Damkjaer and Taylor (2017) defined as designing and managing systems to meet the current and future needs of society while leaving ecological, environmental, and hydrological integrity intact. Savenije et al. (2014) asserted that water sustainability involves ensuring adequate supply by increasing the efficient use of water, reducing demand, and addressing the limitations of natural systems. At a 2015 conference at the University of Portugal in Lisbon, 150 experts from 25 countries worked to redraft water governance to conform to changing conditions. The consensus was that there was a need for new models focusing on responsible conduct, accountability, and transparency by all stakeholders; collaboration in decision-making by government, operators, customers, regulators, and other entities; and the promotion and sharing of improved practices and innovative solutions (Marques et al., 2016).

In an era of collaborative management, water management must adopt multi-sectoral, transversal, and holistic approaches that engage all factors and actors in resource use policymaking (Casadevall, 2016). These factors include institutions, stakeholders, information, incentives, and leadership, to name a few (Berg, 2016). Further, based on case studies and empirical data, the traditional top-down regulatory approach alone no longer produces effective results, especially in developing countries lacking functional water governance structures (Berg, 2016).

**Water scarcity and industry.** The global water supply could fall significantly below demand by 2030 due to population and economic growth (World Economic Forum, 2015). In a quantitative analysis of scarcity trajectories at the subnational level, Kummu et al. (2016) found that in the past century, the number of people experiencing water scarcity increased 16-fold, while the total population only increased four-fold. The Food and Agriculture Organization (FAO) of the United Nations reported that agriculture accounted for 70% of total water consumption (DeSouza, 2016). Growing meat and dairy consumption placed additional stress on global water supplies (Hoekstra, 2015).

Overexploitation of freshwater supplies is producing water scarcity in many parts of the world (Savariar, 2014; Savenije et al., 2014). Aggressive agricultural practices, the diversion of rivers and streams, the building of dams and reservoirs, changes in land use, deforestation, urbanization, and other forms of development alter the ecological system and lead to an extreme oversubscription of groundwater resources (Savenije et al., 2014). Water scarcity is inherently a local problem because transporting water over long distances cannot easily solve chronic water shortages (Hoekstra, 2015). At the same time, because watersheds typically transcend political boundaries, water supply is also a transnational problem requiring cooperation and collaboration across regions and continents.

Experts define water scarcity as a lack of water supply arising from the complex interactions between humans and nature (White, 2014). Scarcity can be the result of hydrological, biophysical, technological, socio-economic, governmental, and other forces or combinations thereof (Jaeger et al., 2013). The FAO proposed that water scarcity

exists in three forms: physical, economic, and institutional (DeSouza, 2016). Physical scarcity is a deficit of water of sufficient quality. Economic scarcity occurs if water is inaccessible due to lack of infrastructure or financial support. Inadequate water policies or governance produce institutional scarcity (DeSouza, 2016). The *Falkenmark index* defines water stress as below 1,700 cubic meters per person per year, water scarcity at levels below 1,000 cubic meters, and absolute scarcity at levels below 500 cubic meters per year (White, 2014).

Jaeger et al. (2013) claimed that there was no absolute measure of water scarcity because scarcity is always related to the ability and cost of meeting human preferences and needs. Water scarcity is different from a water deficit or shortage, which reflect insufficient quantities for specific biophysical processes. In short, a deficit can exist without people experiencing scarcity, but scarcity generally occurs under deficit conditions (Jaeger et al., 2013). Also, the availability of acceptable substitutes figures into the concept of scarcity. Throughout history, humans have coped with deficits by switching to other resources or migrating to better-endowed locations. Absolute scarcity only existed when there were no possible substitutes for water or the ability to move to a more favorable location (Jaeger et al., 2013).

Water scarcity is a global economic issue impacting developed and developing countries (Guarino, 2017). Dwindling water supplies in many nations produce a range of effects, from economic slowdown to starvation. Bilateral international trade is another area of concern. Low production of goods by water-stressed economies disadvantages them, leading to trade imbalances and loss of economic assets. Because energy

generation utilizes large amounts of water, water scarcity also could impact energy availability and costs (Guarino, 2017).

Environmental degradation and resource depletion gained attention as critical business management issues (Bergmann, Stechemesser, & Guenther, 2016). Supply disruption, declining water quality, increasing prices, fines for pollution, and litigation negatively impact business operations (Gössling, 2012). Companies that participated in the Carbon Disclosure Project (2017) reported more than 3,000 water risks that could damage their supply chains, growth strategies, and license to operate. Businesses that depend on water for operations, production, or energy generation treat water as a key strategic input, like oil, with clear accounting and future targets for efficient use and conservation (Hoekstra, 2015). Water risk is especially important for agriculture, food, beverage, and meat companies (Ridoutt et al., 2016). Tourism and recreation enterprises are also highly dependent on water supplies (Gössling, 2015).

Roberts and Barton (2015) identified dependence, security, and management response as three factors that influence corporate water risk. I discussed water dependence earlier in this literature review. Water security involves physical and location variables, as well as factors related to accessibility, safety and quality, and governance. To assess water security on a global scale, Gain, Giupponi, and Wada (2016) defined water security as the amount of water needed to support human well-being, commerce, and ecosystems without putting society at an unacceptable level of risk. Corporate water management involves improving water efficiency combined with watershed-level actions to improve the overall sustainability of water supplies.

Corporations increasingly engage in the practice of *water footprinting* to measure direct and indirect water use (Hoekstra, 2015). Analogous to the well-established practice of *carbon footprinting*, water footprinting is a way to measure the amount of freshwater used to deliver a product or service through its entire lifecycle. Fitzgerald and Auerbach (2016) linked water footprinting to *virtual water*, a concept related to the quantification of water embedded in a product or service extracted from its original location. Companies use water footprinting to assess water consumption and identify opportunities for conservation and efficiency (Hoekstra, 2015). Scholars also use water footprinting to describe the transfer of water from developing countries to wealthier ones through the supply chain (Fitzgerald & Auerbach, 2016).

In the past decade, corporate water stewardship (CWS) emerged as a potential solution to the global water crisis (Sojamo, 2015). CWS differs from internal water management measures in significant ways. In CWS, water-intensive businesses actively participate in water governance to ensure their supply. However, many experts viewed the growth of this practice with skepticism and concern. In a case study of CWS in South Africa, Sojamo (2015) found that involvement by large corporations in water governance raised fears of privatization of water governance and potential abuse by powerful corporate interests. Some even questioned whether corporations have legitimate authority to engage in water governance. Sojamo (2015) cautioned that the CWS framework should place equal emphasis on the needs of public institutions and civil society to protect the public from exploitation by powerful corporations.

Martinez (2015) explored the challenges of CWS, particularly the tensions between purely economic (instrumental) approaches to water decision-making versus social responsibility (ethical) approaches through an integrative literature review of nearly 600 articles published between 2007 and 2013. The analysis showed the disparities between force and voluntary compliance, abuse and cooperation, and economic and social responsibility motivations. According to these studies, regulations were necessary, but they alone did not ensure an ample supply of high quality water. Complying with industry certifications also failed to meet requirements, unless stakeholders and corporate peers exerted pressure.

Another issue of concern was the tendency for corporations to exploit free water access wherever possible and resist collective action beyond the walls of the business. Corporations tended to focus on the immediate costs and benefits of water supply while ignoring the long-term consequences of overexploitation and pollution (Martinez, 2015). Various researchers predicted that the existence of coordinating structures and public-private partnerships increased the likelihood of cooperative efforts. Some researchers proposed appealing to competitive advantage, legitimacy, operational efficiency, and supply chain efficiency (Martinez, 2015).

In summary, perhaps no other natural resource encompasses so many environmental, socio-political, and economic dimensions as water. Despite its historical importance to economic growth, classical economists placed little value on water because of its ubiquity. Water seems to fit into what Barney (1991) described as a resource that is more valuable because it needs a long period to develop, it is at first unclear how to

develop it, and it is not easily bought and sold. Moreover, water is costly to transport and store, and quantities are uncertain due to evaporation, seepage, and leakage. When pollution, drought, or other social uses limit water supply, managers might be unable to maintain adequate supplies at a reasonable price.

Because of the finite nature of groundwater and the complexities of water supply, government officials have been empowered to establish pricing and tariffs to recover costs and promote the efficient allocation of water (Marques et al., 2016). Although necessary, these instruments could be inefficient and inequitable. In newer water management models there is greater emphasis on sustainability of supply. Through these models, water managers aim to increase efficiency, reduce demand, and address the limitations of natural systems (Savenije et al., 2014). Over time, a transparent, collaborative, holistic model focusing on responsible conduct and accountability by all stakeholders, including industry, replaced the traditional, top-down regulatory approaches (Marques et al., 2016).

Overexploitation of freshwater supplies produced widespread water scarcity (Savariar, 2014; Savenije et al., 2014). Water scarcity occurs when human needs cannot be satisfied by the amount and cost of available water (DeSouza, 2016). The risks to business disproportionately impact industries for which water is a strategic input, such as agriculture, food and beverage companies, and meat producers (Hoekstra, 2015), as well as tourism and hospitality enterprises (Gössling, 2015). The failure of regulatory approaches alone to ensure an ample supply of high quality water stimulated voluntary cooperative supply and demand management efforts by business and industry.

The practice of tracking direct and indirect water use to identify opportunities for conservation and efficiency through water footprinting has spread (Hoekstra, 2015). While in the past, businesses may have capitalized on free water supplies and polluted with impunity, CWS, wherein water-intensive businesses actively participate in water governance to ensure their supply, became a more common, although controversial practice (Sojamo, 2015).

In the next part, I review the literature on effective resource management and hotel performance through the lens of the conceptual framework, the RBV. I also provide an overview of research on hotel water use and strategies used by hotel managers to maintain adequate supplies, especially under scarce conditions. I end the next part with a brief discussion of challenges and barriers to the adoption of effective water supply strategies by hotel managers.

## Topical Analysis: The RBV and Hotel Water Supply

**Resources and hotel competitive advantage.** Research spanning more than two decades has been conducted on the drivers of hotel performance using the RBV as the conceptual framework. Božič and Cvelbar (2016) conducted a content analysis of 40 empirical studies published in major hospitality and tourism journals from 1996 to 2015. Most researchers employed quantitative methods to test the impact of various resources on hotel performance. A majority found a correlation between resource exploitation and hotel performance, as measured by secondary financial data. In some cases, primary data such as surveys concerning managers' perceptions were used to measure hotel competitive advantage (Božič & Cvelbar, 2016).

The focus of hotel performance studies evolved over this period. In most studies that appeared between 2000 and 2010, researchers investigated the connection between performance and intangible resources, knowledge, and capabilities such as hotel service quality, human resources policies, and branding (Božič & Cvelbar, 2016). According to Bozic and Cvelbar (2016), the impact of natural resources, as evidenced by managers' commitment to environmental management and corporate social responsibility, became a more common focus of hotel performance studies beginning in 2006. Da Rosa and Silva (2017) analyzed 30 articles published between 1996 and 2016. The analysis revealed seven main themes: the impact of environmental practices on business results, the impact of sustainable practices on the environment and surrounding communities, evaluation of environmental performance through the development of indicators and methodologies, environmental disclosure (specifically sustainability reporting and credibility), the impact of external factors such as the economy and politics on hotel initiatives, energy efficiency strategies and the relationship to economic performance, and the value and impact of various certification schemes. Most of these articles involved quantitative analysis of available data and surveys, but case studies were also common. Da Rosa and Silva (2017) noted that hotel size, service levels, type, governance, relevant standards, and customer base correlated with hotel investment in environmental resources management in these studies.

Throughout previous literature, researchers found that effective management of natural resources offered hotels competitive advantages in the areas of operational efficiency, cost-savings, and market positioning. Research on tourists' decision-making

showed an increasing marketing benefit for hotels that practiced resource efficiency and environmental responsibility (Bruns-Smith et al., 2015). A related mixed-methods study of Spanish hotel managers found that quality management and environmental management provided cost savings and market differentiation that could result in a competitive advantage (Molina-Azorín, Tarí, Pereira-Moliner, López-Gamero, & Pertusa-Ortega, 2015). Findings from a study on travel and tourism businesses from 2003 to 2014 indicated that environmental performance positively impacted financial performance in the hotel industry on both aggregate and individual dimensions, mainly through resource use reduction and product innovation (Tan, Habibullah, Tan, & Choon, 2017). In addition, the researchers hypothesized that leveraging immobile resources improved customer satisfaction, retention, and loyalty, promoted employee morale and commitment, and produced a favorable reputation, all of which contributed to better financial performance. Tan et al. (2017) also proposed that hotel managers with slack resources had greater flexibility to engage in environmentally and socially responsible behavior.

**Tourism, hotels, and water resources.** The tourism sector consumes large amounts of water, and conservation is an important management issue for the industry (Gössling, 2015). Tourism accounted for less than 1% of worldwide water use (DeSouza, 2016); however, consumption varies regionally and can be higher where tourism is a larger factor in the economy (Gössling et al., 2012). Tensions between tourists and residents over water use are particularly evident in countries where tourism is a key industry and revenue generator (Guarino, 2017). Water challenges have increased at

tourism destinations in the United States, Australia, Central America, Europe, the Middle East, and China (Gössling et al. 2012).

Water use in tourism will increase by 2020 due to tourism growth, hotel development, and water-related recreation (Becken, 2014). The resulting economic and social tensions could jeopardize the organizations' licenses to operate and damage the reputation of hotel brands in many locations (Styles et al., 2015). Responsible conduct related to water use and conservation by all stakeholders is essential for sustainable development (Marques et al., 2016).

Hotel operators employ water resources to meet a wide variety of customer needs, including sanitation, nutrition, and recreation (Gössling et al., 2012; Kasim et al., 2014). For hotels, water is "an essential factor of production" (Barberán et al., 2013, p. 181). Most hotel managers engage in some degree of water stewardship, employing a variety of water conservation, water reuse, and water recovery strategies. Water efficiency strategies produce substantial cost savings for hotels (Becken & Dolcinar, 2016; Bruns-Smith et al., 2015).

**Water scarcity and hotel performance.** Water fits Barney's (2001) description of a valuable, rare, inimitable, and nonsubstitutable resource that can confer competitive advantages to hotels. Limited water supplies threaten the economic viability of hotels, particularly those located in arid regions (Kasim et al., 2014; Styles et al., 2015). Hotels are easily affected by water scarcity because they cluster in warm, dry vacation locations (Dinarès & Saurí, 2015; Styles et al., 2015). Water scarcity increases costs and complicates hotel marketing (Barberán et al., 2013). The high demand for domestic hot

water (DHW) increases energy use and typically costs hotels three to four times more than cold water (European Commission, 2014). Water costs are particularly high in arid and semiarid regions and on small islands that depend on desalination or imported water (Barberán et al., 2013). Scholars contended that accommodations providers should increase investment in water management strategies to sustain future supplies and mitigate their contribution to water scarcity (European Commission, 2014; Gössling et al., 2012).

Despite water's importance to hotels' financial performance, some researchers proposed that pricing structures have a limited impact on managers' water supply strategies. Razumova, Rey-Maquieira, and Lozano (2016) conducted a case study of Mallorcan hotels to determine how high water tariffs affected innovation in hotel water supply. By dividing the region into areas representing different levels of water tariffs and water consumption fees, the model accurately predicted which hotels were most likely to engage in innovative water strategies. Other variables also contributed to water innovation in hotels, including management priorities, highly motivated employees, and collaboration with other hotels. The authors called for more case studies to determine whether tariff policies are an effective method to promote water management innovation and to pinpoint the level of stringency required to motivate hotels to innovate (Rasumova et al., 2016). A different quantitative study of 134 Mallorcan hotels found that pricing structure had a weak correlation to water consumption: A 1% price increase reduced consumption by only 0.024% (Deya-Tortella, Garcia, Nilsson, & Tiraddo, 2017). One factor in this finding was that municipalities across the region used different rate

structures and tariffs, including a fixed rate based on the number of hotel beds. In addition, water only accounted for 4% of total spending for these hotels. The researchers concluded that purposeful water conservation and efficiency initiatives were better than pricing strategies for ensuring adequate supplies.

**Hotel water use.** It is well documented that hotel guests use substantially more water than their local counterparts (Barberán et al., 2013; Kasim et al., 2014; Styles et al., 2015). Climate, service level, number of rooms, occupancy, and range of amenities determined total hotel water use (Barberán et al., 2013). Public spaces such as reception areas, restaurants, kitchens, lounges, pools, and gyms accounted for approximately half of hotel water use. Hot water alone accounts for nearly a third of guestroom water use (Barberán et al., 2013). Hotel water use also required increased energy consumption, particularly where desalinated water was prominent (Becken, 2014). The impact of water use on energy consumption was greatest in upscale 4-star and 5-star hotels. The effect was particularly pronounced in urban settings where energy was needed to distribute water and dispose of waste (A. Pinto, Afonso, Santos, Pimentel-Rodrigues, & Rodrigues, 2017).

***Direct water use***. In multiple quantitative and qualitative studies, researchers attempted to estimate direct water use in hotels, with varying results. Gössling et al. (2012) estimated hotel guest water use at 84 and 2,000 liters per day and up to 3,423 liters per guest room, while Styles et al. (2015) estimated the average tourist used more than 300 liters of water per person per day. The average resident used half this amount (Styles et al., 2015). Furthermore, tourist demand peaked in summer, when availability

may be at its lowest, drawing water resources away from other local uses (European Commission, 2014). At the brand level, hotel water use varied based on service level (stars), location (urban versus resort), occupancy rate, level of food service, and presence of a pool. Golf courses might increase water consumption by an estimated 87% (Gössling, 2015).

Styles et al. (2015) identified three main factors leading to high water use in hotels: the intensity of room maintenance activities (room cleaning and laundry), the provision of leisure and recreational spaces (pools, spas, green areas, snowmaking), and the need to satisfy a *pleasure approach* to food, showers, and baths. Researchers documented several operational drivers of high water use in hotels:

***Bathrooms***. Researchers estimated that 25% to 40% of hotel water use occurred in bathrooms. Showers were a major source of water consumption in hotel rooms. The suggested shower water flow was 9 liters per minute. However, some hotel showers averaged as much as 20 liters per minute (Becken, 2014). Inefficient fittings and leaks could result in the loss of hundreds of liters per guest per day (Styles et al., 2015). Moreover, many hotels still used high quality drinking water to flush toilets (European Commission, 2014).

***Laundry.*** Hotels generate a significant amount of laundry, estimated at more than 200 kilograms per load (European Commission, 2014). Laundering linens and towels could consume between 50 and 100 liters per occupied room per night, using 12% to 47% of hotel water supplies (Styles et al., 2015).

***Kitchens and restaurants.*** Kitchen and restaurant staff use substantial amounts of water to prepare and serve food and to clean up afterwards. Estimates indicated that kitchens use 16% to 21% of water in hotels (Becken et al., 2014). Hotel employees use large amounts of water for washing and preparing food, thawing food, and cleaning (Gossling et al., 2012). The Alliance for Water Efficiency (2014) confirmed that dishwashers were one of the most water and energy intensive appliances in commercial kitchens.

***Swimming pools.*** Pools account for 3% to 20% of the water used in a hotel (Becken et al., 2014). Maintenance, evaporation, and leakage account for most water consumption in pools (Becken et al., 2014; Styles et al., 2015). Swimming pools may also indirectly contribute to increased water use by resulting in additional showers and laundry (Gössling et al., 2012).

***Building processes.*** Hotel facility operations such as heating, ventilation, and air-conditioning (HVAC) units, irrigation, and cleaning and maintenance activities consumed large amounts of water. Hotel cooling towers account for 10% to 30% of water consumption, and many other building systems rely on water (Becken et al., 2014). Convention, event, and attraction infrastructure associated with hotels was another major source of water demand, particularly regarding public bathroom use (Gössling et al., 2012).

***Irrigation.*** Becken et al. (2014) estimated that irrigation of outdoor areas accounts for another 3% to 4% of hotel water use. Gössling et al. (2012) indicated that in tropical environments, continuous irrigation of gardens could amount to 465 liters per guest per

day, noting that these features required the same level of maintenance regardless of the number of guests on the premises. Maintenance of golf courses and snowmaking were particularly intensive water users (Gössling et al., 2012).

***Energy and food.*** Gössling (2015) argued that indirect water use for energy generation and food supply was responsible for an even greater share of tourism's water footprint. The typical human diet includes 2,000 to 5,000 liters of water per person per day (Table 3); however, Gössling (2015) claimed that this number might be a gross underestimate for tourism, where guests tend to consume luxury foods. Most tourism-related water use estimates included only direct use. However, Gössling (2015) maintained that measuring the water embodied in the food supply is critical to fully appraise water use in hotels and other tourism businesses (Gössling, 2015). Use of water footprinting methodology allowed tourism businesses to differentiate local pressures on water supplies from hotel operations and activities such as golf and swimming from global pressures embedded in the food supply chain. Essentially, tourists consumed a large amount of virtual water content through food purchases while on vacation.

**Strategies for maintaining adequate water supplies.** When faced with limited water resources, hotel managers might employ a variety of strategies to maintain adequate supplies. According to the NRS typology developed by Bell et al. (2012), managers may face two possible scenarios: local degeneration, in which local renewable supply is less than local demand, or local depletion, in which a nonrenewable supply is less than local demand. If local water supplies degenerate, but the resource is renewable through the natural cycle, hotel managers might augment supplies from outside through

methods such as desalination, as well as participate in efforts to restore the resource base. Local depletion presents a more difficult situation. Under these circumstances, hotel managers might use a compilation strategy that involves acquiring outside supplies (possibly transporting water from other locations), practicing postponement (conserving water through efficiency measures or bans), and recycling and recovering water for reuse to maintain sufficient local supply (Bell et al., 2012).

Table 3

*Water Use Categories and Estimated Use per Tourist per Day*

| Direct use category | Consumption per tourist per day (in liters) |
|---|---|
| Accommodation | 84–2,000 |
| Activities | 10-30 |
| **Indirect use category** | **Consumption per tourist per day (in liters)** |
| Infrastructure | n.a. |
| Fossil Fuels | 750 (per 1,000 km by air/car) |
| Biofuels | 2,500 (per 1 L) |
| Food | 2,000–5,000 |
| Total per tourist per day | Estimated range: 2,000 – 7,500 |

*Note*. Adapted from "Tourism and Water Use: Supply, Demand, and Security: An International Review," by S. Gössling, P. Peeters, C. M. Hall, J. P. Ceron, G. Dubois, & D. Scott, 2012, *Tourism Management, 33*, p. 12. Copyright 2011 Elsevier Ltd. Published by Elsevier Ltd. All rights reserved. Adapted with permission.

The findings of a quantitative study of best practices and benchmarks of excellence in water management in the European hospitality sector indicated seven commercially viable practices (Styles et al., 2015). These practices combined postponement through conservation and efficiency with recovery through recycling and

reuse. Strategies included water management planning, water-efficient (low-flow) fixtures and fittings, water conservation during room cleaning, outsourcing laundry to large water-efficient laundries, water-efficient fittings and washers in the kitchen ideally combined with submetering and monitoring of kitchen water use, use of water-free, alternative (geothermal) cooling systems, and irrigation of grounds with harvested rainwater or greywater.

Styles et al. (2015) estimated that application of these best practices could save an average 100-room hotel 15,542 cubic meters of water per year, or 16,573 cubic meters if greywater or rainwater were used to flush toilets. Use of these strategies in European hotels could save 376 million cubic meters of potable water per year, and water savings potential might be even greater outside Europe. The authors recommended that destination managers motivate hotels to conserve water by enacting water-saving pricing and tax incentives and attending to leaking water infrastructure. Payback periods were estimated at less than three years, well within the short payback horizon typical for the hospitality industry. However, in a technical study of various shower flow reducers, A. Pinto et al. (2017) found that when flow rates fell below a certain threshold, users spent more time in the shower, effectively eliminating any water savings.

The practice of linen and towel reuse is one of the most widespread postponement strategies used in hotels. Linen reuse promotes conservation by curtailing the amount of laundry per guest per night to reduce water and energy consumption (Gössling, 2015). Opt-in programs were generally more successful than opt-out programs because they were less reliant on guest cooperation. Staff should be educated about the importance of

following these and other protocols to ensure that water conservation and efficiency plans produce the desired result (Park, Jeong Kim, & McCleary, 2014).

***Substitution.*** The use of greywater as an alternative to freshwater is an emerging technology in dense urban tourism environments (Atanasova et al., 2017). Greywater is a form of water recycling that involves reusing water from sinks, showers, tubs, and washing machines. Greywater that has not come into contact with feces can be used for a variety of functions, such as irrigation and building processes. Atanasova et al. (2017) conducted a pilot study of greywater reuse systems in hotels in a coastal Spanish resort area and documented savings in water and energy along with economic benefits such as paying back the initial investment in three years or less. Wells et al. (2016) identified barriers to wastewater recycling and reuse in an ethnographic study in Belize, finding that negative perceptions of health risks, cultural barriers, and economic issues continued to inhibit adoption of new wastewater technologies. Wells et al. (2016) advocated that wider sharing of technical and economic information and multi-stakeholder participation could help overcome these barriers.

Hurlimann and Dolcinar (2016) also examined perceptual barriers to alternative water sources in nine different regions. In a survey of 2,000 individuals distributed across various regions, Hurliman and Dolcinar (2016) found attitudes varied towards recycled, desalinated, and captured water based on the location, intended use for the water, and the source. Participants were more likely to use alternative water sources for gardening, toilet flushing, cleaning, and washing clothes than for personal hygiene, cooking, and drinking. Respondents favored desalinated water over rainwater for

drinking and placed the highest trust in bottled water, followed by tap water, as the safest and most healthful options. Recycled water was the least acceptable choice.

Desalination is another substitution strategy employed in arid or semiarid coastal or island areas, such as the Mediterranean. Desalination technologies are a mainstay of southeastern Spain, one of Europe's driest regions, where they make possible the extraction of water from brackish (salt-contaminated) aquifers to support tourism and commerce (Aparicio, Candela, Alfranca, & García-Aróstegui, 2017). Desalination technology has long supplemented water availability in volcanic island destinations such as the Spanish Canary Islands.

***Knowledge and dynamic capabilities.*** In the literature review, there were numerous studies showing that knowledge and dynamic capabilities contributed to successful water supply maintenance in hotels. Over the past 25 years, environmental practices spread throughout hotels and many other business sectors. Several scholars applied diffusion innovation theory (DIT) to help explain how knowledge of innovative water supply practices spreads. In DIT, successful diffusion derives from factors such as perceived competitive advantage, compatibility with current practices, and simplicity. Peiro-Signes and Segarra-Oña (2017) used Eurostat data from 695 hospitality companies in three countries to predict environmental commitment. The innovation orientation of the managers and organizational cultures correlated strongly with environmental concerns in this study. Similarly, Horng, Liu, Chou, Tsai, and Chung (2017) examined the diffusion of environmental practices in 94 Taiwanese hotels. A survey of 367 managers found a positive correlation between the diffusion of innovation, environmental

marketing, and sustainable practices enhanced by institutional policies and management attitudes. The presence of an environmental marketing strategy also was a predictor of sustainable innovation in hotels, according to this study.

Another pertinent concern was whether the size and service level of hotels determined investment in resource efficiency. In a quantitative study of small- and medium-sized enterprises (SMEs) in the European hospitality sector, Becken and Dolcinar (2016) confirmed that larger, more upscale (4-star and 5-star) properties and chains were more likely to adopt resource efficiency than small, budget-conscious hotels. The researchers surveyed 601 tourism SMEs (employing fewer than 50 people) in 38 counties to determine whether an investment of between 1% and 11%+ in resource efficiency achieved managers' financial and marketing goals.

According to Becken and Dolcinar (2016) measures aimed at saving energy and water were most prevalent (79% and 72%, respectively), followed by minimizing waste (67%), saving materials (60%), and recycling (56%). Only 18% of the hotels used renewable energy, but 30% said they planned to within the next two years. About 25% already sold scrap material, and another 25% planned to in the next year. The main reasons for these resource efficiency actions were company policy, cost savings, and financial and fiscal incentives. Only 20% mentioned customer demand, and few mentioned achieving competitive advantage or catching up with competitors as a motivation. More than half of the SMEs stated that resource efficiency reduced operating costs, but the results skewed more toward larger businesses (Becken & Dolcinar, 2016).

Customer satisfaction positively correlated with a commitment to environmental sustainability and size of operation (larger).

Another study by Kasim, Dzakiria, and Ahmad (2017) showed the influence of size on resource efficiency. The authors surveyed representatives of 208 hotels in Langkawi, Penang, and Kuala Lumpur, finding that larger hotels were more likely to engage in innovative water practices, and smaller hotels were more likely to operate with little concern about water. Gabarda-Mallorquí, Garcia, and Ribas (2017) reported similar finding from a quantitative study of water efficiency in high-density, high-rise beachside hotels in Costa Brava, a coastal mass tourism location in Spain that struggles with water availability. Lower water consumption positively correlated with larger hotel size, primarily due to economies of scale, as well as the presence of an environmental management program, often connected to eco-certification. Managers of smaller independent hotels also were less likely to engage in water-efficiency efforts, contradicting some previous findings that large chains fared more poorly on water conservation because they were better able to absorb the additional costs (Gabarda-Mallorquí et al., 2017).

Hotel managers gained knowledge from outside experts regarding resource efficiency strategies and innovations through eco-certification. Zhang, Joglekar, Heineke, and Verma (2014) studied 2,893 hotels in 49 U.S. states, approximately half of which had achieved eco-leaf certification from Travelocity.com, to assess the impact of eco-certification on water supply strategies. A regression analysis showed that eco-certification produced greater efficiencies by influencing the behaviors of both the

operators and the customers. Consumer-driven factors appeared to have a greater weight for water use, energy consumption, and general maintenance, while operator-behavior weighed more heavily on the efficiency of supplies used in food and beverage operations and rooms. Zhang et al. (2014) pointed out that results varied widely by size and type of hotel, perhaps due to differences between eco-certifications and variation in how different operators achieved certification. Resource-efficient behavior on the part of consumers might also be a function of advertising eco-certification to attract more environmentally conscious guests.

***Gaps and challenges.*** Regardless of the extent of resource efficiency in hotel operations and the apparent embrace of these measures by hotel managers, gaps persist between stated goals and actual performance, even among eco-certified hotels (Styles et al., 2015). Various factors could account for poor water management in hotels, including complacency, inadequate submetering, poor communications between water-efficiency experts and fiscal authorities, and the relatively low price of water for many hotels (Styles et al., 2015).

In summary, this part of the literature review demonstrated how important resource availability is to hotel performance. Over the past 20 years, research using the RBV as a conceptual framework linked knowledge, capabilities, and natural resources with hotel competitive advantage (Božič & Cvelbar, 2016). Many researchers focused on intangible resources such as hotel service quality, human resource policies, and branding. However, in 2006, natural resource management and social responsibility emerged as central themes that appeared with greater frequency over time (Da Rosa & Silva, 2017).

According to these studies, effective natural resource management offered hotels competitive advantages in the areas of operational efficiency, cost-savings, and market positioning (Bruns-Smith et al., 2015; Molina-Azorín et al., 2015; Tan et al., 2017).

The exceptional demand for water in hotels arises from the 24/7 nature of hotel operations and customer expectations (Gössling et al., 2012; Kasim at al., 2014). The impact was greatest in larger and more upscale (4- and 5-star) properties (Zhang et al., 2014), although occupancy, seasonality, climate, and local water policies also played a role (Barberán et al., 2013). Public spaces such as reception areas, restaurants, kitchens, lounges, pools, and gyms accounted for approximately half of hotel water use. Energy consumed to heat water for bathing is also a major piece of the water footprint from desalination (Becken et al., 2014). Some scholars argued that indirect water use related to food supply might be responsible for an even greater share of tourism's water footprint (Gössling, 2015).

Operators in major tourism destinations around the world are facing water shortages (Becken, 2014). Under these conditions, limited water supplies increase costs and threaten the economic viability of hotels (Kasim et al., 2014; Styles et al., 2015). Excessive water use could jeopardize the organizations' licenses to operate and damage the reputation of hotel brands in some locations (Styles et al., 2015). Consequently, many hotel managers voluntarily engaged in CWS, employing a variety of water conservation, water reuse, and water recovery strategies to optimize available supplies. Under the NRS typology developed by Bell et al. (2012), hotel managers augmented supplies from outside through desalination and participated in efforts to restore the

resource base. Where reserves were depleted, hotel managers transported water from other locations, conserved water through efficiency measure or bans, or recycled water for alternative uses (Bell et al., 2012). Best practices could save tens of thousands of gallons of water per hotel per year with a return on the initial investment in less than three years (Styles et al., 2015).

Various studies indicated that knowledge and dynamic capabilities related to water resource management and sustainability helped determine the extent to which hotel managers adopted innovative water supply strategies. Researchers identified perceived competitive advantages, compatibility with current practices, simplicity, innovation orientation, and a supportive organizational environment as determinants of innovative environmental practices (Horng et al., 2017; Peiro-Signes & Segarra-Oña, 2017). There is some evidence that customer demand and satisfaction, particularly in the luxury hotel sector, also influenced the adoption of water efficiency measures by managers (Zhang et al., 2014). Other researchers proposed that the pursuit of eco-certification produced greater water efficiencies by influencing the behaviors of both the operators and the customers (Zhang et al., 2014), although results varied based on the type of certification.

Although awareness of natural resource management spread throughout the hotel industry over the past 25 years, barriers related to knowledge, capabilities, availability, and cost persisted, especially in smaller, more budget-conscious independent hotels (Gabarda-Mallorquí et al., 2017). Vast differences in water use and supply strategies emerged based on hotel size, service level, occupancy, seasonality, and climate. Even among early adopters, persistent gaps remained between stated goals and actual

performance (Styles et al., 2015). Poor water management could be the result of complacency, inadequate submetering, poor communications between water-efficiency experts and fiscal authorities, and the relatively low local price of water for many hotels (Styles et al., 2015). The NRS typology developed by Bell et al. (2012) illustrated that resource supply strategies could be highly variable and specific to local conditions.

## Transition

Water supply is a critical management issue for businesses in the 21st century (World Economic Forum, 2016). The future viability of tourism businesses, especially hotels, depends on an adequate supply of high-quality water (Kasim et al., 2014). The need is particularly great in coastal areas, on islands, and in arid regions, which tend to be dominated by the tourism industry (Styles et al., 2015). Although hotel managers employ a variety of strategies for maintaining adequate water supplies, gaps remain between espoused goals and actual practices (Styles et al., 2015). The findings of this study may contribute to effective business practices by identifying potential strategies managers can use to maintain hotel water supply. Identifying effective water supply strategies could also contribute to positive social change by helping hotel managers align their practices with sustainable water governance at the local and regional levels.

I conducted a thorough literature review and organized my research in the following manner: the conceptual framework, the topical foundation, and analysis of the topic in relation to the conceptual framework. The literature review provided rich content on the relationship between natural resources and competitive advantage, the economic impact of water demand, supply, and scarcity on industry, and the application of these

theories and concepts to the water supply strategies of hotel managers. The results showed the continuing importance of and the need for additional research on the topic. Through this qualitative multiple case study, I explored strategies hotel managers used to successfully maintain adequate water supplies in arid regions. Data collection involved hotel managers on the Island of Gran Canaria in the Spanish Canary Islands. The Canary Islands are a popular international tourism destination with a history of water supply challenges (Custodio et al., 2016). In Section 2, I provide an overview of the study, including the methodology and design, population and participants, data collection instrument and techniques, the approach for data organization and analysis, ethical practices, and the measures to assure reliability and validity of the study. In Section 3, I present the strategies hotel managers used to maintain adequate water supplies in three Canary Island hotels, application of the findings to professional practice, implications for social change, recommendations for action and further research, personal reflections, and conclusions.

# Section 2: The Project

In this section, I describe my role as a researcher and how I implemented this study on strategies that hotel managers use to maintain water supplies in arid locations. I establish the role of the researcher, describe the method used for identifying the study population, describe the research methodology and design, and explain the criteria for the selection of research participants. I also elaborate on the importance of ethical practices in research along with the processes and procedures undertaken to mitigate potential ethical problems, explain data collection tools, techniques, and procedures used to ensure accuracy, describe the data analysis, and explain the measures that assured the reliability and validity of the study.

## Purpose Statement

The purpose of this qualitative multiple case study was to explore the strategies hotel managers used to successfully maintain adequate water supplies in arid regions. Data collection involved hotel managers on the Island of Gran Canaria in the Spanish Canary Islands, a historically water-stressed tourism location. The targeted population consisted of nine managers who were selected from three hotels because they had successfully implemented effective water supply strategies. Findings from this study may help hotel managers contribute to positive social change by improving hotel water stewardship and aligning hotel water supply strategies with sustainable water governance. It may also influence employees, guests, and other partners to engage in water conservation. Identifying new strategies for water supply management could have implications for a more equitable distribution of water among stakeholders.

## Role of the Researcher

My research goal was to gain insight into the strategies used by hotel managers to successfully maintain adequate water supplies in arid regions. In this qualitative multiple case study, I was involved in all aspects of the data collection process. Yin (2015) pointed out that the researcher is the main data collection instrument in qualitative research. Interviews and document review captured the participants' perspectives on the phenomenon. I collected and analyzed data as accurately as possible and avoided introducing biases based on my worldview and prior experience in the hotel industry, in accordance with the ethical principles outlined in *The Belmont Report* (U.S. Department of Health and Human Services [U.S. DHHS], 1979).

I had no relationship with the participants or the community partner before this study. The selection of the Canary Islands and the community partner resulted from my role as a hospitality educator at a college that works closely with similar schools around the world and my experience as a consultant in the hospitality and tourism industry. My professional role and experience had advantages and disadvantages. Insiders might understand the culture and politics of the industry and therefore find it easier to prompt a fluid, candid conversation (Greene, 2014). Collegial feelings also promote collaboration and cooperation between the researcher and the subject (Collins & Cooper, 2014). However, the researcher might lose objectivity, impose unconscious assumptions, and experience other disadvantages of role duality (Greene, 2014).

Researchers should adhere to ethical practices as outlined in *The Belmont Report* which includes demonstrating respect for individuals, securing their well-being, and

treating them justly and fairly (U.S. DHHS, 1979). Use of informed consent documents, comprehensive risk and benefit analysis, and equitable subject selection procedures are recommended methods to avoid ethical violations (U.S. DHHS, 1979). I adhered to these guidelines by divulging any connections, conflicts of interest, or other conditions that could influence participant responses or my interpretation of them. I stressed that participation in the research was voluntary, offered no inducement that might prejudice results, and in no way impacted the participants' employment status. I further adhered to these guidelines by collecting participant consents and keeping participant information confidential by coding data separately from participant names, although it was necessary to identify the managers' departmental affiliation to interpret results accurately.

In qualitative research, the researcher functions as the research instrument and therefore cannot be easily separated from the research process (Collins & Cooper, 2014; Yin, 2015). The lens a researcher brings to a study can introduce biases, values, and ideologies that influence data collection and interpretation (Diefenbach, 2009). I used a post-positivist lens, proposing that while objective reality exists, social context and values influence interpretation (Patel, 2017). In my worldview, environmental and social responsibility is of growing importance in business in general and hospitality and tourism in particular. My beliefs could have had the unintended consequence of leading research subjects to overstate the importance of sustainable management. Researchers can offset personal biases by making assumptions, interests, objectives, and philosophical positions as explicit as possible (Diefenbach, 2009). It was necessary to set aside my personal

views to gain a deeper understanding of participants' views. I made a sincere effort to mitigate any bias that might have arisen from my personal perspective.

Qualitative researchers use interviews to obtain insights on values, opinions, behaviors, and social contexts associated with a phenomenon (Oltmann, 2016). Using semistructured interviews allowed me to gain an understanding of the phenomenon through participants' eyes. However, researchers must be careful not to steer the conversation too much to obtain the desired data (Elo et al., 2014). Researchers must exercise caution not to place greater importance on easily understood information and make assumptions about how participants might answer based on prior responses (Baskarada, 2014). Being clear about research objectives and using consistent procedures helps researchers achieve their goals through the interview protocol (Marshall & Rossman, 2014). I took note of these cautions and attempted to incorporate them into the interview process. Member checking also confirms that the researcher has captured participants' intended meaning (Fusch & Fusch, 2015). I used member checking, eliciting verbal and written feedback from participants to avoid misinterpreting their comments.

## Participants

The study participants were nine hotel managers in the Spanish Canary Islands, a historically water-stressed tourism destination. Elo et al. (2014) asserted that researchers should select participants who best represent or have knowledge of the research topic. The eligibility requirement for study participants was that they were hotel managers who had used strategies to successfully maintain adequate water supplies in arid regions.

Baskarada (2014) argued that gaining access to a suitable case study organization can be one of a researcher's biggest challenges.

Selection of case study subjects may result from the researcher's existing relationships or interests (Diefenbach, 2009). I was able to access participants through a large multinational hotel group, which I reached through mutual industry contacts via LinkedIn. I determined that the community partner would meet the study criteria because its Canary Island hotels received TravelLife certification in 2015, indicating that its managers had implemented strategies to successfully maintain adequate water supplies in a water-stressed region.

In organizational research, selection of interviewees can depend on the good will of influential people within the organizations to provide access to employees (Diefenbach, 2009). During an initial video conference, the community partners' director of environment and safety agreed to help select three hotels of various sizes and types and introduce me to the general managers with an email explaining the research project. I followed up with these general managers via email to obtain the names of other eligible managers within the hotel, to provide consent forms, and to schedule video conference interviews.

I established a working relationship with the participants through the scheduling email and follow up email communications. Explaining goals and expectations from the beginning helps build trust with interview participants (Moll, 2012). Reviewing the consent form and ensuring confidentiality and data security are important steps in establishing a working relationship with participants (Houghton, Casey, Shaw, &

Murphy, 2013; Robinson, 2013; Yin, 2015). I began each interview by reviewing the consent form and procedures to help establish trust and ensure confidentiality with participants.

## Research Method and Design

This study involved exploring strategies used by hotel managers to successfully maintain adequate water supplies in arid regions. I used a qualitative research method and a multiple case study design. The following subsections explain the basis for my choice of research method and design.

### Research Method

There are three research methodologies: qualitative, quantitative, and mixed methods (Morse & Cheek, 2014). Qualitative research allows the researcher to increase understanding of a poorly understood phenomenon (Yin, 2015). I chose the qualitative methodology for this study because the subject of maintaining hotel water supply in arid regions is in an exploratory stage. Qualitative research allows the researcher to observe the context in which certain actions occur and is the best way to understand the motivations and reasons behind business-related practices, such as water supply strategies (Dasgupta, 2015).

Focusing on participants' perspectives and collecting data in words or images characterizes qualitative research (Moser & Korstjens, 2017). Qualitative methods are particularly useful for exploring how resources, capabilities, or competencies emerge and develop within firms (Dasgupta, 2015). Therefore, the qualitative methodology aligned well with the RBV, this study's conceptual framework.

The other research methodologies were inappropriate for this study. Quantitative methods use statistics to test hypotheses about correlations between variables (Thorne, 2016). The emphasis in quantitative research is on describing a phenomenon in the form of numbers, quantities, and incidences (Anyan, 2013). Mixed methods research combines both quantitative and qualitative approaches (Morse & Cheek, 2014). Mixed methods are best used when a single method does not provide sufficient information to understand a topic, when the researcher is seeking additional explanation, or when the researcher desires to generalize the findings (Morse & Cheek, 2014). I did not test hypotheses concerning hotel water supply strategies, as would be appropriate for a quantitative study. Qualitative methods alone could provide insight into the research question. Moreover, I was not seeking to explain a phenomenon or generalize the finding as would be the case in a mixed methods study.

**Research Design**

The research design I selected was the case study. I considered three research designs for a qualitative study on hotel water supply strategies: phenomenology, ethnography, and the case study. Because narrative research and grounded theory are inappropriate for applied business research, I did not consider those methods. Phenomenology is suitable for studies that seek to describe the essence of a lived phenomenon (Landrum & Garza, 2015). I did not select a phenomenological design because my study is not about the lived experiences of multiple individuals. Because maintaining a hotel's water supply is a well-established phenomenon faced by a large percentage of hotels across multiple regions, a phenomenological design was not

applicable to this research problem. Researchers use ethnography to examine a culturally homogeneous group, describe behaviors, and explain how the culture-sharing group works (Lopez-Dicastillo & Belintxon, 2014). Strategies used by hotel managers to maintain adequate water supplies are not culturally bound nor open to cultural interpretation. Therefore, I did not select an ethnographic design.

Of the various possible qualitative designs, the case study best aligned with the research purpose and questions for this study. The case study design is suitable for answering *how* or *why* questions (Baskarada, 2014; Stake, 1995; Yin, 2017). Case study design also is appropriate for investigating contemporary real-life phenomena when the context is unclear or the researcher can do little to control it (Yin 2017). In this study, I attempted to answer questions about strategies hotel managers use to maintain adequate water supplies and how managers apply these strategies in a real-life contemporary situation.

The case study design is well suited to generating relevant knowledge about management issues (De Massis & Kotlar, 2014). The case study design is ideal for observing rich information about the underlying and idiosyncratic effects of resource-based strategies on firm performance (Dasgupta, 2015). The case study design aligned well with this study's conceptual framework, the RBV. Stake (1995) emphasized that a case should be approached as a specific, complex system bounded by place and time. In this instance, the bounded system was the hotel unit, and managers' water supply strategies were best understood within that specific operational setting.

Methodologists define saturation as the point at which additional research will contribute nothing new to the study (Gentles, Charles, Ploeg, & McKibbon, 2015). In the case study design, data saturation occurs when no further new data emerges with subsequent interviews (Fusch & Ness, 2015; Robinson, 2013). Saturation depends on the depth and richness rather than the amount of data (Malterud, Siersma, & Guassora, 2016), and no correlation exists between the number of interviews and the validity of conclusions (Diefenbach, 2009). Information redundancy is a good indicator of data saturation (Malterud et al., 2016). I interviewed multiple managers at each hotel site, conducted member checking to deepen my understanding, and explored water supply reports from each hotel until I achieved data saturation.

## Population and Sampling

Qualitative methodologists define sampling as the selection of specific sources from which data will be collected (Gentles et al., 2015). The goal of qualitative sampling is to achieve richness of information rather than generalizability; the focus is less on sample size than the adequacy of the sample to answer the research question (Malterud et al., 2016). I used purposive sampling to select the study population, which consisted of nine hotel managers who oversaw water supply strategies for three hotels in the Canary Islands. Purposive sampling entails the assumption that the research subjects have unique or important perspectives on the research question (Robinson, 2013). Sampling applies to the selection of cases and the identification of data sources in case study research (Gentles et al., 2012).

The main criterion for selection is that the site is suitable for the questions under investigation (Diefenbach, 2009). A multiple case study design consisting of three organizations is sufficient for exploring a research question and identifying rival explanations (Yin, 2017). Data quality increases when researchers interview several well-informed participants who can provide different perspectives on the research question (De Massis & Kotlar, 2014). The topic and the extent of data help determine the number of interviews (Yin, 2017). Data saturation is the accepted criterion in qualitative research for determining a sufficient sample size (Gentles et al., 2012). In the case study design, the researcher can achieve data saturation by conducting in-depth interviews and document examination until no new data or themes emerge (Fusch & Ness, 2015; Robinson, 2013). To achieve data saturation, I interviewed managers involved in water supply management in each hotel and reviewed hotel documents that contained data to answer the research question to the point of information redundancy.

Participants were hotel managers who used strategies for successfully maintaining adequate water supplies in an arid region. In a hotel operation, the best informants on water supply strategies are the general manager and the department heads who oversee operations in the areas of facilities and grounds, housekeeping, and food and beverage services. The population may vary from site to site because larger properties may have separate managers for golf courses, spas and recreational facilities, and other adjacencies. Findings of the literature review indicated that the managers of these functions were relevant to answering the research question because they were intimately familiar with

water usage in guest rooms, kitchens, facility systems, pools and spas, and other hotel services.

I conducted private, one-on-one 40-minute semistructured interviews, followed by 30-minute member checking interviews through video conferencing technology from my home office. I also accepted written feedback via email. Moll (2012) stressed the importance of ensuring privacy for building trust between the researcher and the participant. Therefore, the managers participated in a secure, comfortable, and private setting of their choice, whether in the workplace, at home, or another location.

## Ethical Research

Research subjects must be protected from any form of physical or emotional injury based on ethical standards. Participants' identities should remain confidential, and researchers should engage in no deception to achieve research goals (Hancock & Algozzine, 2017). Informed consent is an important step in achieving these goals. Informed consent requires that subjects receive sufficient information about the study and comprehend participant expectations. It also requires that participation be fully voluntary (U.S. DHHS, 1979). My consent form supported each of these criteria and provided other ethical protections by explaining the goals and objectives of the study; the participant selection method; data collection, handling, and analysis procedures; risks and benefits of the study, and the process for withdrawal. Researchers should never coerce or pressure subjects to participate or prevent them from withdrawing from the study if they so choose (Hancock & Algozzine, 2017). Therefore, I did not offer any financial

consideration or another form of inducement. I made it clear that participants could withdraw from the study at any time for any reason without penalty.

Studies with human subject involvement should include statements regarding ethical oversight of the study (DDHS, 1979). The consent form indicated that Walden University reviewed the research plan and that the Institutional Review Board (IRB) ensured that research processes met the highest ethical standards. The consent form included the IRB approval number 01-16-18-0428755. Participants received a phone number for a Walden University research advocate to address any ethical concerns. Furthermore, the consent form communicated other ethical safeguards, including that none of the interview data or documents would be used outside of the study and that the data will be maintained in a secure location and destroyed after 5 years.

Risks to participants were minimal. I did not interview any vulnerable adults. The targeted participants were all active business managers who were eager to share their successful strategies with industry peers. Participation was voluntary, as interview subjects self-selected based on specific selection criteria. Participants received the consent form with my solicitation email and demonstrated consent by responding to the email. The researcher and subjects should concur about various issues, such as data use, confidentiality, and participation requirements before starting data collection (Baskarada, 2014). Each interview began with a review of the consent form to ensure comprehension and answer any questions related to privacy and confidentiality.

This study did involve a small risk that participants would feel subtle pressure to please senior managers and owners with their participation. The researcher should be

cognizant of the potential power differential between researcher and subject and permit the interviewee to exercise the power to discontinue (Anyan, 2013). A small risk also existed that participants would be concerned about whether their comments could reflect on the hotel's performance, and therefore they might have felt encouraged to inflate positive results and minimize negative information. The dominant organizational ideology inevitably influences interview data; however, capturing such data in and of itself can reveal important truths about the organization's social and political context (Diefenbach, 2009).

Confidentiality and privacy procedures are important for building trust and reducing the perceived risk associated with candor (Moll, 2012). This risk reinforces the ethical importance of privacy protection for study participants (Morse & Coulehan, 2015). To gain trust, I employed confidentiality procedures such as using individual identification codes rather than names to label interviews, conducting interviews in private, one-on-one video conferences at a time that was convenient for the participant, and eliminating the names of individuals, hotel units, or the community partner in written findings. Interview codes (a combination of letters and numbers) signified the hotel (A, B, or C), the management role, and date of the interview. For instance, an interview with the general manager at one hotel might be designated as A-GM120117. In written findings, I assigned each participant a number from one through nine. If an individual shared insight and the role was not relevant to the finding, I attributed it to *Participant X*. If the role of the subject was relevant to comments, I attributed it to *Participant X, the*

*general manager of an X-star hotel*. When a majority of participants made reinforcing comments, I attributed them to *participants*.

## Data Collection Instrument

In qualitative research, the researcher is the primary data collection instrument (Collins & Cooper, 2014; Yin, 2015). As the primary data collection instrument, I collected data through semistructured interviews and document review. I conducted interviews using an interview protocol (Appendix A). This protocol involved introducing myself and explaining the research goals, reviewing the consent form to identify questions or concerns, requesting permission to record the interview, posing interview questions in order, asking follow-up questions to clarify or expand responses, requesting documents related to the research question, discussing and scheduling member checking interviews to confirm accuracy, providing contact information for participant questions and concerns, and thanking the participant for the contribution to the study.

Comprehensive data collection employing multiple sources of evidence enhances research reliability and validity (Baskarada, 2014; Fusch & Fusch, 2015). In this study, comprehensive data collection consisted of conducting two to three interviews and reviewing and analyzing hotel water consumption and conservation reports for each of three hotels owned by a multinational hotel group. Member checking interviews enhanced reliability and validity in this study. Member checking interviews, in which participants have an opportunity to clarify or make corrections, are another way to improve accuracy (Houghton et al., 2013).

## Data Collection Techniques

Methodological triangulation can be achieved by combining multiple interviews with a review of documents pertaining to the research question (Fusch & Fusch, 2015). Data collection techniques in this study consisted of semistructured interviews and document review. Qualitative researchers commonly use interviews to collect data (Anyan, 2013; Grossoehme, 2014; Harland, 2014). Interview questions should be simple and direct, solicit responses that answer the research question, allow for further probing, and produce useful data (Baskarada, 2014; Yin, 2017). There were seven open-ended questions that explored strategies used by hotel managers for maintaining adequate water supplies included in the interviews.

I conducted private, one-on-one, 40-minute semistructured interviews, followed by 30-minute member checking interviews, through Zoom® video conferencing technology due to the location of the participants. Some participants submitted written feedback to interview notes via email. Oltmann (2016) recommended that researchers schedule interviews at a convenient place and time for the participants. Video conferencing is superior to phone interviews alone because it helps establish a rapport with the participants (Grossoehme, 2014), and it proved to be beneficial in my interviews.

The video conferencing system also allowed me to audio record the session as it took place. With participants' permission, interviews were recorded and saved to an external hard drive. The interviews were conducted in English because hotel managers in this location commonly conduct business in English. I paraphrased and asked probing follow-up questions to obtain detailed, concrete examples of specific, actionable

strategies and explore how they may or may not have worked. On occasion, I sought clarification in Spanish. An independent professional translator confirmed my understanding of Spanish comments by reviewing my interview notes before I entered them into Atlasti for analysis.

One goal of interviews is to create a safe and trustworthy environment in which respondents feel they can speak freely (Collins & Cooper, 2014). Interviews have the benefit of allowing the participant to share his or her thoughts and experiences related to a phenomenon in his or her own words (Moll, 2012). The interview process can reveal underlying issues and broader discourses that shape responses (Moll, 2012), and interviews have the additional benefit of permitting follow-up questions for clarification or understanding. Researchers can also explore themes that emerge during the interviews (Oltmann, 2016). The ability to reformulate or add new questions during the interview promotes better and deeper knowledge and understanding (Diefenbach, 2009).

A disadvantage of interviews is the influence of the interviewer on participants' responses. Diefenbach (2009) asserted that interviewers could not avoid impacting interview outcomes to some extent. Another disadvantage of interviews is the potential power difference between researcher and subject (Grossoehme, 2014). By controlling the setting, setting the agenda, and establishing the rules of the situation, the researcher exerts a degree of power over the interviewee that could have a coercive effect (Anyan, 2013). As a result, interview subjects might restrict themselves to talking about what the researcher wants to hear or is expected of them. Diefenbach (2009) referred to this tendency as a *socially accepted answering attitude*.

Power shifts to the interviewee during data collection, as the researcher is dependent on the participants' cooperation (Anyan, 2013). Therefore, building rapport and earning the participants' trust is essential when collecting data through interviews. Oltmann (2016) noted that another drawback of interviews is that a novice interviewer may not feel comfortable probing or asking follow-up questions, and this reticence may limit the amount and depth of data gathered. Researchers should also be aware of how their worldviews, biases, and emotions might impact data collection during the interviews (Grossoehme, 2014). I made a note of any biases that could impact data collection and analysis when writing interview notes and reconfirmed any data that might be misconstrued due to faulty assumptions. Data saturation occurs when no further new information or emerging themes appear (Zheng, Guo, Dong, & Owens, 2015). Therefore, interviews and document review continued until data saturation occurred.

Member checking offers the additional assurance of accuracy (Houghton et al., 2013) and returns some power to the research subjects by giving them the opportunity to validate the researcher's interpretation (Anyan, 2013). To facilitate member checking, I wrote a succinct summary of each participant's comments, organized by question number, and emailed it to the participants, allowing them approximately a week for review. I then attempted to schedule a member-checking interview with each participant to review the summary and request corrections, clarifications, or additions.

Some participants chose to make their additional comments and clarifications in writing through email rather than participate in another interview. Asking the same question multiple times can help increase trust and asking different people about the same

issues can improve interview data quality (Diefenbach, 2009). During member checking interviews, I probed participants about information from other sources that may support or contradict accounts. I catalogued and stored participants' written clarifying comments in a secure location with other interview data and deleted it from my email account.

In addition to interviews, I employed a document review for this study. Document review has the benefit of enhancing study validity (Baskarada, 2014). I collected, reviewed, and analyzed documents related to water policies and usage at each hotel to help answer the research question. I loaded relevant data that answered the research question from these documents into data analysis software to be analyzed along with data from the interviews and member checking.

## Data Organization Techniques

A case study database provides researchers with a tool for tracking data collection from the beginning to the end of the research process (Baskarada, 2014; Marshall & Rossman, 2014; Yin, 2017). The research database for this study contained electronic interview recordings, member checking summaries, interview notes, and other documentation used in the study. I assigned identifications codes rather than names to interview recordings and notes and organized them in a password-protected folder on a secure external hard drive. Codes for interviews consisted of a combination of letters and numbers signifying the hotel (A, B, or C), the participant's management role, and date of the interview. For instance, an interview with the general manager at Hotel A was designated as A-GM12017. I created an inventory log to catalogue all data using an identification code, file type, file author, and date. When my research ends, I will remove

audio files, interview notes, and other documentation from the hard drive and store data in a secure location for 5 years, after which time I will destroy all materials.

## Data Analysis

In this study I employed methodological triangulation, using two types of data collection techniques to explore the research question. Triangulation is common in case study research as a means of checking information derived from different sources and gaining a clearer and deeper understanding of findings (De Massis & Kotlar, 2014; Taylor, Bogden, & DeVault, 2015). The four types of triangulation are data triangulation, investigator triangulation, theory triangulation, and methodological triangulation (Fusch & Ness, 2015). Methodological triangulation increases confidence in the credibility of a study by ensuring the completeness and consistency of data (Houghton et al., 2013). The researcher can balance the snapshot nature and situation-dependence of interview statements by referring to additional data sources (Diefenbach, 2009). I used methodological triangulation involving two data sources, interviews and document analysis, in my study.

Qualitative analysis involves identifying constructs and grouping them into themes with supporting evidence (Baskarada, 2014). By recognizing similarities and differences, the researcher can classify ideas into patterns or wholes. Yin (2017) proposed five steps for case study data analysis: examining, categorizing, tabulating, testing, and recombining evidence to draw empirical conclusions. The analysis in this study began with examining the various sources of data, including interview recordings, member checking interviews, and water use documents.

Next, I categorized data by themes and patterns related to the research question and literature. Putting information into different arrays or matrices, creating data displays, tabulating different events, or creating a temporal scheme can accomplish the organization of the data (Yin, 2017). A matrix with defined rows and columns could be used to display and analyze data (Dasgupta, 2015). Some of the data organization categories included themes related to the RBV and other aspects of the conceptual framework, the value and use of water, water scarcity in business and tourism, and hotel water use and conservation. Analyzing the topics based on information contained in documents and gathered through interviews supported the search for both reinforcing and contradictory evidence. This process allowed triangulation of data to provide multiple sources of support for emerging themes (Stake, 1995).

Coding is a valuable technique for organizing data for analysis (Baskarada, 2014; De Massis & Kotlar, 2014). A certain degree of subjective decision-making about what to include and exclude is unavoidable no matter how objective the coding process (Diefenbach, 2009). An in-depth description of the coding process helps the reader judge reliability (De Massis & Kotlar, 2014). Use of qualitative data analysis software also can bring rigor to this phase by organizing large amounts of data for easy management through the analysis process (De Massis & Kotlar, 2014).

Once I identified themes, I coded all collected data with the aid of the qualitative software program Atlasti, with which I had previous experience. Yin (2017) pointed out that due to the complexity of behavior and contexts, interview responses are likely to represent only part of the overall case study evidence. It is necessary to convert all

evidence, including notes and other archival documents, into a form that can be coded in the software. For this reason, interviews and documentary evidence were also coded in Atlasti to support methodological triangulation.

Multiple case study design can be superior to a single case study design for producing a deeper understanding of a subject (Baskarada, 2014; Hancock & Algozzine, 2017; Yin, 2017). Multiple case study design also may produce more varied evidence (De Massis & Kotlar, 2014). I continued to compile data on water supply strategies until no new data emerged. I then tabulated the results, developed initial findings, and tested them through additional interviews or document research. Tabulation reduces the evidence and enhances analysis by selecting, focusing, condensing, and simplifying data (De Massis & Kotlar, 2014). I continued to compile data emerging from the interviews and documents. As a final step, I revised my initial findings to reflect the evidence and drew conclusions.

## Reliability and Validity

### Reliability

Reliability means the researcher can obtain the same results by following the same data collection methods throughout a study (Baskarada, 2014; Grossoehme, 2014; Yin, 2017). Case-to-case replication can support reliability much like multiple experiments support reliability in quantitative research (Baskarada, 2014; Yin, 2017). The focus of reliability is to ensure the accuracy and precision of research by minimizing errors and biases (De Massis & Kotlar, 2014). Interview protocols help establish

commonalities and ensure reliability, consistency, and validity when using semistructured interviews to gather data (Houghton et al., 2013).

Dependability in qualitative research characterizes the stability of data over time (Houghton et al., 2013). Researchers demonstrate dependability by maintaining an auditable trail in a password-protected database to catalogue all data related to the study. I maintained a log including interview notes and documents identified by a code, file type, file author, and date. Such a log helped trace the development of themes in response to new information throughout the study (Elo et al., 2014). Qualitative analysis software also can enhance dependability (Houghton et al., 2013). I used Atlasti software to document decisions made during collection and analysis. Member-checking of data interpretation helps prevent mistakes and biases that can detract from the dependability (Baskarada, 2014). Finally, member-checking of interview summaries enhanced dependability. Keeping a research diary can further enhance dependability by making the researcher's decisions concerning questioning and interpretation transparent (Grossoehme, 2014; Houghton et al., 2013). Unfortunately, I was unable to maintain a reflective journal to document the research process.

**Validity**

Validity refers to whether a study achieves what it set out to achieve, and also refers to trustworthiness (Grossoehme, 2014). Validity is enhanced when all phases of research are documented and can be audited from beginning to end (Marshall & Rossman, 2014). This extensive record-keeping allows others to assess the validity of the

research by determining how well the findings reflect the participants' statements (Diefenbach, 2009).

Houghton et al. (2013) listed four methods for ensuring credibility in case study research: prolonged engagement and persistent observation, triangulation, peer debriefing, and member checking. Prolonged engagement and persistent observation mean that the researcher spends a sufficient amount of time to gain a comprehensive understanding of the research question (Houghton et al., 2013). Methodological triangulation involves employing multiple sources of evidence to confirm the accuracy and completeness of data (Yin, 2015). Triangulation helps develop as complete a picture as possible of the research question (Houghton et al., 2013). To achieve triangulation, I collected and analyzed data from two sources, interviews and documents, to verify the consistency and completeness of data. This procedure ensured that findings were valid.

De Massis and Kotlar (2014) described cross-case comparison as another way for researchers to enhance the credibility of findings. Some scholars recommend peer debriefing with a colleague or an external expert, although the value of this approach has been widely debated (Houghton et al., 2013). Peer debriefing can take the form of having another researcher review the coding to see if he or she can produce similar results. I did not engage in peer debriefing for this study. I did support study credibility through member-checking interviews. Member-checking enhances credibility by protecting against misinterpretation by reviewing preliminary findings and making corrections, clarifications, or additions as needed (Stake, 1995).

Researchers cannot generalize qualitative findings in the same way as quantitative results (Baskarada, 2014; Marshall & Rossman, 2014; Yin, 2017). Qualitative researchers typically make limited claims regarding representativeness (Roy, Zvonkovic, Goldberg, Sharp, & LaRossa, 2015). Qualitative researchers should provide a *thick description*, including examples of raw data and verbatim remarks, to allow readers to judge the credibility of the research and its transferability to other settings (De Massis & Kotlar, 2014; Houghton et al., 2013). When future readers can access research reports, site information, and sampling procedures, the credibility and transferability of findings increase (Marshall & Rossman, 2014). Researchers should maintain data in a well-organized, retrievable form so that future researchers can reanalyze the data if desired. Moreover, writing openly about assumptions and potential biases, the search for rival explanations, and the use of triangulation and other methods to test interpretations may give future readers more confidence in the study's credibility (Marshall & Rossman, 2014).

Confirmability refers to the accuracy and objectivity of data (Houghton et al., 2013). Confirmability is enhanced when two or more sources agree about the accuracy, relevance, or meaning of a proposition (Elo et al., 2014). Capturing and coding all relevant facts and confirming that each concept is adequately represented in data interpretation is one method for ensuring confirmability. Another measure is conducting interviews with participants from different hierarchical levels, functional areas, and groups who can give different perspectives and rival explanations related to the research question (Dasgupta, 2015). I enhanced confirmability by conducting interviews with

managers at multiple levels of the organizations and giving them equal weight. Cross-case comparison promotes confirmability by permitting analysis of results from multiple settings (De Massis & Kotlar, 2014).

The validity of a research study also depends on data. A sufficient amount of data must be collected to support a study's conclusions (Fusch & Ness, 2015). Transparency of the process for determining whether data saturation has been reached is essential for judging validity (Malterud et al., 2012). I conducted nine interviews involving two to three managers responsible for the major water-consuming functions in each of the three hotels and one manager from the multinational hotel group. Interviews and review of documents on successful water use and conservation strategies generated the data necessary to achieve data saturation. Roy et al. (2015) cautioned that the depth of data is a better indicator of validity than the quantity of data. Therefore, interviews and document collection ceased when I achieved data saturation or when no new information emerged. Saturation occurred when I achieved the appropriate depth of data and exhausted my research efforts to answer the research question.

## Transition and Summary

Section 2 described the research plan for this qualitative multiple case study that explored the strategies used by hotel managers to successfully maintain adequate water supplies in arid regions. This section discussed my role as a researcher, the target population, and the criteria for selection of participants. Section 2 expanded on my reason for selecting a qualitative multiple case study. I reiterated the importance of employing ethical research processes and described the safeguards I took to ensure

participant privacy and confidentiality. Section 2 also elaborated on the data collection instrument and techniques, and the approach for data organization and analysis. In Section 2, I discussed issues related to the reliability and validity of the research, including dependability, credibility, transferability, and confirmability. Section 2 ended with a restatement about data saturation's role to ensure validity. In Section 3, I report the findings of the study organized according to themes that emerged from data analysis. Section 3 includes supporting content relevant to the findings that emerged in the literature review. I also discuss the value and applicability of the findings to professional practice, the implications for social change, recommendations for action and further research, personal reflections, and conclusions.

Section 3: Application to Professional Practice and Implications for Change

In Section 3, I present the findings of this research study. This section includes a restatement of the purpose of the study, the presentation of findings, a discussion of the findings' application to professional practice, comments on the implications for social change, recommendations for action, recommendations for further research, personal reflections, and conclusion.

## Introduction

The purpose of this multiple case study was to explore strategies hotel managers used to maintain adequate water supplies in arid regions. The data came from interviews with managers and water use reports at three hotels in the Spanish Canary Islands and their corporate office. The findings revealed the strategies managers used to successfully maintain water supplies in an arid tourism destination.

## Presentation of the Findings

The overarching research question for this study was: What strategies do hotel managers use to maintain adequate water supplies in arid regions? The four overarching themes that emerged to answer the research question were: (a) value water as a strategic business resource, (b) mitigate risks of natural resource scarcity, (c) promote water efficiency and conservation practices, and (d) sustain supply through CWS. Several subtopics reoccurred throughout these themes, including water cost, water quality, desalination, reuse and recycling, a culture of water conservation, and collaboration in water governance. I elaborate on these four themes and provide related content and discussion in Section 3.

**Theme 1: Value Water as a Strategic Business Resource**

The value managers placed on water as a strategic business resource is the focus of Theme 1. Analysis of participant interviews and documents demonstrated that hotel managers in the Canary Islands linked access to water resources with performance and competitive advantage. Topics related to valuing water resources, ranked by frequency of occurrence, appear in Table 4.

Table 4

*Frequency of Topics Related to Valuing Water*

| Topics | *n* | Frequency of Occurrence |
|---|---|---|
| Hotel Water Use | 14 | 25% |
| High Cost of Water | 13 | 24% |
| Hotel Performance | 11 | 20% |
| Competitive Advantage | 9 | 16% |
| Water Quality | 9 | 16% |

*Note*. *n* = frequency

Key words frequently associated with these topics included *cost savings*, *water pricing*, *hotel size*, and *hotel service standards*.

**Hotel water use.** The intensive use of water in hotels has been documented in multiple studies (Barberán et al., 2013; Gössling et al., 2012; Kasim et al., 2014; Styles et al., 2015). Participants discussed a similarly high level of water demand at their properties. Analysis of water use records and reports from the hotels in this study further underscored the value of water (Appendix B). Larger and more luxurious properties have been found to use more water (Barberán et al., 2013; Styles et al., 2015). The larger and more upscale hotels included in this study also used more water. Water efficiency, the

extent to which managers optimized water use for their properties, appeared to align with the total number of rooms, rather than the overall size of the property or the level of service. The most water efficient operation was the 4-star property with 1,136 rooms, rather than the 5-star property with 561 rooms. Large size and high occupancy rates can spread fixed costs over a larger customer volume, producing greater water efficiency (Zhang et al., 2014). Age, design, amenities, and climate could also account for different levels of water efficiency in different sized properties (Da Rosa & Silva, 2017; Styles et al., 2015; Zhang et al., 2014). However, researchers have shown that the knowledge and dynamic capabilities of managers could account for differences in environmental performance (Del Mar Alonso-Almeida et al., 2017).

**High cost of water.** Managers in this study frequently expressed dissatisfaction with the high cost of water. Document and interview data showed that water was an unusually large percentage of the hotels' operating budgets (10%) at these properties and was a major motivator for managers' water efficiency efforts. The American Hotel and Lodging Association (n.d.) estimated overall utility costs including electricity, gas, and water typically average only 6% of operating costs. Razumova et al. (2016) and Deya-Tortella et al. (2017) proposed a weak correlation between water supply strategies and water costs, but Bell et al. (2013) and others argued that scarcity would lead managers to conserve water as a hedge against price increases and regulations. Managers included in this study appeared to respond to water costs as predicted by Bell et al. (2013). With operating costs and occupancy expected to rise in 2018 (CBRE Hotels, 2018), the

managers included in this study appeared to be highly motivated to reduce water costs to meet financial objectives and achieve profitability.

Barberán et al. (2013) observed that water costs might be particularly high in arid and semiarid regions and small islands that depend on desalination or water importation. Participants consistently blamed the high price of water on the cost of desalination. Sadwhani Alonso, Álvarez, Melián-Martel, and Díaz (2015) estimated that energy costs accounted for three-quarters of the total cost for desalination, but costs are dropping because of the incorporation of energy recovery, renewable energy, and a variety of other technological innovations. The increasing cost and declining yield of groundwater mining could shift the preponderance of sourcing towards desalination in the future (Custodio et al., 2016). Given that both groundwater mining and desalination remain relatively expensive and extract a high financial and environmental cost, there is growing pressure to develop other sources of water supply, such as dams, reservoirs, and water recycling (Gude, 2017).

Participant 5, the general manager of a 4-star property, speculated about the potential benefits of setting up an onsite desalination plant, observing that it would drastically reduce water costs for the hotel. However, private ownership of desalination plants is rare in the Canary Islands, and regulations would complicate the process of obtaining one. Participant 5 admitted that keeping desalination in the public domain was preferable so that "all companies and institutions have the same objective of preserving our natural environment, without the coastal area of the island becoming a catastrophic and disordered landscape of machinery and pipes of a thousand thicknesses or calibers."

The findings of this study could help extend knowledge of neoclassical price theory under conditions of extreme resource scarcity. There is a unique relationship between water prices and production in the Canary Islands, which depends on expensive groundwater mining and desalination technologies (Custodio et al., 2016). The poor quality of the water derived from these sources increases the costs of operationalizing an already rare resource, confirming classical economic theories ascribing a competitive advantage to businesses that can successfully leverage a scarce asset (Barney, 1991; Hunt, 2015; Salazar, 2017).

**Hotel performance and competitive advantage.** Participants in this study confirmed the applicability of the RBV to hotel environmental performance. RBV theorists argued that firms could achieve a long-lasting competitive advantage by optimizing internal resources and capabilities (Božič & Cvelbar, 2016; Enriquez de la O, 2015; Tan et al., 2017). Water is "an essential factor of production" for hotels (Barberán et al., 2013, p. 181). Participant 5 agreed that water offered a strategic advantage and described water as "an essential and strategic good both for the basic needs of customers [showers and toilets], for direct services [swimming pools and showers and water used in spa facilities] and indirect uses [water used in kitchens for food preparation]." Barney (2001) contended that water is a VRIN resource and therefore might confer the greatest strategic advantage, a sentiment reflected in Participant 5's comment that hotel managers should "treat water as if it were gold."

**Water quality.** Custodio et al. (2015) commented that while some anxiety about water scarcity in the Canary Islands is appropriate, quality may be a bigger source of

concern than quantity. Although tap water meets basic Spanish health standards, it has high mineral content (lime), and the government does not recommend drinking it (Sadwhani Alonso et al., 2015). Indeed, participants complained about the poor quality of water from municipal sources nearly as much as they complained about the cost. Several participants stated that to them, water quality was a greater business risk than scarcity.

All three hotels included in this study used secondary treatment systems to remove minerals and improve the taste of water for use in food and beverages and to protect equipment from damage that could lead to high repair or replacement costs. Participant 3, a food and beverage manager of a 3-star property, explained that poor quality water could also impact the cleanliness of dishes, glassware, and cutlery, resulting in customer complaints. Additional water treatment steps further increase operating costs and generate waste. According to Participant 9, a manager at the corporate office, the two larger hotels in the study own their own reverse osmosis water treatment equipment, but the smaller one rents it due to the high capital investment costs.

In summary, valuing water as a strategic resource proved to be an important strategy for hotel managers operating in the Canary Islands. The high demand for water, the cost of supply, and the impact on operating budgets made water a VRIN resource that strongly motivated managers to engage in efficiency and conservation efforts. The poor quality of the water, which required secondary treatment at an extra cost to the hotels to be suitable for guest consumption and facilities operations, compounded the strategic impact of water on hotel viability.

**Theme 2: Mitigate the Risks of Natural Resource Scarcity**

The risks of operating under conditions of resource scarcity are the subject of Theme 2. The findings showed that resource scarcity produced subtantial business risks for hotel managers in the Canary Islands. Participants stressed the need for a continuous, uninterrupted supply of water. Analysis of hotel documents did not directly address this theme, but data analysis demonstrated the extensive need for continuous water supply. Topics related to mitigating risks of natural resources scarcity, ranked by frequency of occurrence, appear in Table 5. Key words frequently associated with these topics included *tourism water demand*, *guaranteed water supply*, *interruption of water supply*, *backup reserves*, *reuse and recycling*, and *desalination*.

Table 5

*Frequency of Topics Related to Risk of Natural Resource Scarcity*

| Topics | *n* | Frequency of Occurrence |
|---|---|---|
| Water Scarcity | 10 | 18% |
| Hotel Water Supply | 10 | 18% |
| Business Risk | 7 | 13% |

*Note*. *n* = frequency.

**Water scarcity.** Water is a scarce commodity in the Canary Islands, and the seasonal nature of tourism results in spikes in water use that strain available resources (Custodio et al., 2016). The Canary Islands are volcanic islands in the Atlantic Ocean located at the same latitude as the Sahara Desert (Custodio et al., 2016). The climate is temperate and dry and marked by natural resource scarcity. The islands receive an average rainfall of 325mm per year, just above the 300mm threshold that defines arid

zones in Spain (García-Rodríguez et al., 2016). Participant 5 stressed that "the greater the water scarcity, the bigger the impact on the hotel's business."

**Hotel water supply.** The findings indicated that hotel operations depend heavily on continuous water supply and interruptions can have negative consequences on operations, customer satisfaction, and profitability. Participants identified gardens and pools as the most water-intensive features of their properties and therefore the most dependent on adequate water resources. Participants also mentioned elaborate gardens as a necessary aesthetic feature of the hotel environment, especially at larger resort properties. Swimming pools are another major feature of the resort environment that participants noted. Pools require large amounts of water for filling, filtration, maintenance, and treatment. Becken et al. (2014) stated that pools might account for 3% to 20% of water use in hotels, and Gössling et al. (2012) asserted that the presence of a pool could increase water usage by 87%.

Water shortages could force hotel managers to curtail or modify these important amenities. Participant 5 said dramatic interruptions in supply could force managers to shut down services such as spas and pools. Long-term interruptions could impact access to pool showers or restrooms in common areas. A major scarcity event could require temporarily closing off rooms and moving guests to other parts of the property. According to Participant 1 and others, any of these scenarios could diminish customer satisfaction and impact profitability.

**Business risk.** Bell et al. (2012) proposed a typology for explaining the RBV under conditions of natural resource scarcity. Consistent with the typology, water

availability in the Canary Islands is characterized by limited renewability due to scant rainfall and ongoing scarcity due to increasing demand and dwindling groundwater supplies. The Islands also suffer from degeneration of overall and preferred quality of water supplies; in some locations reserves have reached the point of nonrenewability (Bell et al., 2012; Custodio et al., 2016). Moreover, the Canary Islands suffer from local degeneration of a typically renewable resource, which produces both overall scarcity and scarcity of preferred quality water supplies.

Bell et al. (2012) explained that a formerly renewable resource could become nonrenewable as the result of environmental damage. Custodio et al. (2016) proposed that intensive exploitation of groundwater in the Canary Islands has depleted water reserves in some areas to the point of nonrenewability. Under these conditions, NRS typology proposed that managers would use certain approaches to mitigate local degeneration and local depletion. Three types of approaches predicted by NRS typology emerged from the research: employment approaches, conservation approaches, and mobilization and compilation approaches.

***Employment approaches.*** Employment approaches include avoidance to reduce the use of scarce natural resources, logistics in which abundant resources are shifted to areas experiencing scarcity, allocation to ration scarce resources, and sustainment to ensure ongoing availability (Bell et al., 2012). The hotel managers in this study relied heavily on avoidance and allocation strategies to mitigate scarcity. For instance, participants spoke extensively about preventing leaks, reducing flow rates from faucets and fixtures, and employing creative low-water cleaning strategies. They also discussed

sustainment strategies such as using cisterns to maintain a backup supply in case of interruptions. Participant 5 summed up these strategies up as "rational use of water that, among others, does not generate any…waste, which would undermine the economic objective of the business unit itself."

***Conservation approaches.*** Bell et al. (2012) identified resource recovery and resource base protection as appropriate conservation approaches under conditions of local degeneration and local depletion. According to participants, resource recovery strategies are uncommon in the Canary Islands, except by the municipal government to irrigate public parks and golf courses. Participant 9, a manager at the corporate office, said most existing Canary Island hotels have no capacity for using greywater, but newer hotels incorporate plans for water recycling. Nonetheless, the two larger hotels in this study have onsite water recycling plants to provide greywater mainly for garden irrigation. Concerning resource base protection, hotel documents and interviews presented evidence of a substantial commitment to pollution prevention and wastewater treatment that aligns with municipal water standards.

***Mobilization and compilation approaches.*** Bell et al. (2012) also identified mobilization and compilation approaches as relevant strategies for mitigation of local degeneration and local depletion. These approaches involved augmenting resources from outside sources, either through importation or substitution. The advent of desalination in the 1970s eliminated the need for imported water. Desalination functions as the primary substitution strategy in the Canary Islands and Southeastern Spain by augmenting degenerating freshwater sources with treated seawater (Aparicio et al., 2017).

Hernández-Sánchez, Boluda Botella, and Sánchez-Lizaso (2017) argued that desalination is an appropriate complement to other available resources to guarantee a water supply independent of the hydrological cycle. Indeed, the development of desalination enabled the growth and stability of the Canary Islands' tourism (Custodio et al., 2016). Participant 5 said that "desalination is a process that not only allows the tourist and hotel activity to develop but also [enables] the agricultural activity that allows at least part of the fruit and vegetable production consumed in the islands to be cultivated locally and not have to be imported from outside." Participant 1 noted that "Prior to desalination, water cuts were very frequent, lasting one or two days, leaving the population without access to water, except for what they could buy in stores." Participants expressed confidence that water supply is now virtually guaranteed thanks to desalination.

Bell et al. (2012) cautioned that supply chain disruptions might occur when managers make false assumptions about the availability of a resource or its quality or fail to adjust to changing conditions of supply and demand. Other experts believe that desalinated water has limited application as a substitute for naturally derived water and is economically and environmentally inferior. Baduizzman, McLaughlin, and McCauley (2017) concluded in a study of the potential for substitution strategies in Northern California that under the most severe scarcity conditions, three quarters of the needs could be met by water recycling and reuse and only one quarter by desalination. Participant 5 cautioned that "the negative part of the desalination . . . is that it has led society to think in general that water will never fail." However, in January 2018, such a

supply failure occurred. An intense winter storm damaged a pipeline and the three hotels included in this study were forced to depend on the hotels' water reserves. The managers at each hotel maintain a cistern containing a three- to five-day backup supply. Participant 1 explained that managers augmented backup supply with conservation and limited irrigation; they also curtailed certain cleaning tasks in favor of maintaining other guest services. While the incident lasted only a few days, it highlighted the risks of overdependency on desalination technology as a major strategy for addressing ongoing resource depletion.

In summary, hotel managers included in this study are dependent on continuous water supply and may experience negative consequences on customer satisfaction and profitability when they must suspend services and amenities or shut down parts of their properties because of an interruption in supply. As NRS typology predicted, under scarce conditions, managers used certain employment, conservation, and mobilization approaches to mitigate local degeneration and local depletion. Participants noted that resource recovery strategies were limited and secondary to desalination as a water supply strategy. Some researchers cited desalination as an appropriate complement to other available resources to guarantee water supply (Hernández-Sánchez et al., 2017), while others asserted that it has limited application and is inferior both economically and environmentally (Baduizzman et al., 2017). A three-day outage of the local desalination plant in January 2018 highlighted the dangers of overdependence on desalination as the primary strategy for mitigating the risk of natural resource scarcity.

**Theme 3: Promote Water Efficiency and Conservation Practices**

The focus of Theme 3 is the use of water efficiency and conservation practices by hotel managers to ensure a sustainable, continuous supply of high-quality water. Previous research on hotel environmental performance indicated that the most widespread environmental hotel practices are low-cost measures that result in energy, water, and waste management savings (Becken, 2014; Becken & Dolcinar, 2016; Becken et al., 2014; Bruns-Smith et al., 2015). According to hotel water use reports and interviews, managers at the three Canary Island hotels applied the same types of low-cost, practical, and cost-saving practices that appeared in other studies of water supply management. A detailed description of the managers' practices based on interviews and document analysis appears in Appendix B. Table 6 summarizes topics related to water efficiency and conservation, ranked by frequency of occurrence.

Table 6

*Frequency of Topics Related to Water Efficiency and Conservation*

| Topics | *n* | Frequency of Occurrence |
|---|---|---|
| Water Efficiency and Conservation | 28 | 51% |
| Awareness (staff and guest) | 27 | 49% |

*Note*. *n* = frequency.

Key words frequently associated with these topics included *water planning*, *measurement*, *preventive maintenance*, *postponement*, *wastewater management*, *corporate resources*, and *training*.

**Water efficiency and conservation.** Comparing the practices of these hotel managers to best practices and benchmarks of excellence for water management in the

European hospitality sector could help extend the understanding of hotel water efficiency and conservation practices. In interviews and documents, participants directly addressed seven categories of practices identified by Styles et al. (2015): water management plans, efficient fittings, housekeeping, laundry, kitchens, pools, and cooling and irrigation.

***Water management plans.*** Monitoring and benchmarking of water consumption is fundamental to effective water supply strategy (Styles et al., 2015). Measurement is a necessary first step for identifying leaks and opportunities to reduce water use. This strategy aligns with the emerging practice of water footprinting among water-intensive businesses. The managers in this study emphasized water planning and budgeting for their hotels based on historical data. Participant 6, the general manager of a 5-star property, said: "Measure, measure, measure…to avoid any leakage. That's the best way to save." Participant 9, a manager at the corporate office, said that by detecting and quickly attending to leaks, the hotels collectively saved 12% of total water consumption. He added "[Leak prevention] is the number one priority. It is the cheapest way and delivers the greatest cost savings and highest ROI." Hotel documents indicated that managers either employ or contract with technical experts to periodically check all pipes and equipment for leaks and efficient functioning through segregated metering.

***Efficient fittings.*** Reducing water use in guest areas by installing low flow fittings or retrofitting existing fixtures is a fundamental and cost-effective best practice for hotels (Styles et al., 2015). This strategy applies to guest rooms, pool change areas, and public areas. Many of these practices are estimated to achieve payback in one year or less, while basin and toilet retrofits can pay back in three to six years (Styles et al., 2015). In

the three hotels included in this study, water flow rates were higher for hand basins and showers than targeted by Styles et al. (2015). Hotel documents indicated that retrofitting of hand basins was in progress, but consistent with other studies, this strategy was delayed due to the greater time, planning, and resources involved. Participant 6, the general manager of a 5-star property, observed that higher shower flow rates are a common feature of luxury resorts, and some organizations avoid reduction efforts because they can result in customer complaints.

Reducing energy consumption associated with heating water for guestrooms is another important best practice that ultimately saves water (Styles et al., 2015). Providing hot water also adds significantly to operating costs by increasing energy use (European Commission, 2014). Here the hotel managers exceeded best practices by installing solar hot water systems, eliminating the environmental and financial impact of hot water generation across their properties. Solar heating of water did not appear in the best practice model proposed by Styles et al. (2015), but it is an increasingly common innovation for resort hotels in sunny locations.

***Housekeeping*.** Minimizing the amount of water used to clean rooms and common areas is another area of best practice identified by Styles et al. (2015). While Styles et al. (2015) mainly focused on limiting the number of toilet flushes and the time that taps run during room cleaning, the managers at the hotels in this study highlighted additional creative water-saving strategies. Participant 1, the general manager of a 3-star property, described how housekeepers cleaned with cloths (no mops) and cleaned an entire floor of rooms with just 5 liters of water. Participant 8, the housekeeping director

at the 5-star hotel, described a special mop that requires only 2 liters of water to clean a large area. Participants at both these hotels reported using water-efficient equipment to clean floors in common areas.

***Laundry.*** Linen and towel reuse is nearly ubiquitous across the hotel sector as a water- and energy-saving strategy. Styles et al. (2015) advocated minimizing laundry loads by reducing the volume of bedclothes and towels taken for washing by 30%. Participant 9 reported initiating an opt-out linen and towel reuse program across the three Canarian properties in 2016, reducing the volume of laundry by 50% by changing sheets and towels two times per week unless otherwise directed by the guest; this policy exceeded the best practice benchmark. Styles et al. (2015) also identified outsourcing to large offsite laundries that can save water through economies of scale. Analysis of hotel documents showed that the participants followed this strategy, although it is unclear whether the offsite provider was certified as environmentally preferable as recommended under best practices.

***Kitchens.*** Best practices in kitchen water supply management involve measuring and metering water use, maintaining water-efficient fittings and cleaning equipment, and controlling water consumption in cooking and cleaning (Styles et al., 2015). Participants 3 and 7, a food and beverage manager and a chef, respectively, mentioned several water-saving strategies related to pedal-operated taps and waterless cooking and thawing techniques. In addition, Participant 7 said kitchen staff saved water by boiling or cooking all food in ovens (rather than boiling or simmering on a stovetop) and cleaned vegetables in an 8-liter bucket of water with bleach. Participants pointed to the use of water-

efficient dishwashers and other water-saving dishwashing techniques such as ensuring full loads. Managers said that they pay the same level of attention to preventing and fixing leaks in the kitchen as in the rest of the hotel.

***Pools.*** Styles et al. (2015) did not identify a quantitative benchmark for pool water management but mentioned employing natural filtration systems, optimizing backwashing, and minimizing evaporation and leakage as preferred strategies. According to hotel documents, two of the hotels had natural filtration systems, while one (a 5-star property) had a less efficient sand filtration system with plans to upgrade in the future. Documents indicated that all three hotels minimize chemical use through salt ionizing systems that reduced the amount of chlorine used for disinfection.

***Cooling and irrigation*.** Avoiding the use of drinking water in building systems and irrigation of green spaces is considered best practice (Styles et al., 2015). I was unable to confirm whether the three hotels in this study substituted greywater for potable water in building systems. However, participants from the two more upscale hotels reported using their onsite water treatment plant to recycle water from baths, showers, and hand basins for irrigating elaborate gardens and green spaces. Participant 2, the facilities manager at the 3-star property, said there was no capacity to recycle greywater but felt it was less important because the hotel had a very small garden. Document analysis showed that all three hotels conserved water by using drip and micro-spray irrigation to maintain gardens and grounds.

**Awareness (staff and guests).** The literature on dynamic capabilities indicates that managers' knowledge and capabilities can influence the success or failure of

environmental and social responsibility initiatives in firms (Del Mar Alonso-Almeida et al., 2017; Peiro-Signes & Segarra-Oña, 2017). The presence of dynamic capabilities further predicted that managers would acquire knowledge, gain new competencies, and implement innovative approaches in response to fluctuations in resource availability. Participants confirmed that they purposefully applied knowledge and dynamic capabilities to promote water efficiency and conservation goals in these hotels.

Bromiley and Rau (2014) noted that according to RBV theory, the dissemination of knowledge and promotion of new competencies through the organizational culture was a resource in and of itself. The orientation of the managers helped diffuse knowledge through organizational culture (Peiro-Signes & Segarra-Oña, 2017). Participants in this study reported actively building a culture of water efficiency and conservation in the hotels by disseminating knowledge and promoting new competencies. Water supply management (along with energy conservation) was part of annual objectives for general managers. Participant 5 said, "The first knowledge to share, develop, and defend is the social-environmental concept of water as a scarce resource . . . and then develop appropriate environmental practices in the efficient and rational use of water." The challenge, he added, was continuing to ensure that everyone is aware, motivated and committed to water efficiency and conservation.

"The most important thing is staff engagement," said Participants 7, a chef, who described holding daily meetings with kitchen staff to review consumption, identify problems, and develop strategies to eliminate waste. New employees receive special training in water efficiency and other environmental issues. The corporate office

reinforces this message at annual environmental workshops and provides ongoing strategic support.

The certifying agency, TraveLife, is another source of knowledge the hotel managers exploit. Participant 5 said that as an independent resource, TraveLife helped him "professionalize" the hotels' environmental programs, detect anomalies, and implement additional measures "integral to the water management process." The managers also extended the culture of water conservations to the guests. Participant 1 said that guests are generally aware that they are visiting a water-stressed area and are willing to accommodate water conservation efforts.

Nevertheless, participants reinforced the water conservation mindset in guests by providing information about water-saving strategies in rooms and other areas of the property. The local government also runs awareness campaigns on water conservation, primarily aimed at the local population, which serve to remind tourists not to waste water as well. Managers in this study created a culture of water conservation through staff engagement, regular training, and frequent communication with employees and guests. These practices made water conservation part of every employee's job, diffusing water saving goals through all levels of the organization.

In summary, managers at the three Canary Island hotels included in this study pursued low-cost, practical, and cost-saving practices to achieve water efficiency and conservation goals. The practices adopted by these managers were consistent with benchmarks of excellence in the European hotel sector presented by Styles et al., 2015 in many critical areas but differed in areas in which they might negatively impact guest

expectations or deplete capital reserves. Consistent with previous studies, managers' knowledge and dynamic capabilities supported water efficiency and conservation goals in these hotels. These managers created a culture of water conservation through staff engagement, regular training, and frequent communication with employees and guests. The managers leveraged TraveLife certification as another knowledge resource; however, depending on TraveLife to define their program may have limited their water efficiency and conservation results.

**Theme 4: Sustain Supply through Corporate Water Stewardship**

Sustaining supply by engaging in corporate water stewardship is the focus of Theme 4. Water stewardship involves voluntary participation in water governance by corporate water-users (Sojamo, 2015). Data analysis showed evidence that the hotel managers made efforts to sustain the resource base to ensure their supply while considering the community's well-being. Topics related to hotel water stewardship, ranked by frequency of occurrence, appear in Table 7.

Table 7

*Frequency of Topics Related to Corporate Water Stewardship*

| Topics | *n* | Frequency of Occurrence |
|---|---|---|
| Hotel Water Stewardship | 12 | 22% |
| Municipal Water Supply | 8 | 15% |
| Climate Change | 4 | 7% |

*Note*. *n* = frequency.

Keywords frequently associated with these topics included *water governance*, *wastewater management*, *resource base protection*, and *water pollution*.

**Hotel water stewardship.** CWS is an emerging business practice for water-intensive businesses (Sojamo, 2015). In CWS, businesses cooperate in sustaining the resource base for their own benefit while also considering the community well-being. Participant 5 recognized how dependent the hotel business was on the continuing health of the islands' water supply and expressed his commitment to stewardship as "the contribution that, as a company, you make to the sustainability of the geographical destination that welcomes and gives shelter to your economic activity." In addition to economic (instrumental) motivation, CWS also is linked to ethical (social responsibility) motivations (Martinez, 2015). Participants consistently expressed concern about water availability beyond the walls of their own business. Participant 5 stressed the importance of "making more water available to the society in which you operate by consuming just what you need, without wasting one cubic meter more." According to hotel documents, managers certify that their hotels' usage does not impact the availability of local supply in accordance with local regulations.

CWS involves collaboration with government and competing water users to allocate water resources equitably. Participants characterized their hotels' participation in local water governance in terms of respecting the current norms, applying policies and measures of environmental sustainability and efficient resources use, and collaborating in the implementation of additional measures that contribute to improving water management. Another way these hotel managers engaged in water governance was through pollution prevention. Managers paid for disposal and treatment of wastewater through an onsite treatment plant and maintained an emergency pollution prevention

plan. Managers also monitored wastewater for pollutants, particularly fecal bacteria. Over the years, unauthorized discharge of raw sewage into the sea caused serious contamination and microalgae blooms in coastal waters, closing beaches and harming the image of the islands as a sun and beach tourism destination (Anscombe, 2018). One such event occurred while I was gathering data for this study in January 2018.

**Municipal water supply.** Historically, water governance in the Canary Islands pitted the interests of the community against water rights holders, a dynamic which continues to this day despite laws defining water as a public good subject to government oversight and planning (Custodio et al., 2016; Gómez-Gotor, Del Río-Gamero, Prieto Prado, & Casañas, 2017). In 1990, the Canary Islands government established water councils for the various islands and allowed public investment in water treatment, desalination, and other technologies (Gomez-Gotor et al., 2017). This legislation led to the development of the first National Hydrological Plan in 2001, which initiated planning to preserve and conserve scarce resources and promote sustainable use of water (Gomez-Gotor et al., 2017). Adoption of the plan enabled expansion of public investment in desalination. Under the Spanish Water Act of 1985, Canary Islands water managers are required to develop water plans every six years. The 1998 plan primarily focused on improving the water infrastructure on the islands. Since joining the European Union, the Canary Islands' water planners also are required to account for depletion of water reserves and wastewater discharges (Custodio et al., 2016). Both the Spanish Water Law and the EU Water Framework Directive (WFD) proposed that groundwater mining be reduced and better environmental conditions be restored.

Custodio et al. (2016) argued that public administration of water in the Canary Islands was weak and allowed private rights holders to sidestep social responsibility. Consistent with Porter's (1980) classic theory of strategy, under this system, rights holders applied intense supplier pressure, affecting costs, prices, and profitability for Canary Islands hotels. Custodio et al. (2016) argued that pricing and incentives actively work against the public good. Furthermore, government efforts to subsidize water prices to offset rising costs have prevented the public from experiencing the full impact of resource depletion and may have offered a false sense of security against water scarcity (Custodio et al., 2016).

**Climate change.** Participants 1 and 5 noted the impact of climate change on the Canary Islands, describing longer summers, heavier rain during the short winters, and more extreme storms. Summer sand storms emanating from the Sahara Desert also occur with greater frequency due to increasing desertification in nearby Africa. Participant 1 predicted that this process would increase water demand for residents, tourists, and farmers. When asked if climate-change induced water scarcity could potentially provoke competition between the sectors for water resources, Participant 5 replied that rather than competing, the hotels and agricultural sector would be inclined to collaborate "since hotels prefer to have a continuous supply of local food products rather than import from outside." To meet this demand, Participant 5 continued, "an increasing number of desalination facilities will be required, causing our coasts to be flooded with these types of industrial facilities, which also cause environmental problems of all kinds."

In summary, hotel managers included in this study promoted corporate water stewardship by making efforts to sustain the resource base to ensure their supply as well as serve the good of the entire community. CWS practices included cooperating with government agencies and other stakeholders to use resources efficiently, reduce pollution, and safeguard the health of public water sources. Private water rights holders continue to exert pressure on hotels, and subsidized pricing masks the actual cost of water supply. Increased pressure from climate change could upset the balance of supply and demand, resulting in increased competition for water supply access and technology.

## Applications to Professional Practice

By studying managers operating hotels in a historically water-stressed tourism region, I was able to highlight how owners, operators, and managers in other hotels might address water scarcity. The four themes emerging from this study offer a roadmap that other hotel leaders can follow to successfully maintain adequate water supplies: (a) value water as a strategic business resource, (b) mitigate the risks of natural resource scarcity, (c) promote water efficiency and conservation, and (d) sustain supply through water stewardship.

Hotel managers should first and foremost value water as an essential business input. In general, the hotel management literature seems to take water supply for granted while devoting the preponderance of the attention to energy. But industry professionals may be overlooking an important source of competitive advantage, which could become more important to business performance. The managers in this study treated water as a strategic business resource and recognized its impact on hotel performance. Water

accounted for nearly 10% of the operating budget at these hotels, significantly above average (AHLA, n.d.). In addition, poor water quality forced managers to incur additional supply costs for secondary treatment.

Given the impact on profitability, these managers prioritized water budgeting and close monitoring of water use to prevent loss through leakage, overuse, and waste. They encouraged demand control in every aspect of operations and engaged guests in water conservation practices. They measured water efficiency and savings against budget and rewarded managers for meeting water management objectives. They also pursued a variety of creative but modest strategies such as cleaning rooms with cloths rather than mops and washing fruits and vegetable in 8-liter buckets of bleached water – ideas that did not appear in the best practices literature. By engaging staff in identifying problems and developing practical, small-scale solutions, these managers were able to create a culture of water efficiency and keep water at the forefront of daily operations. Some studies indicated a weak correlation between water conservation and costs (Deya-Tortella et al., 2017; Razumova et al., 2016). As water supplies decrease and costs rise in many regions of the world, hotel operators may become more motivated to emulate the managers involved in this study.

According to the findings, hotel managers should do more to mitigate the risks of natural resource scarcity by investing in innovative technologies. Participants frequently spoke about the need to have an uninterrupted, guaranteed water supply 24-hours-a-day, seven days a week and described the potential impact of water supply disruption on the business. Reduced services, closure of pools, spas, and other amenities, and turning away

guests are possible scenarios that could negatively impact profitability and guest satisfaction. Bell et al. (2013) remarked that economists typically expect substitution and innovation to offset resource scarcity-based risks.

In this study, desalination and water recovery and recycling were the most prominent innovative substitution strategies. Although desalination technology is highly advanced in the Canary Islands, it is not infallible and cannot easily be applied at the property level, while resource recovery and recycling can. However, one participant in this study said most existing Canarian hotels lack the capacity to generate and use greywater, although newer hotels are developing water recycling techniques. The two larger hotels in this study had onsite water recycling plants to provide greywater mainly for garden irrigation. Based on these findings, hotel managers operating in regions with limited or uncertain water supplies should consider more aggressive investment in water recovery and recycling technology and methods.

Water efficiency and water conservation practices are common in the hotel industry, but a review of the academic and professional literature indicated that no single set of practices would guarantee optimal water supply in every hotel. Differences in size, age, type, occupancy, amenities, location, climate, and many other factors affect overall water usage as well as water efficiency. The managers in this study implemented comprehensive environmental programs with significant efforts devoted to water efficiency and conservation, but these programs did not include all the best practices identified by Styles et al. (2015). For instance, the hotel managers maintained a higher shower flow rate (between 8 and 9 liters per minute) than best practice ($\leq$7 liters per

minute), presumably to avoid customer complaints. And despite the extreme water scarcity conditions in the Canary Islands, only one of the three hotels included in this study achieved frontrunner status in water efficiency for mid-range hotels of ≤140 liters per guest per night. These limitations reflect a continuing challenge for hotel managers concerning water scarcity: to conserve water while providing the luxury experience expected by guests in upscale resort settings.

Hotel managers also favor practices that are low-cost, practical, and cost-saving over those that require greater investment and take time to pay back (Becken & Dolcinar, 2016). Retrofitting fixtures and instituting water recovery systems take time, planning, and resources. Finally, the managers in this study relied on the TraveLife eco-certification standard to help develop their programs. However, as Styles et al. (2015) pointed out, certifications often fail to produce quantitative water efficiency. Therefore, these findings also imply that to achieve optimal water efficiency, hotel managers should look beyond certifications and align with more rigorous standards of excellence, adjusted to their local and hotel type.

Finally, the managers in this study practiced CWS in recognition of their dependence on the health of the local environment and the goodwill of the local community. By adopting policies and practices that helped sustain the resource base, the managers not only helped themselves but also helped support local agriculture and a thriving local population that can participate in the economy. By looking beyond the walls of their own business, other hotel managers can reap the rewards of water stewardship.

## Implications for Social Change

The findings of this study could contribute to social change by illuminating specific steps hotel managers, along with owners, employees, guests, and partners, can take to become better environmental stewards and align their practices with sustainable water governance. Enhanced environmental performance by hotel managers could benefit other businesses, municipal water managers, and the community by making more water available for other uses such as agriculture, commerce, and recreation. By helping sustain the resource base, hotel water stewardship could help preserve resources for future generations.

Operators of hotels and other water-intensive businesses are voluntarily adopting CWS initiatives to limit their impact on local water supplies and align their practices with sustainable water governance. Although study participants said they did not directly engage with municipal water managers at the local level, they characterized their hotels' water stewardship in terms of respecting the current norms, applying policies and measures of environmental sustainability and water efficiency, and contributing to improved water management. The managers said they adopted these practices both for instrumental (sustaining the destination that supports the business's economic activity) and ethical (ensuring water availability beyond the walls of their business by not overusing or wasting water) reasons.

Perhaps most importantly, managers created a culture of water conservation throughout their operations by educating staff and guests and encouraging them to contribute to environmental goals with their own ideas. By demonstrating that good

business practices and corporate social responsibility need not conflict, these managers offered good examples of the benefits of CWS for others to follow.

## Recommendations for Action

The results of this study may lead to a better understanding of water challenges in hotels and broader adoption of benchmarks of excellence by industry leaders, multinational hotel group executives, and hotel managers at all levels. Hotel environmental management is a patchwork of different standards and approaches to water supply management, all of them aiming to save resources, reduce costs, and maintain the supply of high-quality water while preserving water availability for the surrounding community. Unfortunately, not all approaches produce measurable water efficiency at the property level (Styles et al., 2015). Hotel professionals, environmentalists, and academics should come together to establish an empirical benchmark of excellence for water efficiency for hotels at every service level to help standardize best practices and link them more directly with measurable outcomes. Green et al. (2017) argued that the private sector rarely participates in setting deliverable research priorities but could benefit from collaboration with researchers.

After publishing this study, I plan to submit additional articles on the subject in hotel and tourism journals and present the findings at industry and academic conferences. I also plan to participate in efforts to establish a water efficiency benchmark of excellence for hotels at each service level by initiating dialogue with industry contacts and some of the scholars reviewed for this study.

## Recommendations for Further Research

This qualitative multiple case study explored strategies used by hotel managers to successfully maintain water supplies in an arid tourism destination. Future research on hotel water practices in other arid tourism destinations could yield different results. Case study research involves limitations that subsequent researchers could address. The first limitation was related to the choice of hotels. I identified the three hotels for this study with the assistance of a manager at the multinational hotel group; this method of selection may have biased the sample towards the organization's best water supply performers. Because the cases included only one hotel in each service level category (3-star, 4-star, and 5-star), the results are not applicable to the category as a whole. All participants were managers at different units of the same hotel group and therefore were more likely to provide reinforcing rather than contradictory information.

Whether quantitative or qualitative, future researchers could evaluate a more heterogeneous sample including multiple brands and properties in each service-level category. Also, an inherent self-selection bias exists in that these managers were volunteers who might have been eager to talk about their accomplishments on behalf of their employers. Random sampling could allow future researchers to avoid this bias. For this study, I made an effort to encourage candor by ensuring confidentiality and conducting private interviews with each of the participants. However, subordinates might have aligned their comments with what they perceived to be the expectations of senior management. A random, heterogeneous sample could help mitigate this limitation as well.

Most of the environmental documentation available from the hotels was compiled for TraveLife certification. Given the specific requirements of that standard, the documents may not have reflected every water supply strategy used by managers at these hotels. Conducting interviews allowed me to fill gaps, but the managers' tight work schedules and limited availability made it difficult to explore every nuance. Future research that augments interviews with an additional data source (e.g., multiple-day onsite observation) might yield even greater depth and richness of data.

Finally, I conducted the interviews in English, although I spoke Spanish in some cases to encourage elaboration. Because of the internationalism of the Canary Islands, the managers' English proficiency was very good. Nevertheless, I employed a professional translator to review audio-recordings and notes to confirm my interpretation of any statements made in Spanish. Future research conducted in a Spanish-speaking country would benefit from including a native Spanish speaker in initial interviews and member-checking activities to streamline data gathering and interpretation.

The findings raised several questions that might be addressed by future researchers. According to some studies, a weak correlation exists between water costs and efficiency and conservation activities in hotels (Deya-Tortella et al., 2017; Razumova et al. 2016). According to the managers in this study, the high price of water was a strong driver of water supply innovation. Future research might re-examine this issue with the goal of identifying the equilibrium point at which price correlates with increased water efficiency strategies by hotel managers. Research on this topic could be especially

important to municipal water managers and policymakers considering pricing and tariff strategies to reduce demand under conditions of scarcity.

As water availability declines, substitution could become a more important strategy for meeting growing demand. One question that emerged from this study was whether desalination is sustainable as the primary substitution strategy for the Canary Islands and other locations. Seawater desalination technology is used to alleviate water scarcity in dry coastal regions and accounts for more than 80 million cubic meters per day of water production worldwide (Hernández-Sánchez et al., 2017). The field of water desalination is highly advanced in the Canary Island, which has the highest density of desalination plants in the world (Sadhwani Alonso et al., 2015).

Desalination technology is rapidly advancing, and renewable energy integration is on the horizon. However, this technology can fail, it extracts a high financial and environmental cost, and it produces poor quality water. On the other hand, water recovery and recycling is an underdeveloped substitution technology that has not been used extensively in the Canary Islands to date and is rarely used on a global basis outside of the Middle East (Gude, 2017). Future research could explore questions about the limits of desalination to satisfy the changing needs of water-stressed destinations. Additional research also could explore barriers to the development of water recovery and recycling in hotels and the potential of this technology to provide an alternative source of high-quality water to sustain supply at the municipal and property levels.

## Reflections

The Walden University Doctor of Business Administration (DBA) process was extremely challenging. The program required a high level of commitment, discipline, perseverance, and flexibility. I found aligning to the DBA rubric to be an arduous and often frustrating process. Assistance came from many directions, including my chair and other faculty, classmates, colleagues, friends, and Walden's website. In the end, however, emotional resilience and a determination to overcome the challenges presented by this project pushed me across the finish line.

I chose the topic of hotel water supply strategies because it was an area in which I had taught and consulted for more than a decade. The research process opened my eyes to a new world of scholarship and discourse in sustainable hospitality. I discovered a robust and educated conversation going on about water scarcity and hotel water supply that extended far beyond what I knew from working in the industry. Conducting the literature review was particularly helpful for illuminating the underlying business concepts driving resource use in the hotel industry. What I learned caused me to adjust my thinking on several issues and revealed the gap between the day-to-day realities of hotel management and best practices research. Conducting my study internationally expanded my knowledge base, widened my perspective, and increased my professional network. I learned that although conditions on the ground may be different, the problems faced by hotel managers are similar everywhere.

Armed with a more global perspective, I plan to use my research findings to enrich my teaching and expand my consulting practice. The finding could also be a basis

for additional research and a book addressing the issue of water scarcity and hospitality, which has increased in urgency and importance during my five years of research on the topic.

## Conclusion

Business leaders face substantial risks from growing water scarcity (World Economic Forum, 2016). As high-quality water supplies decline, production costs and prices are likely to rise, impacting hotel performance and profitability (Barberán et al., 2013). Interruptions in water supply could threaten service delivery and diminish guest satisfaction. Competition for water with other users could deplete the resource base and endanger community support (Styles et al., 2015). The problem is that some hotel managers lack strategies for maintaining adequate water supplies.

This multiple case study highlighted strategies hotel managers used to successfully maintain water supplies in an arid region. These strategies comprised a roadmap for hotel managers in other locations in which water supplies are limited, uncertain, or where supplies could become scarce in the future due to development, resource depletion, and climate change. The strategies fell under four main themes.

The first theme was valuing water as a strategic business resource. The locally high cost of water and its large impact on operating budgets motivated the managers in this study to treat water as a precious commodity ("as if it were gold"). As a result, managers placed a priority on measuring and monitoring water use, preventing leaks and waste, and reporting water use and savings. Some studies indicated that hotel managers can be price-insensitive when it comes to water (Deya-Tortella et al., 2017; Razumova et

al., 2016). When water resources are abundant and cheap, managers may lack the motivation, planning, systems, and personnel to monitor consumption closely.

The second theme was mitigating the risks of natural resource scarcity. Mitigation involved augmenting supply through outside sources, such as desalination, or adopting substitution technologies, such as water reuse and recycling. In general, industry has relied on costly, environmentally damaging groundwater mining and desalination to meet water supply needs (Gude, 2015). Some of the limitations of this approach were revealed by this study, supporting the case for greater investment in water recycling and reuse by hotel operators.

The third theme involved promoting water efficiency and conservation practices throughout the operation. The hotel managers in this study implemented a wide variety of water efficiency and conservation measures in guest rooms, kitchens, pools, grounds, and public spaces (Appendix B). These measures were typical of the low-cost, practical, and cost-saving measures popular in the hotel industry (Becken & Dolcinar, 2016). The managers also established a culture of water efficiency and made conservation part of every employee's job. However, as is common in the hotel industry, the managers limited water savings by maintaining higher flow rates for showers and hand basins permissible under an industry-based certification program. To optimize water efficiencies, hotel leaders must close the gap between industry standards and benchmarks of excellence in these critical water use areas (Styles et al., 2015).

The fourth and final theme was sustaining supply through CWS. The managers in this study demonstrated a strong commitment to CWS, expressing concern about water

availability beyond the walls of the business. Martinez (2015) illustrated the tendency of corporations to exploit free water access wherever possible and resist collective action to allocate water equitably. The findings of this study showed that managers should consider the consequences of unchecked exploitation of limited resources and voluntarily support sustainable water governance, both to assure a long-term supply and maintain the goodwill of the community.

# References

Alliance for Water Efficiency. (2014, August). *Commercial dishwashing introduction.* Retrieved from http://www.allianceforwaterefficiency.org/commercial_dishwash_intro.aspx

American Hotel and Lodging Association. (n.d.). *Guaranteed ways to reduce your hotel's largest operating costs.* Retrieved from http://www.hoteleffectiveness.com/blog/8-guaranteed-ways-to-reduce-your-hotels-largest-operating-costs/

Anscombe, J. (2018, January). *Government unveils sewage and waste water census after 2017 figures show hundreds of unauthorized discharges into the sea*. Retrieved from https://www.janetanscombe.com/news/sewage-wastewater-discharges-tenerife-coast.html

Anyan, F. (2013). The influence of power shifts in data collection and analysis stages: A focus on qualitative research interview. *The Qualitative Report, 18,* 1-9. Retrieved from http://nsuworks.nova.edu/tqr/vol18/iss18/

Aparicio, J., Candela, L., Alfranca, O., & García-Aróstegui, J. L. (2017). Economic evaluation of small desalination plants from brackish aquifers: Application to Campo de Cartagena (SE Spain). *Desalination, 411,* 38-44. doi:10.1016/j.desal.2017.02.004

Atanasova, N., Dalmau, M., Comas, J., Poch, M., Rodriguez-Roda, I., & Buttiglieri, G. (2017). Optimized MBR for greywater reuse systems in hotel facilities. *Journal of Environmental Management, 193,* 503-511. doi:10.1016/j.jenvman.2017.02.041

Badiuzzaman, P., McLaughlin, E., & Darren McCauley, D. (2017). Substituting freshwater: Can ocean desalination and water recycling capacities substitute for groundwater depletion in California? *Journal of Environmental Management, 20,* 123-135. doi:10.1016/j.jenvman. 2017.06.051

Barberán, R., Egea, P., Gracia-de-Rentería, P., & Salvador, M. (2013). Evaluation of water saving measures in hotels: A Spanish case study. *International Journal of Hospitality Management, 34,* 181-191. doi:10.1016/j.ijhm.2013.02.005

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*, 99-112. doi:10.1177/014920639101700108

Barney, J. (2001). Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view. *Journal of Management, 27*(6), 643-650. doi:10.1177/0149206 30102700602

Baskarada, S. (2014). Qualitative case study guidelines. *The Qualitative Report, 19*(40), 1-18. Retrieved from http://nsuworks.nova.edu/tqr/vol19/iss40/3

Becken, S. (2014). Water equity: Contrasting tourism water use with that of the local community. *Water Resources and Industry, 7,* 9-22. doi:10.1016/j.wri.2014. 09.002

Becken, S., & Dolnicar, S. (2016). Uptake of resource efficiency measures among European small- and medium-sized accommodation and food service providers. *Journal of Hospitality and Tourism Management, 26,* 45–49. doi:10.1016/ j.jhtm.2015.11.001

Becken, S., Garafano, N., McLennan, C. L., Moore, S., Rajan, R., & Watt, M. (2014). *Second white paper on tourism and water: Providing the business case.* Queensland, Australia: Griffith Institute for Tourism Research. Retrieved from https://www.griffith.edu.au/

Bell, J. E., Autry, C. W., Mollenkopf, D. A., & Thornton, L. M. (2012). A natural resource scarcity typology: Theoretical foundations and strategic implications for supply chain management. *Journal of Business Logistics, 33*(2), 158-166. doi:10.1111/j.0000-0000.2012.01048.x

Bell, J. E., Mollenkopf, D. A., & Stolze, H. J. (2013). Natural resource scarcity and the closed-loop supply chain: A resource-advantage view. *International Journal of Physical Distribution & Logistics Management, 43*(5/6), 351-379. doi:10.1108/IJPDLM-03-2012-0092

Berg, S. V. (2016). Seven elements affecting governance and performance in the water sector. *Utilities Policy, 43,* 4-13. doi:10.1016/j.jup.2016.04.013

Bergmann, A., Stechemesser, K., & Guenther, E. (2016). Natural resource dependence theory: Impacts of extreme weather events on organizations. *Journal of Business Research, 69,* 1,361-1,366. doi:10.1016/j.jbusres.2015.10.108

Bjornlund, H., Xu, W., & Wheeler, S. (2014). An overview of water sharing and participation issues for irrigators and their communities in Alberta: Implications for water policy. *Agricultural Water Management, 145,* 171-180. doi:10.1016/j.agwat.2013.09.020

Borland, H., Ambrosini, V., Lindgreen, A., & Vanhamme, J. (2016). Building theory at the intersection of ecological sustainability and strategic management. *Journal of Business Ethics, 135*(2), 293-307. doi:10.1007/s10551-014-2471-6

Božič, V., & Cvelbar, L. K. (2016). Resources and capabilities driving performance in the hotel industry. *Tourism and Hospitality Management, 22*(2), 225-246. doi:10.20867/thm.22.2.8

Bromiley, P., & Rau, D. (2014). Towards a practice-based view of strategy. *Strategic Management Journal, 35*(8), 1,249-1,256. doi:10.1002/smj.2238

Bruns-Smith, A., Choy, V., Chong, H., & Verma, R. (2015). Environmental sustainability in the hospitality industry: Best practices, guest participation, and customer satisfaction. *Cornell Hospitality Reports, 15*(3), 6-16. Retrieved from www.chr.cornell.edu

Carbon Disclosure Project. (2017). *A turning tide: Tracking corporate action on water security,* [CDP Global Water Report 2017]. Retrieved from https://www.cdp.net/ en/research/ global-reports/global-water-report-2017

Carroll, A. B., & Buchholtz, A. K. (2015). Corporate citizenship: Social responsibility, responsiveness, and performance. In J. Shafritz, J. Ott, & Y. Jang (Eds.), *Classics of organization theory* (pp. 439-455). Boston, MA: Cengage Learning.

Casadevall, S. R. (2016). Improving the management of water multi-functionality through stakeholder involvement in decision-making processes. *Utilities Policy, 43,* 71-81. doi:10.1016/j.jup.2016.04.015

CBRE Hotels. (2018, May-June). *Hotel horizons*. Retrieved from https://pip. cbrehotels.com/ publications-data-products/hotel-horizons

Collins, C., & Cooper, J. (2014). Emotional intelligence and the qualitative researcher. *International Journal of Qualitative Methods, 13*(1), 88- 103. doi:10.1177/ 160940691401300134

Custodio, E., del Carmen Cabrera, M., Poncela, R., Cruz-Fuentes, T., Naranjo, G., & Puga de Miguel, L. (2015). Comments on uncertainty in groundwater governance in the volcanic Canary Islands, Spain. *Water, 7,* 2,952-2,970. doi:10.3390/ w7062952

Custodio, E., del Carmen Cabrera, M., Poncela, R., Puga de Miguel, L. O., Skupien, E., & del Villar, A. (2016). Groundwater intensive exploitation and mining in Gran Canaria and Tenerife, Canary Islands, Spain: Hydrogeological, environmental, economic and social aspects. *Science of the Total Environment, 557,* 425-437. doi:10.1016/j.scitotenv.2016.03.038

Da Rosa, F. S., & Silva, L. C. (2017). Environmental sustainability in hotels: Theoretical and methodological contribution. *Revista Brasileira de Pesquisa em Turismo, 11,* 39-60. doi:10.7784/rbtur.v11i1.1161

Damkjaer, S., & Taylor, R. (2017). The measurement of water scarcity: Defining a meaningful indicator. *Ambio, 46*(5), 513–531. doi:10.1007/s13280-017-0912-z

Dasgupta, M. (2015). Exploring the relevance of case study research. *Vision, 19,* 147-160. doi:10.1177/0972262915575661

De Massis, A., & Kotlar, J. (2014). The case study method in family business research: Guidelines for qualitative scholarship. *Journal of Family Business Strategy, 5,* 15-29. doi:10.1016/j.jfbs.2014.01.007

Del Mar Alonso-Almeida, M., Buil-Fabregà, M., Bagur-Femenías, L., & Aznar-Alarcón, J. P. (2017). Shedding light on sustainable development and stakeholder engagement: The role of individual dynamic capabilities. *Sustainable Development, 25,* 1,099-1,719. doi:10. 1002/sd.1682

DeSouza, M. (2016). *Coping with water scarcity in agriculture: A global framework for action in a changing climate* (Job No. 15604E). Retrieved from http://www. fao.org/documents/ card/en/c/8dd680fd-70d3-4725-8d9f-30f9a02455a0

Deya-Tortella, B., Garcia, C., Nilsson, W., & Tiraddo, D. (2017). The effect of the water tariff structures on the water consumption in Mallorcan hotels. *Water Resources Research, 52*(8), 6,386–6,403. doi:10.1002/2016WR018621

Diefenbach, T. (2009). Are case studies more than sophisticated storytelling? Methodological problems of qualitative empirical research mainly based on semi-structured interviews. *Quality & Quantity, 43*(6), 875-894. doi:10.1007/s11135-008-9164-0

Dinarès, M., & Saurí, D. (2015). Water consumption patterns of hotels and their response to droughts and public concerns regarding water conservation: The case of the Barcelona hotel industry during the 2007-2008 episode. *Documents d'anàlisi Geogràfica, 61,* 623-649. doi:10.5565/rev/dag.255

Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K., & Kyngäs, H. (2014). Qualitative content analysis: A focus on trustworthiness. *Sage Open, 4*(1), 2158244014522633. doi:10.1177%2F2158244014522633

Enriquez de la O, J. F. (2015). Resource-based view and dynamic capabilities: Achieving competitive advantage through internal resources and competencies. *Vezetéstudomány/Budapest Management Review, 46*(11), 50-61. Retrieved from http://corvinus-mba.hu/school/research-publications

European Commission, Lifelong Learning Program. (2014). *Green games in tourism & hospitality: State of the art report.* Retrieved from http://greengamesproject.com/learning-resources/state-of-the-art-report

Fitzerald, J., & Auerbach, D. (2016). The political economy of the water footprint: A cross-national analysis of ecologically unequal exchange. *Sustainability, 8*(12), 1,263-1,279. doi:10.3390/su8121263

Food and Agriculture Organization of the United Nations. (2016). *Coping with water scarcity in agriculture: A global framework for action in a changing climate* (Ref. No. 15604E/1/07/16). Retrieved from http://www.fao.org/3/a-i5604e.pdf

Fusch, P. I., & Fusch, G. E. (2015). Leadership and conflict resolution on the production line. *International Journal of Applied Management and Technology, 14*(1), 21-39. doi:10. 5590/IJAMT.2015.14.1.02

Fusch, P. I., & Ness, L. (2015). Are we there yet? Data saturation in qualitative research: *The Qualitative Report, 20,* 1,408-1,416. Retrieved from http://tqr.nova.edu

Gabarda-Mallorquí, A., Garcia, X., & Ribas, A. (2017). Mass tourism and water efficiency in the hotel industry: A case study. *International Journal of Hospitality Management, 61,* 82-93. doi:10.1016/j.ijhm.2016.11.006

Gain, A. K., Giupponi, C., & Wada, Y. (2016). Measuring global water security towards sustainable development goals. *Environmental Research Letters, 11,* 124015. doi:10.1088/1748-9326/11/12/124015

García-Rodríguez, J. L., García-Rodríguez, F. J., & Castilla-Gutiérrez, C. (2016). Human heritage and sustainable development on arid islands: The case of the Eastern Canary Islands. *Island Studies Journal, 11*(1), 113-130. Retrieved from https:// www.island scholar.ca

Gentles, S. J., Charles, C., Ploeg, J., & McKibbon, K. A. (2015). Sampling in qualitative research: Insights from an overview of the methods literature. *The Qualitative Report, 20,* 1,772–1,789. Retrieved from http://nsuworks.nova.edu/

Gómez-Gotor, A. B., Del Río-Gamero, B., & Prieto Prado, I. & Casañas, A. (2017). The history of desalination in the Canary Islands. *Desalination, 428,* 86-107. doi:10. 1016/j.desal. 2017.10.051.

Gössling, S. (2015). New performance indicators for water management in tourism. *Tourism Management, 46,* 233-244. doi:10.1016/j.tourman.2014.06.018

Gössling, S., Peeters, P., Hall, C. M., Ceron, J. P., Dubois, G., & Scott, D. (2012). Tourism and water use: Supply, demand, and security: An international review. *Tourism Management, 33*(1), 1-15. doi:10.1016/j.tourman.2011.03.015

Grant, R. M. (1996). Toward a knowledge□based theory of the firm. *Strategic Management Journal, 17,* 109-122. doi:10.1002/smj.4250171110

Green, J. M. H., Cranston, G. R., Sutherland, W. J., Tranter, H. R., Bell, S. J., Benton, T. G., . . . Vira, B. (2017). Research priorities for managing the impacts and dependencies of business upon food, energy, water and the environment. *Sustainable Science. 12*(2), 319-331. doi:10.1007/s11625-016-0402-4

Greene, M. J. (2014). On the inside looking in: Methodological insights and challenges in conducting qualitative insider research. *The Qualitative Report, 19,* 1-13. Retrieved from http://nsuworks.nova.edu/

Grossoehme, D. H. (2014). Overview of qualitative research. *Journal of Health Care Chaplaincy, 20*(3), 109-122. doi:10.1080/08854726.2014.925660

Guarino, A. S. (2017). The economic implications of global water scarcity. *Research in Economics and Management, 2*(1), 51- 63. doi:10.22158/rem.v2n1p51

Gude, V. G. (2017). Desalination and water reuse to address global water scarcity. *Review of Environmental Science and Biotechnology, 16*(4), 591-609. doi:10. 1007/s11157-017-9449-7

Gutiérrez-Martín, C., Borrego-Marín, M. M., & Berbel, J. (2017). The economic analysis of water use in the Water Framework Directive based on the system of environmental-economic accounting for water: A case study of the Guadalquivir River basin. *Water, 9,* 181-196. doi:10.3390/w9030180

Hancock, D. R., & Algozzine, B. (2017). *Doing case study research: A practical guide for beginning researchers.* (3rd ed.) New York, NY: Teachers College Press.

Harland, T. (2014). Learning about case study methodology to research higher education. *Higher Education Research & Development, 33,* 1,113–1,122. doi:10.1080/07294360.2014. 911253

Harrison, J. S., Freeman, R. E., & de Abreu, M. C. S. (2015). Stakeholder theory as an ethical approach to effective management: Applying the theory to multiple contexts. *Revista Brasileira de Gestão de Negócios, 17,* 858-869. doi:10.7819/rbgn.v17i55.2647

Helfat, C. E., & Peteraf, M. A. (2015). Managerial cognitive capabilities and the microfoundations of dynamic capabilities. *Strategic Management Journal, 36*(6), 831-850. doi:10.1002/smj.2247

Hernández-Sánchez, J. C., Boluda Botella, N., & Sánchez-Lizaso, J. L. (2017). The role of desalination in water management in Southeast Spain. *Desalination and Water Treatment, 76,* 71-76. doi:10.5004/dwt.2017.20657

Hoekstra, A. (2015). The water footprint: The relation between human consumption and water use. In M. Antonelli & F. Greco (Eds.), *The water we eat* (pp. 35-48). Cham, Switzerland: Springer. doi:10.1007/978-3-319-16393-2_3

Horng, J. S., Liu, C. H., Chou, S. F., Tsai, C. Y., & Chung, Y. C. (2017). From innovation to sustainability: Sustainability innovations of eco-friendly hotels in Taiwan. *International Journal of Hospitality Management, 63,* 44-52. doi:10.1016/j.ijhm.2017.02.005

Houghton, C., Casey, D., Shaw, D., & Murphy, K. (2013). Rigour in qualitative case-study research. *Nurse Researcher, 20*(4), 12-17. doi:10.7748/nr2013.03.20.4.12.e326

Hunt, S. D. (2015). *Marketing theory: Foundations, controversy, strategy, and resource-advantage theory.* New York, NY: Routledge.

Hurlimann, A., & Dolnicar, S. (2016). Public acceptance and perceptions of alternative water sources: A comparative study in nine locations. *International Journal of Water Resources Development, 32*(4), 650-673. doi:10.1080/07900627.2016.1143350

Jaeger, W. K., Plantinga, A. J., Chang, H., Dello, K., Grant, G., Hulse, D., . . . Mote, P. (2013). Toward a formal definition of water scarcity in natural-human systems. *Water Resources Research, 49*, 4,506-4,517. doi:10.1002/wrcr.20249

Kasim, A., Dzakiria, H., & Ahmad, R. (2017). Does firm size influence innovative water management responses in the hotel sector? *Advanced Science Letters, 23*(1), 369-372. doi:10.1166/asl.2017.7189

Kasim, A., Gursoy, D., Okumus, F., & Wong, A. (2014). The importance of water management in hotels: A framework for sustainability through innovation. *Journal of Sustainable Tourism, 22*(7), 1,090-1,107. doi:10.1080/09669582.2013.873444

Kummu, M., Guillaume, J. H. A., de Moel, H., Eisner, S., Flörke, M., Porkka, M., . . . Ward, J. (2016). The world's road to water scarcity: Shortage and stress in the 20th century and pathways towards sustainability. *Scientific Reports, 6*(1), 1–16. doi:10.1038/ srep38495

Landrum, B., & Garza, G. (2015). Mending fences: Defining the domains and approaches of quantitative and qualitative research. *Qualitative Psychology, 2*(2), 199-209. doi:10.1037/ qup0000030

Leonidou, L. C., Leonidou, C. N., Fotiadis, T. A., & Zeriti, A. (2013). Resources and capabilities as drivers of hotel environmental marketing strategy: Implications for competitive advantage and performance. *Tourism Management, 35*, 94-110. doi:10.1016/j.tourman. 2012.06.003

Lin, Y. & Wu, L-W. (2014). Exploring the role of dynamic capabilities in firm performance under the resource-based view framework. *Journal of Business Research, 67,* 407-413. doi:10.1016/j.jbusres.2012.12.019.

Lopez-Dicastillo, O., & Belintxon, M. (2014). The challenges of participant observations of cultural encounters within an ethnographic study. *Procedia Social and Behavioral Sciences, 132,* 522-526. doi:10.1016/j.sbspro.2014.04.347

Malterud, K., Siersma1, V. D., & Guassora, A. D. (2016). Sample size in qualitative interview studies: Guided by information power. *Qualitative Health Research, 26,* 1,753-1,760. doi:10.1177/1049732315617444

Marques, R. C., Pinto, F. S., & Miranda, J. (2016). Redrafting water governance: Guiding the way to improve the status quo. *Utilities Policy, 43,* 1-3. doi:10.1016/j.jup. 2016.11.002

Marshall, C., & Rossman, G. B. (2015). *Designing qualitative research* (6th ed.). Thousand Oaks, CA: Sage.

Martinez, F. (2015). A three-dimensional conceptual framework of corporate water responsibility. *Organization & Environment, 28*(2), 137–159. doi:10.1177/ 10860266 14545632

Martínez-Granados, D., & Calatrava, J. (2016). Combining economic policy instruments with desalination to reduce overdraft in the Spanish Alto Guadalentín aquifer. *Water Policy, 19,* 1-7. doi:10.2166/wp.2016.055

Martins, R., Quintal, C., Cruz, L., & Barata, E. (2016). Water affordability issues in developed countries: The relevance of micro approaches. *Utilities Policy, 43,* 117-123. doi:10.1016/ j.jup.2016.04.012

Molina-Azorín, J. F., Tarí, J. J., Pereira-Moliner, J., López-Gamero, M. D., & Pertusa-Ortega, E. M. (2015). The effects of quality and environmental management on competitive advantage: A mixed methods study in the hotel industry. *Tourism Management, 50,* 41-54. doi:10.1016/j.tourman.2015.01.008

Molinos-Senante, M., & Donoso, G. (2016). Water scarcity and affordability in urban water pricing: A case study of Chile. *Utilities Policy, 43,* 107-116. doi:10.1016/ j.jup.2016.04. 014

Moll, S. (2012). Navigating political minefields: Partnerships in organizational case study research. *Work, 43*(1), 5-12. doi:10.3233/WOR-2012-144

Morse, J. M., & Cheek, J. (2014). Making room for qualitatively-driven mixed-method research. *Qualitative Health Research, 24,* 1-5. doi:10.1177/1049732313513656

Morse, J. M., & Coulehan, J. (2015). Maintaining confidentiality in qualitative publications. *Qualitative Health Journal, 25,* 151-152. doi:10.1177/10497323 14563489

Moser, A., & Korstjens, I. (2017). Series: Practical guidance to qualitative research. Part 1: Introduction. *The European Journal of General Practice, 23*(1), 271-273. doi:10.1080/ 13814788.2017.1375093

Nelson, R. R., & Winter, S. G. (2002). Evolutionary theorizing in economics. *The Journal of Economic Perspectives, 16*(2), 23-46. Retrieved from http://www.jstor.org

Oltmann, S. M. (2016). Qualitative interviews: A methodological discussion of the interviewer and respondent contexts. *Qualitative Social Research, 17*(2), Art. 15. Retrieved from http://nbn-resolving.de/urn:nbn:de:0114-fqs1602156

Park, J., Jeong Kim, H., & McCleary, K. W. (2014). The impact of top management's environmental attitudes on hotel companies' environmental management. *Journal of Hospitality & Tourism Research, 38*(1), 95-115. doi:10.1177/109634801 2452666

Patel, T. (2017). Multiparadigmatic studies of culture: Needs, challenges, and recommendations for management scholars. *European Management Review, 14*, 1,740-1,754. doi:10.1111/emre.12089

Peiro-Signes, A., & Segarra-Oña, M. (2017). Looking for determinants of the environmental concern in the hospitality industry. In V. Katsoni, A. Upadhya, & A. Stratigea (Eds.), *Tourism, culture, and heritage in a smart economy* (pp. 173-181). Cham, Switzerland: Springer International AG.

Pinto, A., Afonso, A. S., Santos, A. S., Pimentel-Rodrigues, C., & Rodrigues, F. (2017). Nexus water energy for hotel sector efficiency. *Proceedings of the 8th International Conference on Sustainability in Energy and Buildings.* Turin, Italy: KES International.

Pinto, F. S., & Marques, R. C. (2015). Tariff structures for water and sanitation urban households: A primer. *Water Policy, 17*, 1,108-1,126. doi:10.2166/wp.2015.188

Porter, M. E. (1980). Industry structure and competitive strategy: Keys to profitability. *Financial Analysts Journal*, 30-41. Retrieved from http://www.jstor.org/stable/4478361

Ralston, P. M., Blackhurst, J., Cantor, D. E., & Crum, M. R. (2015). A structure-conduct-performance perspective of how strategic supply chain integration affects firm performance. *Journal of Supply Chain Management, 51*(2), 47-64. doi:10.1111/jscm. 12064

Razumova, M., Rey-Maquieira, J., & Lozano, J. (2016). The role of water tariffs as a determinant of water saving innovations in the hotel sector. *International Journal of Hospitality Management, 52,* 78-86. doi: 10.1016/j.ijhm.2015.09.011

Ridoutt, B., Sanguansri, P., Bonney, L., Crimp, S., Lewis, G., & Lim-Camacho, L. (2016). Climate change adaptation strategy in the food industry: Insights from product carbon and water footprints. *Climate, 4,* 26-40. doi:10.3390/cli4020026

Roberts, E., & Barton, B. (2015). *Feeding ourselves thirsty: How the food sector is managing global water risk.* Boston, MA: Ceres.

Robinson, O. C. (2013). Sampling in interview-based qualitative research: A theoretical and practical guide. *Qualitative Research in Psychology, 11,* 25-41. doi:10. 1080/14780887. 2013.801543

Roy, K., Zvonkovic, A., Goldberg, A., Sharp, E., & LaRossa, R. (2015). Sampling richness and qualitative integrity: Challenges for research with families. *Journal of Marriage and Family, 77*(1), 243-260. doi:10.1111/jomf.12147

Sadhwani Alonso, J. J., Álvarez, L. A, Melián-Martel, N., & Díaz, J. S. (2015). The Canary Islands and its passion for water desalination. *Desalination and Water Treatment, 9,* 2,340-2,350. doi:10.1080/19443994.2014.939862

Salazar, L. A. L. (2017). The resource-based view and the concept of value: The role of emergence in value creation. *Mercados y Negocios, 1*(35), 27-46. Retrieved from http://www.revistascientificas.udg.mx

Savariar, V. (2014). Environmental health monitoring: A pragmatic approach. *International Journal of Waste Resources, 4,* 164-176. doi:10.4303/2252-5211.1000164

Savenije, H. H. G., Hoekstra, A. Y., & Van der Zaag, P. (2014). Evolving water science in the Anthropocene. *Hydrology and Earth System Sciences, 18*(1), 319-332. doi:10.5194/hess-18-319-2014

Sojamo, S. (2015). Unlocking the "prisoner's dilemma" of corporate water stewardship in South Africa: Exploring corporate power and legitimacy of engagement in water management and governance. *Sustainability, 7*(6), 6,893-6,918. doi:10.3390/su7066893

Stake, R. E. (1995). *The art of case study research.* Thousand Oaks, CA: Sage.

Styles, D., Schoenberger, H., & Galvez-Martos, J. L. (2015). Water management in the European hospitality sector: Best practice, performance benchmarks, and improvement potential. *Tourism Management, 46,* 187-202. doi:10.1016/j.tourman.2014.07.005

Tan, S. H., Habibullah, M. S., Tan, S. K., & Choon, S. W. (2017). The impact of the dimensions of environmental performance on firm performance in the travel and tourism industry. *Journal of Environmental Management, 203,* 603-611. doi:10.1016/j.jenvman.2017. 02.029

Taylor, S., Bogdan, R., & DeVault, M. (2015). *Introduction to qualitative research methods: A guidebook and resource*. New York, NY: Wiley & Sons.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), 509-533. Retrieved from http://www.jstor.org/ stable/3088148

Thorne, S. (2016). The status and use value of qualitative research findings: New ways to make sense of qualitative work. In M. Lipscomb (Ed.), *Exploring evidence-based practice: Debates and challenges in nursing* (pp. 151-164). New York, NY: Routledge.

U.S. Department of Health and Human Services, National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. (1979, April 18). *The Belmont report: Ethical principles and guidelines for the protection of human subjects of research.* Retrieved from http://www.hhs.gov/ohrp/humansubjects/ guidance/belmont. html

United Nations Educational, Scientific and Cultural Organization. (2015). *Water for a sustainable world: The United Nations world water development report 2015.* Retrieved from http://unesdoc.unesco.org/images/0023/002318/231823E.pdf

Wells, E. C., Zarger, R. K., Whiteford, L. M., Mihelcic, J. R., Koenig, E. S., & Cairns, M. R. (2016). The impacts of tourism development on perceptions and practices of sustainable wastewater management on the Placencia Peninsula, Belize. *Journal of Cleaner Production, 111,* 430-441. doi:10.1016/j.jclepro.2014.08.050

White, C. (2014). Understanding water scarcity: Definitions and measurements. In Q. R. Grafton, P. Wyrwoll, C. White, & D. Allendes (Eds), *Global water: Issues and insights* (pp. 161-166). Canberry, Australia: ANU Press.

Wohlers, T., Mason, A., Wood, J., & Schmaltz, E. (2014). Tragedy of the commons meets the anti-commons: Water management and conflict on the southern plains of the United States. *Journal of Environmental Assessment Policy & Management, 16*(1), 1-20. doi:10.1142/S1464333214500057

World Economic Forum. (2015). *Global risks 2015* (10th ed.). Retrieved from http://www3. weforum.org/docs/WEF_Global_Risks_2015_Report15.pdf

World Economic Forum. (2016). *Global risks report 2016.* Retrieved from http://reports. weforum.org/global-risks-2016/

World Tourism Organization. (2016). *UNTWO tourism highlights 2016 edition.* Retrieved from http://mkt.unwto.org/publication/unwto-tourism-highlights-2016-edition

Yazan, B. (2015). Three approaches to case study methods in education: Yin, Merriam, and Stake. *The Qualitative Report, 20*(2), 134-152. Retrieved from http://nsuworks.nova.edu/

Yin, R. K. (2015). *Qualitative research from start to finish* (2nd ed.). New York, NY: Guilford.

Yin, R. K. (2017). *Case study research: Designs and methods* (6th ed.). Thousand Oaks, CA: Sage.

Zhang, J. J., Joglekar, N., Heineke, J., & Verma, R. (2014). Eco-efficiency of service co-production: Connecting eco-certifications and resource efficiency in U.S. hotels. *Cornell Hospitality Quarterly, 55,* 252-264. doi:10.1177/19389655Insert

Zheng, R. S., Guo, Q. H., Dong, F. Q., & Owens, R. G. (2015). Chinese oncology nurses' experience on caring for dying patients who are on their final days: A qualitative study. *International Journal of Nursing Studies, 52*(1), 288-296. doi:10.1016/j. ijnurstu.2014.09. 009

# Appendix A: Interview Protocol

| | |
|---|---|
| 1. Introductions | Introduce myself and explain the purpose of the study. Ask the participant to introduce himself and describe his role in the hotel. |
| 2. Review consent form | The subject will receive the consent form via email prior to the interview and indicate consent by replying to the email. However, before beginning the interview, I will review the consent form with the participant and answer any questions or address any concerns. |
| 3. Audio recording | Ask permission to record the interview and turn on the recording device. |
| 4. Interview | Begin the interview with Question 1 and follow through to the final question:<br><br>Q1. What strategies do you use to maintain adequate water supplies at your hotel?<br><br>Q2. What are some of the challenges related to strategies for maintaining adequate water supplies?<br><br>Q3. How have you addressed the challenges in maintaining adequate water supplies at your hotel?<br><br>Q4. Which of your strategies do you think are most effective for maintaining water supplies at your hotel?<br><br>Q5. What challenges did you face working with local communities to implement these strategies?<br><br>Q6. Where did you receive technical support or knowledge needed to implement these strategies?<br><br>Q7. What else can you tell me about the hotel's water supply assurance strategies? |
| 5. Follow up questions | Ask follow up questions to clarify or expand responses. |
| 6. Documentation | Request any documents related to the interview questions. |
| 7. End interview sequence | Discuss member checking interview and schedule a date to follow up. |
| 8. Invite follow up questions | Provide contact information for participant follow up questions and concerns. |
| 9. Thank participant | Thank participant for contribution to the study. |

# Appendix B: Detailed Water Use and Conservation Data

Table B1

*Water Consumption in Studied Hotels (2016)*

| | Hotel A (3-star) | Hotel B (4-star) | Hotel C (5-star) |
|---|---|---|---|
| Total Number of Rooms | 200 | 1136 (116 suites) | 561 (40 suites) |
| Total Number of Stays | 133 | 789 | 376 |
| Total Annual Consumption | 31,000 L | 90,000 L | 116,000 L |
| Average Monthly Consumption | 2,546 L | 7,428 L | 9,638 L |
| Average Water Use/Guest/ Night | 231 L | 111 L | 309 L |
| Water Savings (Used vs. Budgeted) | 109 L | 839L | 186L |

*Note*. Source: Water use reports from studied hotels.

Table B2

*Managers' Water Supply Strategies for Three Hotels in the Canary Islands (2016)*

| Category | Description of Strategies (based on TraveLife Certification Standard) | Hotel A (3-star) | Hotel B (4-star) | Hotel C (5-star) |
|---|---|---|---|---|
| Planning | Water is budgeted annually | Yes | Yes | Yes |
| | Variances are addressed as they occur. | Yes | Yes | Yes |
| Measurement | Water use measured in cubic meters and per guest per night. | Yes | Yes | Yes |
| | Measurement is taken daily, registered monthly; | Yes | Yes | Yes |
| | Use is compared y-o-y | Yes | Yes | Yes |
| | Leaks and inefficiencies are addressed promptly | Yes | Yes | Yes |
| | Quality is checked daily | Yes | Yes | Yes |

Table B2

*Managers' Water Supply Strategies for Three Hotels in the Canary Islands (2016)* (cont.)

| Category | Description of Strategies (based on TraveLife Certification Standard) | Hotel A (3-star) | Hotel B (4-star) | Hotel C (5-star) |
|---|---|---|---|---|
| Fixtures | Toilets at no more than 6.15 L /flush | Toilets: Dual flush, 3L + 6L per flush | Toilets: 6.15L per flush | Toilets: Dual flush, 3L + 6L per flush |
| | Urinals at no more than 2 liters per flush | Urinals 1.8L per flush | Urinals: 1.9L per flush | Urinals: 1.9L per flush |
| | Showers at more than 10 liters per minute | Showers: 8L per min, no baths | Showers: 9L per min, no baths | Showers: 8L per min, some baths |
| | Hand basins at nor more than 5 liters per minute | Hand basins: 5L per min | Hand basins: 5L per min | Hand basins: >5L per min |
| | Sink aerators fully replaced | Yes | No - in process of changing | No - in process of changing |
| Laundry | Opt-in linen reuse program maximum of three nights (two changes per week) | Yes | Yes | Yes |
| | Offsite towel and linen service | Yes | Yes | Yes |
| | Onsite washing machines for mops, rags, uniforms, and blankets; | Yes | Yes | Yes |
| Housekeeping | Water efficient cleaning methods | Rooms are cleaned with cloths, no mops; public areas cleaned with water efficient equipment. | NA | Special mop only requires 2L of water; use greywater when possible; public areas cleaned with water efficient equipment. |
| Leak Prevention | Technical services department checks all pipes and equipment for leaks and for efficient functioning through segregated metering. | Yes | Yes | Yes |

Table B2

*Managers' Water Supply Strategies for Three Hotels in the Canary Islands (2016)* (cont.)

| Category | Description of Strategies (based on TraveLife Certification Standard) | Hotel A (3-star) | Hotel B (4-star) | Hotel C (5-star) |
|---|---|---|---|---|
| Pools | Swimming pools have salt ionizing systems; | Yes | Yes - 2 pools | Yes |
| | Filters are backwashed when the pressure reaches 1.5 bars. | Yes | Yes | No - 1.6 bars |
| | Natural filtration system; | No | Yes – Diatom Earth filtration System | No - Sand filtration system; changing to more efficient in future |
| Building Systems | Pumps, cooling systems, air-conditioning, and refrigeration systems are maintained and serviced by external companies in accordance with manufacturer's guidelines and Spanish law; | Yes | Yes | Yes |
| | Solar hot water array services entire hotel | Yes | Yes | Yes |
| Grounds keeping | Cultivate indigenous plants in the garden; | Yes - Very small garden | Yes - very large garden | Yes - moderate sized garden |
| | Use drip and microspray irrigation with timing device per zone | Yes - Drip irrigation only | Yes | Yes |
| | Onsite water treatment plan recycles and treats water from baths, showers, and hand basins for irrigation | No | Yes | Yes |
| Kitchen | Aerators on taps | Yes | Yes | Yes |
| | Pedal controlled taps | Yes | Yes | No |
| | Water-efficient dishwashing | Yes | Yes | Yes |
| | Water-efficient food preparation practices | No boiling or simmering food; 8L of bleach-water to clean vegetables; thaw food in the refrigerator | NA | NA |

Table B2

*Managers' Water Supply Strategies for Three Hotels in the Canary Islands (2016)* (cont.)

| Category | Description of Strategies (based on TraveLife Certification Standard) | Hotel A (3-star) | Hotel B (4-star) | Hotel C (5-star) |
|---|---|---|---|---|
| Staff and Guest Education | New employee training, weekly departmental meetings, and annual environmental training | Yes | Yes | Yes |
| | Notices on bulletin boards and employee intranet. | Yes | Yes | Yes |
| | Sustainability leaflets in guest rooms, on in-house TV, and interactive lobby display. | Yes | Yes | Yes |
| Wastewater | The hotel pays for disposal and treatment; | Yes | Yes | Yes |
| | Carries out own analysis of wastewater; | Yes | Yes | Yes |
| | Monitored by local authorities; | Yes | Yes | Yes |
| | Environmental plan in place to prevent pollution in the event of an environmental emergency | Yes | Yes | Yes |
| Local Impact | Draw from the main municipal water supply | Yes | Yes | Yes |
| | Certified that hotel use does not impact local availability | Yes | Yes | Yes |

*Note.* Adapted from water use reports of studied hotels and participant interviews.