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The Role of Internet of Things in Hotels' Profitability

Gershwin Narraidoo
Walden University

Walden University

College of Management and Technology

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Gershwin Narraidoo

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Dr. Susan Fan, Committee Member, Doctor of Business Administration Faculty

Dr. Patsy Kasen, University Reviewer, Doctor of Business Administration Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2020

Abstract

The Role of Internet of Things on Hotels' Profitability

by

Gershwin Narraidoo

MBA, Walden University, 2011

BA, Bournemouth University, 2002

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

June 2020

Abstract

As consumers increase the use of smart technologies, the lack of or improper

implementation of Internet of Things (IoT) systems may affect the profitability of hotel

businesses. For this qualitative single case study, Porter's value chain model was the

conceptual framework. The data collection process also included direct observations,

participant observations, company performance documents, and reflective journaling.

Data analysis from multiple sources of data was triangulated to hoteliers revealing that

the implementation of IoT systems strategies may increase profit through the use of IoT

system technology. Using Yin's 5-step process, data were coded and analyzed and

produced 3 themes: offer end-to-end guest experiences through innovation, eliminate the

need for transactional activity, and unlock free time for meaningful human-only work. As

such, in terms of increasing profit and enhancing customer value proposition, a key

recommendation is for hoteliers to align their IoT system strategy with the three

identified themes from this study to increase profit. As a result of IoT system strategy

success in hotels, findings may contribute to positive social change through the

development of new hotels and job creation in new geographical areas, which will

ultimately contribute to the socioeconomic growth of local communities.

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Dedication

I am grateful to Christ, as I felt his presence during all the good and challenging times, and I am grateful for his continuous blessing in my life. I also dedicate this doctoral study to my doctoral chair, Dr. Gene Fusch, who is an exceptional educator and who always went above and beyond to guide me to become a better independent scholar. I also thank my dear friend and colleague, Dr. Lisa Smith, who was my mentor during my journey to complete this degree. To my daughter, Zoe, and son Gabriel, this is for you to know that everything is possible through hard work and discipline. To my wife, Dolly, thank you for being the love of my life, supporting and understanding me during my long hours in front of the computer, and away from the family. To my mother, Lise in Mauritius, and mother-in-law Milly I thank you for your continuous support and prayers.

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I would like to acknowledge my Dr. Gene Fusch, Chair, Dr. Susan Fan, second committee member, and Dr. Patsy Kasen, URR, as well as the team from the writing center at Walden University for their continuous timely advice, support and guidance to be where I am today. I also thank members of my professional network who guided me on selecting this research topic. A special thank you to Johnson and Wales University for the financial support to complete this degree.

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Section 1: Foundation of the Study

With the fourth industrial revolution, using information technology (IT) to improve financial performance and competitive advantage is no longer just about using computers (Christensen, Bartman & van Bever, 2016). As Witkowski (2017) argued, business leaders who use emerging IT trends like artificial intelligence (AI), the Internet of Things (IoT), cloud computing, and big data capabilities for competitive advantage could enhance their business performance with improved financial performance and value creation. However, within the literature about IoT systems in the hospitality industry from 2016 through 2020, there was a gap concerning studies about the role of emerging trends like the IoT on hotel business performance.

Unlike other sectors, the hospitality industry was slow to adopt emerging IT trends like IoT systems within their value chain of activities (Pizam, 2017). Pizam (2017) said the benefits from using IoT system strategies in hotels, theme parks, and cruise liners could significantly improve decision-making in terms of cost-efficiency, supply chain management (SCM), and customer relationship management (CRM). Therefore, by exploring strategies hoteliers used to develop and implement IoT systems to increase profit, future scholars and practitioners may benefit from understanding how emerging IT trends like the IoT might impact hotel strategies in the fourth industrial revolution.

Background of the Problem

The term IoT is relatively new, and yet it has the potential to disrupt socioeconomic life. The National Science Board (2018) forecasted a significant increase in the use of IoT devices in several industries like healthcare, public transportation,

banking, security, agriculture, and the service industry. In 2009 post the invention of the Internet while human keyed most of the data we currently have online, Practitioners and scholars alike started to use the term IoT for everyday devices connected through sensors and the nternet which performed tasks and exchanged real-time data (Radoglou Grammatikis, Sarigiannidis, Moscholios, 201. As a result of IoT strategies, business decisions would improve because managers of data would have the option of relying on artificial intelligence to complete tasks and make decisions with little to zero human interventions. In the hospitality industry, while large corporations like Disney and Royal Caribbean Cruises are already implementing IoT devices like unique internet-enabled wrist bands to allow guests to gain control of devices during their stay, others like Hilton Worldwide and Mariott are actively researching their own IoT systems (Pizam, 2017). As such, exploring the role of the IoT in hotel businesses may help the hotel industry as well as the community. While the IoT could affect enterprises positively with economic benefits (Lee, 2016, there may be a possibility of improvements in the social lives of individuals as well (National Science Board, 2018). Thus, my central research was to explore the IoT strategies which hoteliers used to increase profit.

Problem Statement

As consumers increase the use of smart technologies, hoteliers are looking for ways to use smart technologies like the IoT to improve the value proposition for their guests (Buhalis & Leung, 2018; Wu & Cheng, 2018. In a random study of 595 guests at U.S. hotels, Beldona, Schwartz, and Zhang (2018) found that 96% of guests at U.S. hotels expected smart technologies in their rooms to be better than technologies they had

at home. The general business problem was the lack of or improper implementation of IoT systems may affect the profitability of hotel businesses. The specific business problem was that some hoteliers lack strategies to develop and implement IoT systems to increase profit.

Purpose Statement

The purpose of this qualitative single case study was to explore the strategies hoteliers use to develop and implement IoT systems to increase profit. The targeted population consisted of leaders who have developed and successfully implemented IoT system implementation strategies within their business activities in a hotel located in the eastern United States. The implications for positive social change include the potential to understand IoT system development and implementation strategies in increasing profit, thus increasing predilection for the sustainability of hotel businesses. Consequently, the findings from the study could lead to sustainable socioeconomic growth for regions where the hotel industry is a major contributor of employment in local communities.

Nature of the Study

To explore IoT strategies used by hoteliers to increase profit, I used a qualitative research method instead of a quantitative or mixed method to gain rich and in-depth data through open-ended questions. The qualitative research method was most suitable to explore new concepts and acquire new insights while gaining an exhaustive comprehension of a phenomenon through open-ended questions (Anderson, 2010; Denzin, 2009; Marshall & Rossman, 2016). In contrast if the purpose of the research is to test hypotheses for examining variables' relationships through close-ended questions, a

quantitative research method is most appropriate (Russell et al., 2016). Mixed methods combines both the quantitative and qualitative methods (Pluye, Bengoechea, Granikov, Kaur, & Tang, 2018). Since I did not test hypotheses for examining variables' relationships, which is part of both quantitative and mixed methods research, the qualitative research method was most appropriate.

For a qualitative study on IoT strategies used by hoteliers, I considered using ethnography, phenomenology, or the case study design. To identify intangible cultural factors such as beliefs, feelings, relationships, perspectives, and emotions which are challenging to quantify, an ethnographic design would be appropriate (Fields & Kafai, 2009; Yazan, 2015). In contrast, as Giorgi (2009, 2012) and Moustakas (1994) stated, A phenomenological research design is useful in identifying and exploring participants' profound life experiences. Despite the benefits of ethnography and phenomenological research designs, Chicoine (2018) identified potential drawbacks from phenomenological research as researcher bias, time, cost, and challenges to reach data saturation. Because a case study design is bounded by space and time (Andrade, 2009; Baxter & Jack, 2008; Yin, 2018) and typically enables the researcher to reach data saturation through triangulation (Stake, 2010), the case study design was appropriate for addressing my study's purpose. For the purpose of exploring strategies which hoteliers used to develop and implement IoT systems to increase profit, I used a single case study design.

Research Question

What strategies do hoteliers use to develop and implement IoT systems to increase profit?

Interview Questions

1. How did the implementation of smart technologies like IoT systems improve overall hotel operations in terms of primary activities?

2. What IoT systems development and implementation strategies are you using in your hotel operations to increase profit?

3. What IoT systems development and implementation strategies are most effective in increasing value for your hotel guests?

4. How do you assess the effectiveness of your IoT systems development and implementation strategies within your primary business activities to achieve increased profits?

5. What impacts are you seeing from implementing the IoT in your primary hotel activities?

6. What additional information would you like to share about your organization's strategies for developing and implementing IoT systems to increase hotel profits?

Conceptual Framework

The value chain model was the conceptual framework of my study. In 1985, as Michael Porter completed his research on competitive advantage, he noted that organizations could compete on mainly two primary strategies which are through (a)cost leadership, and (b) product differentiation (Prasad & Warrier, 2016). Porter (1985, 1991) as well as Koc and Bozdag (2017) noted the creation of value across an organization's chain of activities is significant for developing strategies for achieving competitive

advantage. In an empirical study between 2013-2016 about strategies adopted by North American hoteliers, Sun, Law, and Schuckert (2018) found Porter's value chain theory to be the most applicable strategy implementation model to the hotel industry because of the interactions of guests and employees creating value. As such, Porter's value chain was a useful framework to identify and explore the role of technology like the implementation and development of IoT systems strategies to increase profit. Critical constructs of Porter's value chain framework consist of five primary activities needed to produce goods and services as well as four supporting activities businesses which facilitate the business operation. Porter (1985) stated, the primary activities related to producing, selling, and providing customer support for goods and services are: "(a) inbound logistics, (b) operations, (c) outbound logistics, (d) marketing and sales, (e) service. The support activities are: (a) procurement, (b) human resources management, (c) technological development, (d) infrastructure" p. 37). Porter argued that if leaders of organizations increased technological development across their value chain of activities, firms would experience growth, increase, profit and achieve and sustain a competitive advantage. As applied to my study the value chain model held that I expected the propositions advanced by the conceptual framework to align with *how hoteliers developed and implemented IoT systems in their business activities* to increase profit.

Operational Definitions

Competitive advantage: Competitive advantage refers to the leverage which companies have over competitors as results of low cost or product differentiation strategies leading to unique value propositions in the marketplace (Porter, 1985, 1991).

Disruptive Innovation: Disruptive Innovation denotes innovation resulting from a new business model or technology disrupting existing organizations in the market place as a result of creating new value for an untapped market (Christensen & Euchner, 2015).

Hoteliers: Hoteliers insinuates executive managers and owners who have a leadership role in making decision pertaining to the operation and execution of strategies in the hotel business (Mitchell, Font & Li, 2015).

Internet of Things (IoT): IoT signifies Devices connected through sensors and the internet which performed tasks and exchange real-time data (Radoglou, Grammatikis, Sarigiannidis, & Moscholios, 2019).

Primary activities: Primary activities refer to undertakings used to produce goods and services consisting of "(a) inbound logistics, (b) operations, (c) outbound logistics, (d) service as well as sales and marketing" (Porter, 1985, p.37).

Smart technology: Smart technology denotes technology derived from the concept of IoT, enabling devices to make decisions regarding activities based on virtual programming from the Internet (Lyapina, Sotnikova, Lebedeva, Makarova, & Skvortsova, 2019).

Value chain: Value chain means activities undertaken by an organization using internal and external resources to create new value for customers (Porter, 1985).

Assumptions, Limitations, and Delimitations

Assumptions

During the research process, irrespective of the methodology used, researchers make suppositions based on facts assumed to be accurate, resulting in an element of risk

(Fan, 2013; Wolgemuth, Hicks & Agosto, 2017). To ensure research quality, Wolgemuth et al. (2017) argued that researchers must mitigate risks from assumptions by explaining inclusion and exclusion decisions as well as their impacts on findings. In the endeavor to explore the role of the IoT in the hospitality industry, I made three assumptions. My initial assumption was that the critical construct synthesis (CCS) of Porter's value chain model was valid and appropriate based on similar assumptions made by Porter in 1985 concerning the applicability of the model and its constructs in a similar time of economic and political stability. Because in most qualitative case studies researchers select a small sample bounded by space and time to gather rich and in-depth data (Merriam, 1998; Stake, 2010), a second assumption was to use purposeful sampling. Purposeful sampling of specific hotels who did use IoT led to rich and in-depth data for the study in comparison to those hotels which were yet to do so. The third assumption was that participants in the study provided truthful data during interviews and member checking of transcribed data.

Limitations

While the objective of the qualitative researcher is to collect and report findings through various methods of data collection leading to triangulation, often external elements beyond the control of the researcher limited positive outcomes of the study. Consequently, as Brutus, Aguinis, and Wassmer (2013) posited, researchers should address limitations of the study to mitigate the impact of weaknesses, thereby improving the potential for others to transfer findings. I left a trail of evidence through journaling after direct observations, interview transcripts, and documentation to let the reader and

future researchers determine the level of transferability. A primary limitation was the novelty aspect of the IoT in the hospitality industry in comparison to other industries like manufacturing and retail where business leaders prove the significance of using the IoT in their strategies (Pizam, 2017). Hence, the few hoteliers who use smart technology in their business model might not be experienced enough on the topic to respond to the interview questions appropriately; causing response bias (Carnes et al., 2015). A second limitation of the study was limited access to financial documentation as a data collection method. Because not all hotel organizations were willing to share details of their current financial metrics as a result of implementation of IoT strategies, it created weaknesses in findings. However, I observed samples of IoT systems offerings and implementation related to the hotel marketing of smart technology to their target market. A third limitation was the inability to generalize research findings because of the qualitative research methodology (Fusch & Ness, 2015). To reduce the limitation from lack of generalization, I used multiple data collection methods left a trail of evidence and used methodological triangulation to let the reader determine transferability.

Delimitations

The context of the study defined the boundaries of the research process. Baxter and Jack (2008) argued that the benefit of using a qualitative case study is that it is bounded by space and time. As it pertained to this study, because of time and financial constraints, selection of participants was limited to a single site location in the Eastern U.S only. This delimitation had the potential to limit the applicability of the findings

concerning strategy adaptation to other hotels located outside this geographical area and the selected hotel, which was my study focus.

Significance of the Study

In the hotel industry, hoteliers continually strive to improve their value chain to increase profit, sustain growth, and achieve competitive advantage. As the applicability of IoT increases in business activities, Lee (2016) as well as Leminen, Rajahonka, Westerlund, and Wendelin (2018) argued that business owners were to integrate IoT strategy into their business practice to increase their margin and remain competitive. Additionally, while Shinn, Nakatani, and Rodriguez (2017) noted the implementation of IoT to increase value across the chain of activities in a business; Yan, Jin, Liu, and Liu (2018) found the potential to improve profit using IoT strategies across the supply chain by lowering cost or differentiating the products From a hotelier perspective where the primary objective is to create a unique guest experience and the concern is to optimize profitability, implementation IoT strategies could improve customer loyalty, thereby creating competitive advantage. Therefore, completing this study was significant to business practice, as findings from the study might include a practical model for hoteliers to understand why IoT strategies are effective in increasing profits.

The implications for positive social change in this study include the potential for business leaders to identify IoT strategies which lead to increase profit, while also growing sustainability of hotel businesses. Pavlou (2018) noted that IoT in the industry and everyday life could improve performance and quality of life. In a study of the socioeconomic contribution of a hotel in Turkey, Mitchell et al. (2015) argued that aside

from creating employment in the local area, if a hotel was financially successful in the long run hoteliers could afford to increase employee benefits as well as contribute to the socioeconomic needs of communities.). For instance, through the use of smart technologies like the IoT, hotel organizations could become financially successful, thereby enabling them to sustain and increase local employment for the local communities as result of growth and new employment opportunities.

A Review of the Professional and Academic Literature

Critical analysis of the literature review is essential to provide context and purpose of research. Marshall & Rossman (2016) stated a necessary study of current literature was crucial to give substance to the research problem concerning rationality and boundaries of existing research. Additionally, Guarnieri, Sobreiro, Nagano, and Serrano (2015) noted an exhaustive literature review to be a significant element to show reliability and purpose to the targeted audience of the study The objective of this literature review was to provide a preliminary setting and conceptual framework to the phenomenon under study that I titled *The Role of Internet of Things on Hotel's Profitability.* The research question to the problem was: What IoT strategies do hoteliers implement to increase profit? The objective of this study was to enable hoteliers to benefit from previously inaccessible IoT strategies to increase profit, thereby also creating competitive advantages.

his literature review begins with Porter's value chain model as the conceptual framework. After the conceptual framework and historical contributions regarding Porter's value chain framework, the literature review will explain: (a) alternative

concepts and theories related to increasing profit as well as competitive advantage through IT systems like the IoT, and (b) a review of other hotel systems strategies studies, explaining the choice of Porter's value chain model as a framework for this study.

To support this study with credible prior research and justify the selection of the appropriate conceptual framework, I reviewed peer-reviewed articles, books, and primary research from governmental sources. Of the 194 sources I reviewed, 167 (86%) were peer-reviewed, of which 97 had publication dates between 2016 and 2019. keywords and phrases used were *impact of strategy*, *big data capability*, *cloud computing*, *AI*, *strategy implementation*, *evaluation of strategy*, *competitive advantage*, *IoT technology*, *marketing strategy*, *brand management*, *value chain*, and *hotel industry*. To conduct my search, I used Academic Search Complete, Business Source Complete, Directory of Open Access Journals, Emerald Insight, Hospitality & Tourism Complete, and Science Direct.

Porter's Value Chain Framework
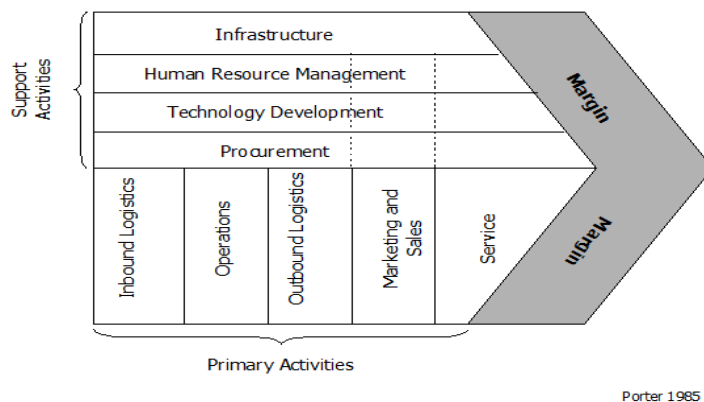
Porter 1985

Figure 1. A Generic value chain representing one company. From Competitive Advantage: Creating and Sustaining Superior Performance (p. 37), by M. Porter, 1985, New York, NY: The Free Press.

Michael Porter established the value chain model as a strategical conceptual framework for business leaders to increase value. To facilitate competitive advantage strategies through cost leadership or product differentiation, Porter focused on the creation of value across an organization's chain of primary and supporting activities. For business leaders aiming for sustainable competitive advantage (see Figure 1), Porter (1985) noted leaders had to optimize the value generated from primary activities such as "(a) inbound logistics, (b) operations, (c) outbound logistics, (d) marketing and sales, (e) service in relation to supporting activities like (a) procurement, (b) human resources management, (c) technological development, (d) infrastructure" (p. 37). Porter's value chain model was a useful framework for business leaders to create value for products and services after they changed business inputs into outputs to create margin (profit) across the SCM.

While the primary activities related to the conception of products and services, to sales, maintenance, as well as customer support, the supporting activities were dynamic to the entire value chain model. As illustrated in table 1, Porter (1985) further explained the key constructs of primary and supporting activities as follows:

Table 1

A Sample Table Showing Porter's Value Chain Model Key Constructs

	Inbound logistics	Operations	Outbound logistics	Marketing and sales	Service
Primary activities influencing value creation	Receiving, storing and distribution processes	Changes in business inputs into outputs for customers	Storage and distribution of products or services to customers	Differentiation through effective communication Knowledge management Customer relationship management (CRM)	Customer relationship Post-sale service
	Infrastructure	Human resource management	Technology	Procurement	
Supporting activities	Support systems for daily operations	Support systems for managing the value of people involved in the business organization	Technology and IT support of all primary activities	Ability to find vendors and obtain necessary resources for business operation and management	

From Table 1, it is evident that business decision-makers have opportunities to create value with the various primary activities through supporting activities related to changing business inputs into unique products and services sold for a margin. While Porter (1985) posited that value creation was possible as a result of a series of primary and supporting activities, Christensen and Euchner (2015) expanded on Porter's philosophy of competitive advantage through the creation of the unique business model. Additionally, Prasad and Warrier (2016) found that business leaders use Porter's value

chain model to implement effective strategies to (a) manage cost, (b) create value for customers, (c) increase profitability, and (d) sustain competitive advantage. As such, when leaders understand the dynamics between the drivers of cost and the different value-creating factors of business activities, they can implement effective strategies that increase profit and competitive advantage (Grace, Leverty, Phillips, & Shimpi, 2015; Diener & Lüttgens, 2016). Therefore, as illustrated in table 1, through the dynamic interaction of supporting activities with primary activities in the SCM, business leaders might optimize cost efficiency and value creation.

My research question related to the IoT systems strategies hoteliers used to increase profit. In the context of the circular economy and the fourth industrial revolution, several researchers (e.g. Garido-Hidalgo, Olivares, Ramirez & Roda-Sanchez, 2019; Padma & Ahn, 2020; Schuckerta, Liang, Law & Sun, 2019) found that IoT systems and big data analytics capabilities were critical to the SCM of several industries. Concerning the use of IoT systems for competitive advantage, Nagy, Olah, Erdei, Mate, and Popp (2018) found that organizations had an edge in terms of speed and accuracy of data shared with critical parties within the business model, enabling smarter decision making for success. Consequently, business leaders could use IoT systems strategies within their business model to improve decision making in terms of value creation which leads to enhanced financial performance and competitive advantage.

To optimize value and increase profitability from primary and supporting activities in hotels, hoteliers could use a conceptual framework like Porter's value chain model to make real-time decisions through the use of IoT systems. Porter (1985) said the

creation of value across an organization's chain of activities was significant to increase profitability and competitive advantage, in the context of exploring IoT systems strategies which hoteliers implement to increase profit, Porter's value chain model was a feasible conceptual framework.

Porter Value Chain Model in Research

The successful applicability of the value chain model to implement business strategies leads to versatility for several sectors of the economy. When Porter's value chain model first originated in the mid-80s, it was prevalent in the manufacturing industry, and later implemented in various types of firms from different sectors of the economy to implement generic strategies like cost leadership, product differentiation, and focus strategies (Choi, 2001; Sun et al., 2018; Viltard, 2017). Hines and Rich (1997) derived the seven value-stream mapping model from Porter's value chain model to identify and mitigate the waste of valuable resources across the SCM system, practitioners advocated the simultaneous use of lean management system to optimize value and cost-efficiency.

However, with the advancement in technology, globalization, and emerging trends in IT, the types of primary and supporting activities performed by firms have evolved since the conception of the value chain model. Viltard (2017) said that improving operational efficiency alone does not lead to a competitive advantage. Moreover, Carr (2003) argued that investment in IT to improve cost efficiency does not lead to a competitive advantage. The size of the firm, industry, and competitive forces are critical

criteria that business leaders use in selecting strategies to improve firms' performance and sustain competitive advantage.

Value creation is possible when leaders use unique business models to deliver value different from competitors. As such, Viltard's (2017) argument on the suitability of cost leadership and product differentiation strategies to large business organizations only, and the applicability of focus strategies to smaller firm mainly is valid. Carr (2003) is debatable, as Christensen, Bartman, and van Bever (2016) explained that business leaders are more likely to create sustainable competitive value when the use of IT was in alignment with the business purpose. For instance, one could argue about the success of companies like FedEx and DHL, who capitalized on constantly improving IT within their value chain model to improve customer service and efficient delivery of products (Ulmer & Streng, 2019). Consequently, because of the significant changes in the dynamics of the business world, both scholars and practitioners should view the effectiveness of Porter's value chain model with a flexible approach.

Such a flexible approach to using Porter's value chain model beyond the manufacturing industry and for lean management strategies happened in the early 2000s in the service industry. In a study of five luxury hotels located in Korea, Choi (2001) argued that Porter's value chain model applied to the service industry. Choi further reported that it was excellent for internal environmental analysis of soft factors like leadership, culture, and politics in the strategy formulation and implementation. The appropriateness of the value chain model in hotels was later reiterated by Sun et al. (2018), who argued that it was the most useful conceptual framework for strategic

planning in the American hotel industry between 2013-2016. Sun et al. further reported

that hoteliers could use Porter's value chain model to implement business strategies

related to increasing the value proposition of hotel products and services. Hence, because

of the versatility of the value chain model from manufacturing to service industries, with

the emerging IT trends for competitive advantage, Porter's value chain model remained

popular.

In the fourth industrial revolution, with emerging IT trends like the IoT systems,

big data capability, and cloud computing, Porter's value chain model, is still useful as a

source strategy formulation and implementation to enhance performance. The original

philosophies of Porter and Millar (1985) remained unchanged, as they initially posited

that IT played a crucial role in improving operational efficiencies within each step of the

value chain. However, today, the use of IT for competitive advantage goes beyond the

essential use of computers and cost-efficiency purpose as business leaders use it for

efficient decision making. In a study on how IoT systems strategies could improve the

value chain of activities and financial performance in the manufacturing industries of

Hungary, Nagy, Olah, Erdei, Mate, and Popp (2018) successfully used Porter's value

chain model. As such, other researchers (e.g., Phillips, Thai & Halim, 2019; Sun et al.,

2018) also found the value chain model useful in implementing business strategies that

optimize value across the SCM system.

From sectors like manufacturing, the environment, education, IT, to service

sectors like hotels and airlines, Porter's value chain model is relevant to the formulation

and implementation of strategies (Acharyulu, Venkata-Subbaiah, and Narayana-Rao,

2015, Choi, 2001; Phillips, Thai & Halim, 2019; Porter & Millar, 1985). As Porter (1985, 1991) argued, the value chain model can be an efficient strategic formulation and implementation tool to business decision-makers in terms of (a) cost-efficiency, (b) value creation, (c) decision making, (d) waste management, and (e) management of soft resources.

Cost-efficiency. Achieving cost-efficiency from inputs, transformation processes, and outputs is one of the primary outcomes of using the value chain model. During the process of achieving profit and competitive advantage from value creation, business leaders make decisions based on the costs to carry out value chain activities and potential profit when sold to consumers (Porter, 1985). For various sectors of the economy, business decision-makers have limited resources as inputs and make a profit by creating unique value better than their competitors through the creation of a unique business model (Christensen et al., 2016). In the context of manufacturing industries, practitioners successfully used Porter's value chain model to benefit from cost-efficiency (Acharyulu et al., 2015; Koc and Bozdag, 2017). In the service industry, the value chain model was a practical conceptual framework to show practitioners how business leaders achieved cost-efficiency and made a profit in their primary activities (Feng, Yang, Shen & Cai, 2017; Phillips et al., 2019; Sun et al., 2018).

Value Creation. In the manufacturing sector, business decision-makers successfully used the value chain model to manage different operational and managerial activities related to supplying final goods while optimizing value. In a case study of the Indian manufacturing steel industry, Acharyulu et al. (2015) found Porter's value chain

model to be a useful, flexible model to increase value and achieve competitive advantage. Acharyulu et al. further explained that while they used the same five primary activities of Porter's value chain model, for the supporting activities, they used six modified critical constructs in the context of the steel industry. As Acharyulu et al. explained, these key constructs for the supporting activities were (a) project management, (b) finance management, (c) services management, (d) human resource management, (e) technology management, and (f) materials management. From their findings, Acharyulu et al. concluded that the flexibility of Porter's value chain model and the appropriateness of the primary value chain of activities to the manufacturing industry were vital to creating value for the steel industry.

Building upon Porter's philosophy of creating value from business activities, with the emerging trends in IT for competitive advantage, Ikävalko, Turkama, and Smedlund, (2018) explored how the co-creative nature of IoT systems influenced value creation in business. In the research on how European firms could mitigate waste, Ikävalko et al. reported the activities of the firms in using IoT systems in the SCM system had to align with stakeholders' value expectations. Ikävalko et al. further stated that IoT systems were critical to enhancing performance and value creation within each step of the SCM system. Since Porter's value chain model could be a flexible conceptual framework for successful strategy implementation about value creation, it would also be useful in the scope of innovation and decision making.

Decision Making. Several researchers (Koc and Bozdag, 2017; Nagy et al., 2018; Pavlou, 2018; Sun et al., 2018) found Porter's value chain model an efficient tool to

improve decision making and reduce risks in various economic sectors. To assess the impact of innovation in manufacturing companies and improve decision making across the value chain of activities, Koc and Bozdag (2017) successfully used the value chain model as a theoretical framework. Koc and Bozdag reported that Porter's value chain theory created a useful model for business leaders to manage innovation and risks across the supply chain. As such, Porter's value chain, could be a cost-effective investment decision-making tool for novelty innovation in the manufacturing industry.

The use of innovative IT systems like the IoT can assist in decision making across primary and supporting activities of the value chain model is creating opportunities for business leaders to improve financial performance and achieve competitive advantage (Pavlou, 2018). Post the conclusion of a study of the manufacturing industries in Hungary, Nagy et al. (2018) stated that IoT systems strategies improve the potential value creation opportunities across supply chains. Nagy et al. further reported IoT system strategies improved decision making and profitability. While the value chain model was a useful strategic tool to make decisions in the manufacturing sector, it could also be valuable for the hotel industry.

While Choi (2001) was among the first scholars to explore the applicability of Porter's value chain model in the service industry, in particular with front office operations in hotels of Korea, Sun et al. (2018) also reported similar findings for the U.S hotel industry. In an empirical study about the strategic formulation and implementation tool adopted by North American hoteliers between 2013-2016, Sun et al. (2018) stated that Porter's value chain model was the most important theoretical and conceptual

framework. From their findings, Sun et al. proposed future researchers to use a holistic approach to the application of Porter's value chain for the implementation of successful strategies aimed at increasing the value proposition and improving decision making.

Waste management. Since most business models involve the processing of input of resources into the output of goods through multiple business activities, managing waste is a critical factor which leads to cost-efficiency as well as value creation (Al-Aomar & Hussain, 2018; Garido-Hidalgo, Olivares, Ramirez, & Roda-Sanchez, 2019). While lean management techniques in combination with the value chain model were applicable in the manufacturing and engineering sectors, Al-Aomar and Hussain (2018) argued that lean processes were adaptable in hotel management to increase customer value. After evaluating 50 hotels in the United Arab Emirates about the applicability of lean management system in the primary activities of hotels, Al-Aomar, and Hussain found that several hotels were involved in (a) waste management program, (b) cost-conscious initiatives, and (c) on-time ordering for food and beverage as well as other commodities needed in the supply chain of hotels. Such activities to reduced waste, added value within the business operation in terms of cost-efficiency as well as the brand in terms of being environmentally conscious.

At the broad economic level, with the fast evolution of technology, as an excess of electronic waste became an issue to the environment and society, building on Porter's value chain model, Garido-Hidalgo et al. (2019) proposed using a reverse-supply chain (RSC) framework. Garido-Hidalgo et al. further explained that the success of the RSC model was dependent on the successful use of radio frequency identification (RFID) in

the Large Internet of Things (LIoT) system to communicate throughout the supply chain for efficient decision making. While the initial objective of the research of Garido-Hidalgo et al. was to use LIoT and RFID to manage waste within the SCM system, Consequently, a significant research outcome of Garido-Hidalgo et al., was the applicability of Porter's value chain model in the context of the fourth industrial revolution.

Management of soft resources. The management of soft resources like leadership, politics, culture, customer relationship are factors which proponents of the value chain model often argue as an impediment to the use of Porter's value chain model in the service industry (Acharyulu et al., 2015; Choi, 2001; Sun et al., 2018). Since the airline and hospitality industry involved using more intangible resources as part of their value chain of activities in comparison to manufacturing industries, understanding the role of corporate social responsibility (CSR) to create value is essential. Using Porter's value chain model as a conceptual framework, Phillips et al. (2019) explored how intangible resources like CSR culture and leadership used within the supply chain impact customer satisfaction and financial performance. From their findings, Phillips et al. reported that business decision-makers should provide guidance for CSR initiatives as well as encourage a culture of CSR to benefit from enhance financial performance and increased customer satisfaction across the SCM system. The study on the role of CSR in the value chain capabilities of the airline industry was significant as it showed the relevance of Porter's value chain to use soft factors like leadership and culture as a means to increase value and achieve competitive advantage.

Since customers and employees play a significant in co-creating value in hotels (Choi, 2001; Pizam, 2017; Sun et al., 2018), understanding how soft resources like customer relationship, the culture of human resources, and leadership add value within the supply chain activities is critical. Choi (2001) found that Porter's value chain model was superior to other strategic tools aimed at enhancing value and long-term financial performance, as intangible factors like leadership and culture to strengthen value fit into the framework. Because the need to improve value co-creation through customers and employees is higher in hotels, adding CRM and enterprise resource planning (ERP) systems as part of the supporting activities of hotels is key to improving value from soft resources. (Talón- Ballesteroa, González-Serranoa, Soguero-Ruiz, Muñoz-Romero & Rojo-Álvarez, 2018). Talón-Ballesteroa et al. further argued that the use of big data in the hospitality industry was in its infancy stage and that hoteliers could create customer value from the information of CRM systems.

While the CRM system could assist hoteliers with the customer value proposition, ERP might play a significant role in communicating with all stakeholders of the hotel business while increasing value. Building on the increasing significance of enterprise IoT, Lee (2019) presented the Enterprise IoT Ecosystem (EIE) as an essential supporting activity for hotels to benefit from new value-added services. Using the example of the implementation of IoT technologies for hotel rooms, Lee illustrated how the EIE could facilitate the implementation of IoT systems strategies in the hotel industry. Lee further explained that ERP, like EIE, was useful for communicating guest expenditures across the department, collecting detailed guest profiles and preferences, for hotel employee's

internal communication, and communication with outside hotel vendors. Consequently, as the evidence showed from several researchers (Choi, 2001; Lee, 2019; Talón-Ballesteroa et al., 2018), managing soft resources is possible through additional supporting activities in the value chain model of hotels. CRM and ERP systems could be effective in helping activities in the value chain of the hotel business model.

From the literature review of the evolution of Porter's value chain model in research, evidence showed that it is a reliable framework to formulate and implement business strategies for improving financial performance and competitive advantage. While scholars and practitioners advocated the use of Porter's value chain model in the manufacturing industry (Porter, 1985, 1991; Choi, 2001; Koc & Bozdag, 2017), within the existing literature, it was useful for various sectors of the economy because of its flexibility and adaptability. As such, in the context of the fourth industrial revolution, Porter's value chain model was a viable framework to explore how emerging IT trends like IoT systems, big data analytics capabilities, cloud computing, and ERP, for competitive advantage and improved profitability (Prasad &Warrier, 2016; Viltard, 2017). However, it was essential to evaluate other similar and contrasting theories or conceptual framework in alignment with the use of IoT systems strategies to increase profits in hotels.

Criticisms of Porter's Generic Strategy

Critics from scholars like Gould and Desjardins (2015), Lages (2016), as well as Viltard (2017) often argued about the generalization of the applicability of Porter's competitive strategy to all types of business organizations. Other variables like the

accessibility of resources, size of the firm, business environment determine the choice of strategy a firm adopts (Lages, 2016; Viltard, 2017). To comprehend the arguments from the critics of Porter's generic approach, a review of the development of Porter's five forces model, Porter's value chain model to Porter's competitive strategy is necessary.

In 1980, when Michael Porter found that business organizations faced five external competitive forces, Porter proposed using the value chain model as a strategic planning tool to develop three main strategies (Viltard, 2017). Porter (1980) argued that business leaders always faced five competitive forces consisting of (a) threat of new entry, (b) supplier power, (c) buyer power, (d) threat of substitutes, and (e) competitive rivalry, and suggested that a clear understanding of a primary firm activities as well as supporting activities was necessary to plan for strategies. After using the manufacturing sector as the primary model for the theory applicability, Porter (1985) suggested that business leaders could compete through product differentiation, cost-leadership, or focus strategy.

For Viltard (2017), the most significant drawbacks of using Porter's competitive strategy were about the size of the firm. Viltard argued that only large organizations could use cost-leadership strategy and product differentiation strategies because a large amount of capital investment was necessary to improve the value chain of activities. Viltard also argued that because of the business dynamics of the 1980s differs from the era the digital economy, even for a large firm, making a significant capital investment in new technology to improve SCM was highly risky and often lead to competitive disadvantage. From a practitioner's lens, Viltard used the example of failures in the auto

industry from the Smart cars and the Beetle by Volkswagen. For both of these car models, despite the business leaders invested in cost-leadership strategies and product differentiation, customers did not react as expected. As such, Viltard suggested that business leaders from smaller firms were better off using the focus strategy only.

Conversely, the argument of Gould and Desjardins (2015), as well as Lages (2016) about Porter's generic strategy, was that aside from Porter's five competitive forces, with the fourth industrial revolution, there are many other factors to consider in strategic planning. Lages (2016) argued that compared to the early '80s and even the '90s, the speed of technological change, the availability of capital from crowdsourcing, open innovation, and the need to integrate the needs of stakeholders in strategic planning made Porter's generic strategy redundant. Consequently, Lages questioned the validity of the value chain model, in terms of its rigidity to integrate the potential value from customers, environment, and the government into value creation. It is through such criticisms of the traditional strategic planning tool that Lages later developed the Value Creation Wheel theory.

Additionally, Gould and Desjardins (2015) also criticized the appropriateness of Porter's generic strategy in the context of a modern economy where the competitive business forces, technology are continually changing. The argument of Gould and Desjardins was about the size of the business organizations and the accessibility to unique resources to large firms mainly. Gould and Desjardins disputed that not all business organizations could benefit from cost-leadership or product differentiation strategies. As such, Gould and Desjardins also challenged the segmentation of value

chain of activities in the context of the circular economy, where businesses could enhance value through partnership and strategic alliance to improve value at different stages of the primary business activities.

While most of the critics of Porter's generic strategy were thought-provoking, the value chain model might still be relevant to the hospitality industry (Sun et al., 2018) as well as for the applicability of emerging IT trends for competitive advantage (Nagy et al., 2018). As such, in the context of the fourth industrial revolution where hoteliers were increasing the use of emerging IT trends like IoT system strategies to improve customer value and profitability, Porter's value chain model would be a considerable conceptual framework.

Areas of Debate and Current Theories

As the role of IT continued to evolve from performing basic tasks requiring the input of humans to efficient decision making across processes through emerging IT trends like IoT system, business leaders might need to use relevant theories for strategic planning. As Pavlou (2018) and Pizam (2017) explained, in the early days of the internet, the ideas of (a) operating devices remotely, (b) accessing real-time data, and (c) making decisions through artificial intelligence (AI) were not facts of life. However, in an empirical study of 25 most prominent research related to the role of AI and IoT systems on global communities, Kankanhalli, Charalabidis, and Mellouli (2019) found that AI will have the capability to make decisions on behalf of humans in areas such as transportation, energy, healthcare, education, and public safety.

Pizam (2017) said that even in the hospitality industry, organizations like Disney, Marriott, and Royal Caribbean Cruises explored the benefits of IoT systems within their supply chain to improve the guest's experience. For instance, the fact that hotel guests can now perform checking in, order room service, control room temperature through their cellphone, guests feel empowered towards their experience (Morosan & DeFranco, 2019). These examples from the hotel industry showed that efficacy in supply chain management is among the many advantages of using IoT and AI in business. Because the implication of emerging IT trends like the IoT can lead to significant opportunities and challenges (Radoglou Grammatikis, Sarigiannidis & Moscholios, 2019), business leaders should carefully select the appropriate innovation management and value creation theoretical or conceptual framework in strategic planning. Thus, for this study, it was essential to discuss alternatives theories and conceptual frameworks like Barney's (1991) resource-based view (RBV) theory of the firm, and the value creation wheel (VCW) by Lages (2016) about IoT systems for competitive advantage (see Table 2).

Table 2

Taxonomy of Contrasting Theories Related to Enhancing Profit and Value from the IoT

Theory	Year Introduced	Theorist/Author	Key Components
Resourced Base View (RBV) theory	1991	Jay Barney	• Identification of current organization's unique key resources (Clulow, Barry, & Gerstman, 2007). • Select only resources which are (a) valuable, (b) rare, (c) imperfectly imitable, and (d) non-substitutable (Barney, 1991). • Turning asymmetries (skills, processes, assets) into sustainable capabilities (Miller, 2003)
Value Creation Wheel (VCW)	2016	Luis Filipe Lages	• Uses a dynamic approach by integrating the input of all stakeholders in an environment where change is constant (Jahanmir, 2016). • Offers a universal method to problem solving by integrating the aspects of (a) science, (b) technology, (c) management, and (d) society.

RBV Theory

Although business leaders could use various theories to develop business

strategies, an essential decision factor was to analyze the context of the business

environment as well as the appropriateness of the strategic planning tool with the

business model of the firm. While Porter's (1985) value chain model applies to the use of

IoT systems for competitive advantage, Barney's (1991) RBV theory of the firm is a

convincing alternative framework to the development of competitive strategies in the current business environment. As Clulow et al. (2007) noted, the initial step to using the RBV theory of the firm is to identify the current organization's unique vital resources. Moreover, as Barley (1991) opined, business decision-makers select these unique resources when they are (a) valuable, (b) rare, (c) imperfectly imitable, and (d) non-substitutable (VRIN). As such, an essential element of the RBV theoretical framework as a strategic planning tool was that it enabled the business organizations to turn asymmetries (skills, processes, assets) into sustainable capabilities (Miller, 2003). Concerning the use of IT for competitive advantage, decision-makers would need to ensure that the use of IT went beyond ordinary hardware and software functionalities available to other competitors.

When business leaders used the RBV theory as a framework to innovate their unique resources into sellable products or services through the effective use of IT, they often achieved sustainable competitive advantage. Abdelkader and Abed (2016), as well as Cohen and Olsen (2013), successfully used the RBV theory of the firm as a framework to study how firms from various economic sectors use IT for competitive advantage. To examine the impact of IT for competitive advantage in 37 IT Algerian companies, Abdelkader and Abed (2016) used the RBV theory as a theoretical framework. Despite showing the alignment of the RBV theory with IT for competitive strategies, Abdelkader and Abed (2016) failed to prove a direct cause and effect for the contribution of IT to increased financial performance.

Additionally, Cohen and Olsen (2013) used RBV as a theoretical framework to examine the role of information technology (IT) resources on South African hotels post the world cup of 2010. Post the collection of survey data from 112 hoteliers (managers/owners), Cohen and Olsen reported that the use of a complementary system of IT resources within the hotels had a causal effect on the performance of hotel employees towards guests. As Cohen and Olsen argued, when hotel employees embraced the use of IT as part of the culture of service, the use of IT for competitive advantage was evident. Cohen and Olsen further stated that IT infrastructure, IT Human Resources, and IT Management processes were critical resources for competitive advantage. As such, when business leaders used IT as a unique VRIN resource, the RBV theory was a useful strategic planning and implementation tool.

Moreover, to improve the SCM system, both scholars and practitioners used the RBV theory as a framework. In a study of 12 Portuguese manufacturing firms implementing IT to improve their supply chain, Caldeira and Ward (2003) found that the RBV conceptual framework was appropriate to develop competitive strategies. Additionally, Jeble et al. (2018) found RBV to be a useful theoretical framework in the crafting of competitive business strategies involving the use of predictive analytics within the SCM system.

Furthermore, when business leaders intended to use technological innovation like service digitalization for competitive advantage, the RBV theory was a useful framework for strategic implementation (Kohtamäki, Parida, Oghazi, Gebauer & Baines, 2019; Prajogo, 2016). After analyzing 465 studies related to digital servitization, Kohtamäki et

al. (2019) found that the RBV theory was the most utilized theoretical framework to implement digital servitization within a firm business model. Referring to Roy Royce and Tesla, where leaders had successfully used IoT systems strategies, Kohtamäki et al. argued that digital servitization brought competitive advantage only when firms went beyond their traditional boundaries to service customers. Kohtamäki et al. maintained that business leaders had to consistently innovate their business model to improve their value proposition beyond the initial sale of the product to sustain competitive advantage.

After using the RBV theory as a framework in a study of the impact of technological innovation in the Australian manufacturing sector, Prajogo (2016) reported a positive relationship between competitive advantage and process-product innovation. Prajogo further stated that his findings aligned with the contingency theory concerning the effectiveness of business strategies aligning with the specific business environment. Although Prajogo's (2016) study seemed valid and reliable at the surface, there was a significant limitation in the research process, which led to some suspicions of findings. By using perceptual measures instead of an objective metric to examine the relationship of three key variables (product innovation, process innovation, business performance), the findings were reliable but questionable for external validity. Nevertheless, Prajogo showed that the critical constructs of the RBV have the right constructs to measure the impact of innovation on business performance.

From the literature review of Barney's RBV theory of the firm, evidence showed that it was a reliable framework to formulate and implement business strategies concerning IT for competitive advantage (Abdelkader & Abed, 2016; Caldeira & Ward,

2003; Cohen & Olsen, 2013; Kohtamäki et al., 2019; Prajogo, 2016). Because of the impact of internet and computers in the early 90s on business operations to create competitive advantage (Porter & Millar, 1985), and the conception of RBV theory in 1991, the RBV became the favorite theory for IT implementation strategies (Clulow et al., 2007, Miller, 2003). Consequently, in the context of the fourth industrial revolution, emerging IT trends like the IoT, big data capabilities, and cloud computing only would not lead to competitive advantage. As Porter and Millar (1985) and Christensen et al. (2016) argued, instead, it is how organizations gained new capabilities to increase value through IT that differentiate their organization from competitors.

Unlike Porter's value chain model, which initially worked best in the manufacturing industry and in combination with lean management philosophy, when scholars and practitioners started to use the RBV theory of the firm, it proved to be an adaptable framework to various sectors. While the RBV theory of the firm seemed a viable strategic planning tool for this study, further discussion on evaluating the IoT as a valuable, rare, imperfectly imitable, and non-substitutable was necessary. Because the IoT system was not rare and imitable, as an emerging IT trend on its own, it did not fit the critical constructs of the RBV theory. As such, following the philosophy of Porter and Millar (1985), who argued that IT for competitive advantage goes beyond the use of computers and software only, a strategic planning tool that enables value creation across various supply chain activities will be better for this study. Consequently, Porter's value chain model, which was about the dynamic relationship across the multiple value chain of

activities to optimize financial performance and create unique value, might be a viable

conceptual framework to explore IoT systems strategies on hotel profitability.

The Value Creation Wheel theory

Although I selected Porter's value chain as the conceptual framework for my

study, I also reviewed other theories, such as the VCW theory. In 2016, after the

completion of a 20-year empirical study about value creation, Luis Filipe Lages created

the value creation wheel (VCW) to solve complex socioeconomic challenges to create

positive social change in various areas of our society. After an initial attempt to manage

change, innovation, and create value, using traditional strategic planning tools such as

Porter's value chain model, Ansoff Matrix, BCG matrix, Business Plans, and McKinsey

matrix to list a few, Lages (2016) realized that the rigidity of these models did not

guarantee success. Lages argued that several business organizations suffered from losses,

slow economic growth as a result of using inappropriate strategic planning and

implementation tools, which tend to be linear. Lages further explained that failures from

previous traditional strategic planning tools lead to a culture of uncertainty and lack of

creativity to solve problems in several sectors.

Consequently, in the process of developing VCW (see figure 2), Lages used a

dynamic approach by integrating the input of all stakeholders in an environment where

change is constant. Unlike previous innovation and value creation management tool, the

uniqueness of VCW is that it offers a universal method to problem-solving by integrating

the aspects of (a) science, (b) technology, (c) management, and (d) society. From his

findings, Lages argued that while several organizations were capable of justifying how?

And what? Most were unable to know why? As such, through the VCW, Lages proposed

a method to make efficient decision making as it pertains to innovation and value

creation.
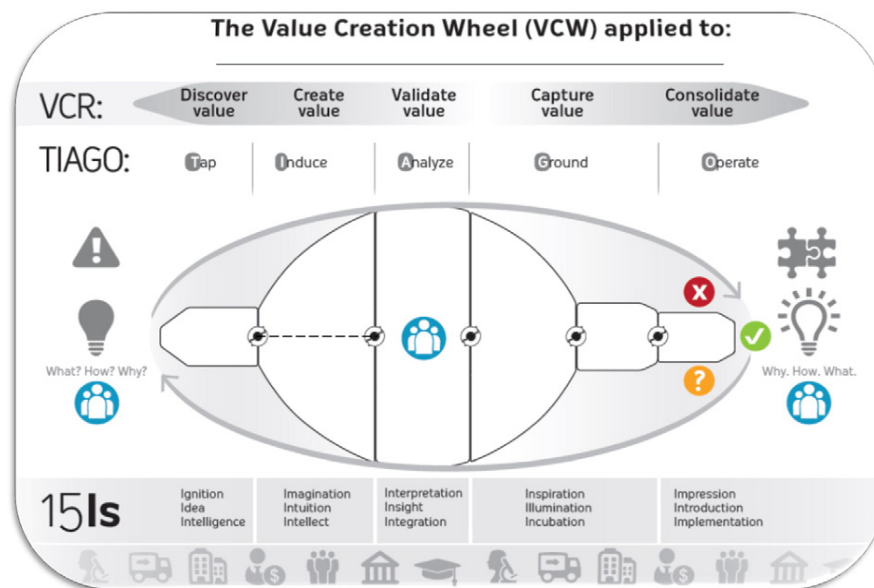
Figure 2. TIAGO and 15Is: VCW's practical tools. (p. 4851), by Lages (2016).

Lages (2016) opined that VCW applied to any decision making involving the least

amount of risks with excellent benefits. VCW consists of five key constructs which are

(a) discovering value (Define/Tap), (b) creating value (Increase/Induce), (c) validating

value (Assess/Analyze), (d) capturing value (Narrow/Ground), and (e) consolidating

value (Act/Operate). Within all the five key constructs, Lages explained that the

superiority of the VCW in comparison to traditional approaches to strategic planning tool

is that it fully integrates the stakeholders' interests.

In a study on the strategic decision-making process of entrepreneurs involved in

the health sector of Cambridge, the U.S., Jahanmir (2016) use the VCW as a conceptual

framework to explore the paradoxes or trade-offs of entrepreneurship. From the findings,

Jahanmir reported that most successful entrepreneurs used a trade-off approach when making decisions about technology, market, customers, and their team. In this study, as Jahanmir explained, the VCW model was useful to analyze entrepreneurial decisions through a paradox and a trade-off approach as decision-makers integrated the stakeholder's interest in making decisions. However, Jahanmir failed to disclose how the entrepreneurs measured the input of stakeholders in making financial decisions.

As a theory created in 2016, aside from Jahanmir's (2016) study, there is a gap in the literature in terms of other scholars who did use the VCW successfully to formulate and implement strategies for enhancing value and performance. However, the proposed theory of VCW was significant to the emerging trends in IT for competitive advantage, as it was not limited to a specific type of industry. For the private sector and small and medium enterprises like in the study of Jahanmir (2016), the VCW developed by Lages (2016) seemed to be the most appropriate model to create and manage value.

The VCW seems viable for improving innovation management in the scope of positive social change as it integrated the stakeholder's interests in decision making. Unlike traditional strategic planning tools, which often failed to execute innovation projects successfully in a dynamic environment (Christensen et al., 2016; Lages, 2016), VCW mitigates the major challenge of uncertainty. However, with the fourth industrial revolution, as Pavlou (2018) and Witkowski (2017) argued, it was essential for business organizations to have the capabilities to make real-time decisions fast and efficiently. Thus, a significant drawback of the VCW was the lack of guidance from Lages (2016) concerning the stakeholder's involvement and possible delay in decision making creating

competitive disadvantages. Although I did not select Lages' VCW theory as the conceptual framework for my study, it might applie to implement IoT systems strategies to increase profit.

Hotel Supply Chain Management strategies

While the three conceptual or theoretical frameworks mentioned above are the most popular for studies about strategic planning, in the hotel industry, hoteliers used other innovative technological strategies across the supply chain to enhance performance. Several researchers (e.g., Al-Aomar & Hussain, 2018; Arbelo, Pérez-Gómez & Arbelo-Pérez, 2017; Cohen & Olsen, 2013; Melian-Gonzalez & Bulchand-Gidumal, 2016) advocated that hoteliers who mastered the SCM system were able to create outstanding value and raving customers. One of the most crucial steps during which guests and hotel employees co-create value is during the stay through the consumption of food and beverage as well as other hotel-related activities (Morosan & DeFranco, 2019). Consequently, a significant success factor of the hotel business was the ability of hoteliers to create exceptional value through the co-creation of value between hotel employees and customers, which ultimately creates raving customers.

Co-creating value. To understand guests' significance of value co-creation in U.S hotels, Morosan and DeFranco (2019) examined the relationship between hotel guests' expectations of services and the level of co-creating value from using the interactive technology services in hotels. While most hoteliers used IT heavily during the online reservation stage and posted the stay for online guest feedback, Morosan and DeFranco found that hotel decision-makers lacked comprehension of the role of IT to co-

create value during the guest's stay. From their findings, Morosan and DeFranco found that the use of interactive technology could assist the marketing department of hotels in understanding the profile of their customers and expectations better.

The benefits of co-creating value in hotels could be applicable beyond geographical boundaries. In 2016, after examining the impact of value co-creation on hotel brand equity, in Spain, González-Mansilla, Berenguer-Contrí, and Serra-Cantallops (2019) reported that value co-creation improved customer satisfaction and generated sustainable value. González-Mansilla et al. also explained that despite value co-creation strategy resulting in competitive advantages in several sectors of the economy, in hotels, few hoteliers managed to implement value co-creation strategies successfully.

Since the hospitality industry is highly dependent on people's interaction to co-create value (Morosan & DeFranco, 2019), globally, hoteliers continuously look for opportunities to improve their SCM with a focus on employees and customers. By creating sustainable value in the hotel's primary activities in departments like sales and marketing, food and beverage, rooms division, reservations, and guest relations, hoteliers improve profitability (Leung, 2019; Lim et al., 2018; Shin, Perdue & Kang, 2019). Therefore, to understand how cost-efficiency, human resources efficiency, and IT led to competitive advantage in hotels, reviewing the literature with a global perspective was necessary.

Cost-efficiency. From the United Arab Emirates to Spain and the U.S., cost-efficiency could be critical to hotel SCM. Both Al-Aomar and Hussain (2018), as well as Feng, Yang, Shen, and Cai (2017), found that improving the utilization of scarce

economic resources in the supply chain of hotels could reduce waste, enabled cost

savings and create value through cost-efficiency. To generate value from hotel supply

chain activities, Al-Aomar and Hussain (2018) tested the applicability of lean methods

like the Toyota Production System (TPS) in 30 hotels located in the United Arab

Emirates. Because of the unsuccessful implementation of lean methods like the TPS in

the service industry, Al-Aomar and Hussain designed the Supplier-Input-Process-Output-

Customer (SIPOC) theoretical framework to have better key constructs applicable to the

business model of hotels. Al-Aomar and Hussain reported that hoteliers who adopted lean

methodology like Just in Time (JIT), improved cost-efficiency, reduced waste, and

increased profits. Additionally, after analyzing the significance of cost efficiency in 231

hotels in Spain between 2008 to 2012, Arbelo, Pérez-Gómez, and Arbelo-Pérez (2017)

reported that labor productivity and cost-efficiency had a significant impact on hotel

profits.

In alignment with cost savings across the SCM, Feng, et al. (2017) experimented

with developing and testing the value of integrating intelligent lighting systems in smart

hotel rooms. After coming up with a design for the lighting system which work within the

concept of the smart hotel, Feng, et al. found that intelligent lighting had several benefits

such as (a) energy savings, (b) improved guest experience, (c) reduced environmental

impact, and (d) integration of ecological lighting into regular mode. Additionally, in the

scope of digitalization and the rise of implementation of IoT systems, Feng et al. also

found the protocol for developing smart light applied to future devices and activities in a

hotel. Finally, the data collected from the lighting system would provide opportunities for

product differentiation and competitive advantage by providing information on preventive maintenance, energy usage, and energy conservation.

Human resources efficiency. While Al-Aomar and Hussain (2018) successfully used the SIPOC as a theoretical framework to develop lean management strategies SCM of hotels, Arbelo et al. (2017) used the stochastic cost frontier model as a conceptual framework to analyze the role of human resources cost efficiency strategies in hotels located in Spain. Arbelo et al. found that the level of knowledge and expertise of the labor force to perform hotel operational tasks contributed to labor productivity and cost savings. Arbelo et al. reported that there was an opportunity for hoteliers to increase profitability by improving human resources efficiencies through specialized training and employee retention programs. Moreover, Shin, Perdue, and Kang (2019) posited that advanced front desk technology also influenced the management of human resources in terms of hiring and training. In the process of exploring the impact of front desk technologies on customer service and hotel productivity, Shin et al. found that the same technology applied to the hiring and training of hotel employees.

While adding technology in the daily activities of hotel employees could bring benefits to hotel operations in terms of cost-efficiency, sustainable value from human resources efficiency might be achievable through innovative behavior, intellectual capital, and organizational learning. Using the intellectual capital (IC) theory, Liu (2017) surveyed 595 hotel managers in China to examine the relationship among employee's innovative behavior, intellectual capital, and organizational learning. Liu reported three findings, which were a causal relationship between innovative behaviors and the (a)

organizational learning, (b) environment of trust and engagement, and (c) hiring of human resources with the right intellect and behaviors. Liu concluded that her findings aligned IC theory because of the positive relationship between innovation culture and social capital.

IT for competitive advantage in hotels. While improving human resources efficiencies through IT across SCM can assist hoteliers to increase profit (Liu, 2017), hoteliers' decision to enhance hotel products through emerging IT trends like IoT can enhance customer value. In a study of 595 former hotel guests who stayed in hotels in the past year in Continental America, Beldona et al. (2018) reported that providing hotel guest technologies which are higher than those at home was a key to increasing profitability and competitive advantage in hotels. In comparison to luxury hotels, Beldona et al. said that hotel guests in mid-scale properties had a higher appreciation for smart technologies better than their homes. Beldona et al. further noted that in strategic planning of hotel operations, hoteliers were to understand that most hotel guests evaluate their stay on the correlation of home and hotel experience.

Using IT for competitive advantage and improving profitability was critical and applicable to hotels and resorts located in islands as well. After interviewing 30 senior managers from five four-five stars hotels located in the Canary Islands, Melian-Gonzalez and Bulchand-Gidumal (2016) reported that IT played a significant role in improving organizational performance. Melian-Gonzalez and Bulchand-Gidumal found that IT in hotels was a catalyst in hotels in terms of (a) operational productivity, (b) personnel productivity, (c) customer service, and (d) income generation paths.

In South Africa, post the opening of several hotels as a result of the World Cup of 2010, Cohen and Olsen (2013) found that the use of a complementary system of IT resources within the hotels had a causal effect on performance. However, Cohen and Olsen also found that IT infrastructure, IT Human Resources, and IT Management processes were critical resources that lead to increased profitability and competitive advantage.

IoT systems strategies in hotels. Pizam (2017) mentioned that even in the hospitality industry, organizations like Disney, Marriott, and Royal Caribbean Cruises explored the benefits of the IoT systems within their supply chain to improve the guest's experience. For instance, the fact that hotel guests can now perform checking in, order room service, control room temperature through their cellphone, guests feel empowered towards their experience. As Pizam (2017) as well as Wu and Cheng (2018) explained hotel leaders showed that efficacy in SCM is among the many advantages of using emerging IT trends like IoT and other emerging IT trends in business.

In line with using smart technologies like IoT systems strategies in hotels, Wu and Cheng (2018) conducted a quantitative experiential study from 525 guests who stayed at The LINQ Hotel & Casino in Las Vegas. After investigating the level of guest smart technology acceptance in The four areas which guests found relevant to rating their overall satisfaction were (a) a sense of belonging to the smart hotel technology, (b) ability to trust the hotel management of smart technology in use, (c) word of mouth on the experience of using the smart hotel correlated with experiential trust and satisfaction, and (d) perception of risk in using technology moderated overall satisfaction. Wu and Cheng

concluded that their study would be useful for hoteliers as they continue to integrate smart technologies as part of their strategy for competitive advantage, especially in the area of marketing.

Conversely, after interviewing 251 international hotel managers, Shin et al. (2019) found that front desk technology innovation positively impacted operational processes, output, experiences, and systems. From their findings, Shin et al. were able to develop a managerial framework for the future implementation of front desk technology for hoteliers seeking to benefit from innovative technological strategies. From a productivity perspective, improved technology at the front desk improved service time, which enable employees to develop a better rapport with the customers as a result of additional time available during check-ins and check-outs.

In the scope of digitalization and the rise of implementation of IoT systems, Feng et al. (2017) also reported that the protocol for developing smart light applied to future devices and activities in a hotel. While Feng et al. found that smart lighting enables cost savings, they argued that the same IT protocol applied to monitor control of room temperature, communication, and other entertainment activities in the room.

After interviewing eight e-commerce and technology committee members in the U.S. hospitality, Bilgihan and Wang (2016) reported that IT-induced competitive advantage was possible when hoteliers integrated technology in synergy within their operation to deliver exceptional customer value. Bilgihan and Wang concluded that IT in hotels was useful to improve (a) daily operations, (b) performance towards hotel guests, (c) organizational processes, and (d) competitive advantage.

Challenges from Innovating SCM in Hotels

While there were several advantages of optimizing the SCM in hotels, understanding the challenges of innovating the SCM in hotels could be crucial. As part of enhancing value through SCM in hotels, developing competitive intelligence (CI) is vital for hoteliers (Köseoglu, Ross & Okumus, 2016; Li, Bonn & Ye, 2019). With technology changes in the SCM of hotels, challenges in terms of technology acceptance, risks of investment, and human resources capability can affect the success of hotel strategies. Thus, using emerging IT trends like IoT systems, AI, service automation could create opportunities for enhancing financial performance and possible competitive advantage (Köseoglu et al., 2016; Li, Bonn & Ye, 2019).

In the hotel industry, external CI, which consists of the hotel room rate, customer feedback, and employee wage rate of competitors, is a critical factor in implementing successful business strategies for competitive advantages (Köseoglu et al., 2016). Additionally, another type of internal CI consists of employee and guests' behavioral patterns retrieved from the use of AI and IoT systems in hotels (Li et al., 2019; Pizam, 2017). After exploring the CI practices in 32 hotels located in North Dakota, Köseoglu et al. (2016) reported that CI, which consists of data mining from (a) CRM systems, (b) enterprise-resource planning, and (c) social media, were valuable but rarely use in decision making. Köseoglu et al. further reported that hoteliers seemed to use underhanded tactics such as (a) mystery shoppers, (b) calling competitors personally, and (c) using global hotel reservation systems, to understand their competitors and make decisions.

While Köseoglu et al. (2016) concluded that a lack of formal hotel management education from hotel managers impeded crafting business strategies for competitive advantage, Li et al. (2019) reported a causal relationship between employee turnover and AI as a result of managerial incompetence. Li et al. explained that because of the unawareness of hoteliers on the impact emerging IT trends like AI and service robots on employee morale, several employees in the Chinese hotel industry feared to lose their jobs. Li et al. further reported that such fear among human resources reduced the potential benefits from emerging IT trends. As such, hoteliers and hotel employees could require specialized training to work with IoT systems, AI, and other emerging smart technology to optimize the possibility of enhancing financial performance and competitive advantage.

Technology acceptance. The level of technology acceptance in hotels from both customers and employees can influence the desired outcome from improving SCM through technology (Lim et al., 2018; Sun, Lee & Law, 2019; Wu & Cheng, 2018). In 2017, post the completion of a study of 421 American hotel employees, Sun et al. (2019) reported that the level of technology acceptance influenced smart technology strategies' success. Sun et al. argued that the awareness of smart technology benefits on workload reduction, the ease of use to increase performance, as well as using a less masculine approach to introducing the technology, impact cultural values towards technology. Before Sun et al. (2019) study, Cohen and Olsen (2013) reported similar findings of technology acceptance of hotel employees in South Africa. Consequently, hoteliers would need to understand the influencers of technology acceptance to optimize hotel

SCM.

Risks of investment. Risks in terms of privacy, trust, and return on investments are significant challenges which hoteliers, as well as other business leaders from various sectors, face when making decisions on investing on technology impacting the SCM (Birkel & Hartmann, 2019; Chan, Okumus & Chan, 2020; Haddud, DeSouza, Khare & Lee, 2017). Birkel and Hartmann (2019) completed a systematic literature review of 102 peer-reviewed journal articles between 2009 to 2016 on the challenges and risks resulting from the implementation of IoT in SCM. Post the literature review, Birkel and Hartmann found that while the number of scholarly articles on the role of IoT on SCM was increasing, most researchers explored or examined the adverse effects on stakeholders in isolation or made a vague generalization. From their findings, Birkel and Hartmann found that (a) privacy, (b) trust, and (c) investment risks, were the most significant challenges impacting the SCM. Birkel and Hartmann further attributed the risks from innovating SCM to the maturity of the technology and the lack of in-depth research on other potential risks and challenges from the disruption of IoT on to businesses.

For Chan et al. (2020), the lack of knowledge on technological systems strategies could impede for hoteliers to invest in uncertain projects which could improve SCM in hotels. After exploring the role of green technology on SCM of 102 hotels in Hong Kong, Chan et al. (2020) reported that several hoteliers did not implement environmental technology strategies because of the length and uncertainty to reach a return on investment as well as the lack of knowledge on the benefits of using such strategies.

Equally, Haddud et al. (2017) reported that failing to analyze the benefits and challenges of implementing IoT strategies within the supply chain of various businesses was disadvantageous to profitability. Haddud et al. explained that using IoT systems strategies brought benefits like (a) improved production, (b) efficient data sharing across the supply chain, (c) cost savings, (d) efficient inventory management, and (e) ability to forecast demand. However, Haddud et al. also cautioned that some challenges from using IoT systems strategies were (a) lack the infrastructure to be IoT ready, (b) skepticism about the potential benefit of using IoT, (c) lack of internal and external human resources to assist with integration of IoT, and (d) fear of network security risks.

Human resources capability. The capability of human resources in terms of knowledge and skills to use emerging IT trends like IoT systems strategies in SCM is critical to the value co-creation between guests and employees (Al-Aomar & Hussain, 2018; Chan et al., 2020; Cohen and Olsen, 2013). Al-Aomar and Hussain (2018) argued that hoteliers who did not have capabilities of managing the cultural and technical challenges of their hotel employees often failed to manage SCM successfully. For Chan et al. (2020), a lack of understanding from hoteliers and human resources capability could prevent decision-makers from enhancing hotel SCM through environmental technology initiatives. After interviewing 102 hoteliers consisting of General managers and resident managers in Hong Kong to investigate the barriers impeding the use of environmental technologies in the hotel industry, Chan et al. reported that inadequate knowledge and human resource limitations were limiting factors. Additionally, Cohen and Olsen (2013) reported similar findings concerning human resources capability to use technology in

South African hotels, as the lack of skills and knowledge to use advanced IT in hotels contributed to the inefficient implementation of technology in SCM.

From the above literature review concerning SCM in hotels, evidence showed that hoteliers could benefit from the enhanced value and raving customers as a result of innovative changes in the operational activities. While the SCM is an essential element to successful strategies leading to hotel profitability, in hotels CRM and enterprise resource planning (ERP) systems are as significant (Dursun & Caber; 2016; Köseoglu et al. 2016; Talón-Ballestero, González-Serrano, Soguero-Ruiz, Muñoz-Romero & Rojo-Álvarez, 2018; Schuckerta, Liang, Law & Sun, 2019). As such, it is essential for hoteliers planning to use emerging IT trends like the IoT systems strategies in SCM to increase profitability, to explore a similar impact on CRM and ERP systems.

Customer Relationship Management

Since value co-creation is substantial to hotels (González-Mansilla et al., 2019), having a customer-centric approach that focuses on retaining customers and building a sustainable relationship is of utmost importance. As such, the management of information about customer's profile, consumption, and customer feedback is essential to develop a competitive advantage (Dursun & Caber, 2016; González-Mansilla et al., 2019; Köseoglu et al., 2016; Schuckerta et al., 2019; Talón-Ballesteroa et al., 2018). Thus, hoteliers striving to increase value should consider the role of emerging IT trends like Big Data analytics capability, cloud computing, and the IoT systems on CRM systems.

Concerning the optimization of CRM, aside from building a relationship through communication channels and reward programs, managing large data sets from IoT

devices, online customer reviews, and social media is essential (Dursun & Caber, 2016). Consequently, because CRM systems tend to accumulate necessary data, business leaders need to develop big data analytics capability (Akter, Wamba, Gunasekaran, Dubey & Childe, 2016).

At an the international level, hoteliers use valuable data CRM systems to develop competitive strategies. To examine the significance of data mining techniques and to profile profitable hotel customers in Turkey, between 2014-2015, Dursun, and Caber (2016) completed a study using Recency-Frequency-Monetary (RFM) analysis model. Dursun and Caber (2016) further posited that the RFM model was effective in analyzing and producing meaningful data on the profile of the most profitable guests and confirmed the relationship amongst (a) repeat purchase, (b) customer loyalty, and (c) profitability. Dursun and Caber (2016) found that while most hoteliers believed in the benefits of using big data from CRM systems, most decision-makers failed to handle large data because of a lack of capability to analyze Big Data.

Additionally, in the European hotel industry, the effectiveness of using data from a CRM system for decision making is equally important to increase profitability. To test the efficacy of using Big Data from CRM systems for decision making, Talón-Ballesteroa et al. (2018) conducted a quantitative study from an international hotel chain based in Europe. Talón-Ballesteroa et al. found that having big data analytics capability to be a useful resource in determining the purchasing pattern of hotel guests by analyzing the guests' profiles. However, Talón-Ballesteroa et al. argued that the use of Big Data in

the hospitality industry was in its infancy stage and that there were a lot of opportunities to benefit from the information of CRM systems.

In a study on customer ratings of luxury hotels located in three major cities in China, to examine how domestic and international hotel brands managed online customer feedback, Schuckerta et al. (2019) found Big Data analytics capability useful to derive meaningful data for CRM initiatives. Schuckerta et al. found data from online reviews website and communication through online management response to be useful CRM of both domestic and international branded hotels in China.

Similar to Dursun and Caber (2016) as well as Talón- Ballesteroa et al. (2018), Köseoglu et al. (2016) reported that competitive intelligence from CRM systems was rarely used for decision making by hoteliers located in North Dakota, the U.S. As Köseoglu et al. (2016) concluded, hoteliers seemed to use underhanded tactics such as (a) mystery shoppers, (b) calling competitors personally, and (c) using global hotel reservation systems, to understand their competitors and make decisions.

However, not all hoteliers rely on underhanded tactics for CRM, like Harrington, Hammond, Ottenbacher, Chathoth, and Marlowe (2019) argued. Post the exploration of the logic behind customer value perception during usage up to value-in-memory post-purchase, Hammond et al. explained that hoteliers could use IoT systems to create long-lasting memories for their hotel guests. Referring to the technological innovation of Disney's magic wrist band, where the implementation of IoT systems improved customer value experience, Harrington et al. posited that similar strategies applied to hotels like the Ritz Carlton hotels where the philosophy was to delight guest.

The use of IT in business operations across all sectors of the economy is common (Carr, 2003); however, very few business organizations have the capabilities or resources to manage Big Data (Vecchiato, 2016; Pizam 2017). From a global perspective, evidence from the literature showed that Big Data analytics capability, as well as the use of IoT systems strategies to collect data from hotel guests to be essential in managing CRM systems. While using emerging, IT trends like IoT systems and Big Data analytics capability were useful resources to improve the effectiveness of CRM systems to increase profitability and value, in ERP, it could be as significant.

Enterprise Resource Planning

Innovation in ERP might lead to a unique customer value proposition, ultimately leading to a competitive advantage for hotels. Since information sharing is an essential aspect of the business model of the hospitality industry (Pizam, 2017), aside from improving information sharing in SCM and CRM with IoT system strategies, in ERP, the benefits from IoT are as relevant. With innovation in IT, hoteliers could use an ERP system to communicate across their internal department to provide customers with efficient and timely service throughout their stay (Azevedo, Azevedo & Romão, 2014). For instance, as Azevedo et al. explained, a hotel consuming food and beverage at a restaurant in the hotels, after using the spa services, could have all the details of his or her expenses from the front office in real-time. Evidence from Azevedo et al. (2014), as well as Kandampully, Bilgihan, and Tingting (2016) showed that IoT system strategies could enhance the current uses of ERP systems in hotels (see figure 3).
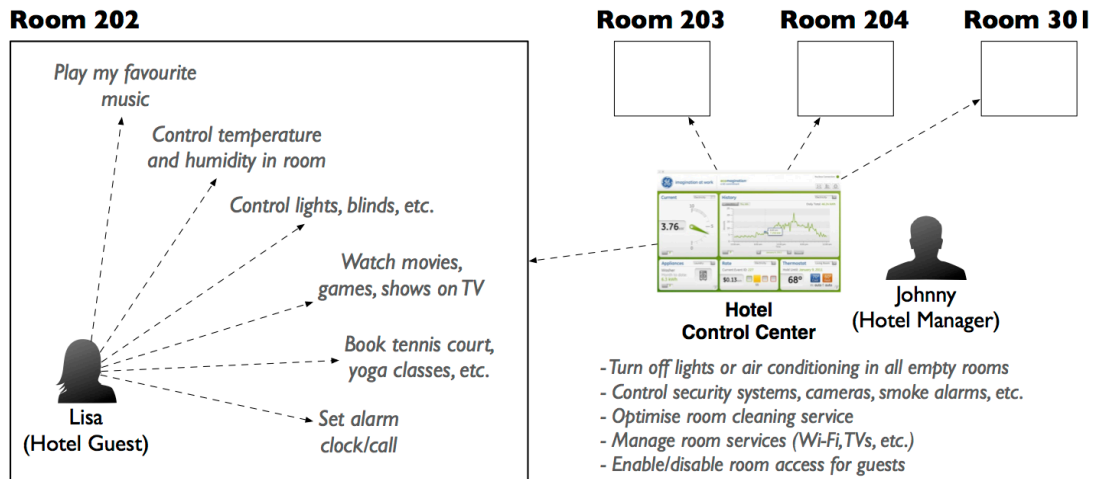
Figure 3. Depiction of IoT systems in hotels operation. From The limitations of the IoT and how the web of things can help, by Guinard and Trifa (2015), Dzone.com

Post an archival study of innovation derived from the hybrid of people-technology in the U.S hospitality industry, Kandampully, Bilgihan, and Tingting (2016) found that co-creating value in hotels was an effective competitive strategy. Additionally, in a study of a hotel group in Portugal, Azevedo et al. (2014) found that ERP systems were critical to the performance of a business as it enabled the integration of various business application's data from operations in real-time for efficient decision making. For instance, when multiple departments such as a spa, front office, housekeeping, human resources, and accounting can communicate in real-time data with each other, they can provide better service to present and future hotel customers (Pizam, 2017). Thus, the role of the IoT systems in ERP was highly significant, as guests' patterns and behaviors were shared across the ERP system, enabling hotel employees to provide efficient, personalized service. As observed in Figure 3, aside from hotel guests being able to personalize their services through IoT devices, hoteliers can use IoT systems to collect a

large set of data which enables efficient decision making in terms of service delivery and interaction.

Potential Themes from the Literature Review and Future Directions

After reviewing the academic and professional literature, while the RBV theory of the firm is famous for studies about the use of emerging IT trends like the IoT for competitive advantage (Kohtamäki et al., 2019; Prajogo, 2016), Porter's value chain model is preferable for this study. Despite several studies from the manufacturing industry successfully using Porter's generic strategy, from the literature review, evidence showed that it was applicable for strategic planning and implementation in the hospitality industry (Sun et al., 2018). Because of the significance of value co-creation in hotel business models (Morosan & DeFranco, 2019) and the critical constructs of Porter's value chain model focus on improving the value of primary business activities, the use of Porter's value chain model is appropriate.

Additionally, from the literature review, the role of IoT systems strategies on SCM, CRM, and ERP in hotels, is that it can increase profitability and create competitive advantage opportunities. From the literature review, there seemed to be a gap in studies about the role of IoT systems strategies on the hotel's profitability. While the use of emerging IT trends alone does not guarantee competitive advantage (Porter & Millar, 1985), using IoT systems strategies which improved cost-efficiency in SCM, and communication in CRM and ERP had the potential to increase profit. Thus, in the scope of understanding the role of IoT in the Fourth Industrial Revolution, using Porter's value

chain model as a conceptual framework could be beneficial to strategic planning and implementation of IoT systems strategies to increase profit.

Transition

In section 1 of this study, I expounded on the background of the problem, problem statement and purpose statement, the nature of the study, as well as the conceptual framework. Additionally, I identified the interview questions emanating from the strategies hoteliers use to develop and implement IoT systems to increase profit. Moreover, I provided operational definitions and rationalized assumptions, limitations, and delimitations of the study. Section 1 also included the significance of the research and an exhaustive literature review where I critically analyzed and synthesized scholarly research about the conceptual framework and its application to the study topic.

After the restatement of the purpose of the study in Section 2, I define my role as a researcher and expand on the research methodology and its application to the study. Furthermore, I explain the research process concerning selection of participants, population and sampling, ethical research, data collection instruments, and analysis of data. This section concludes with a justification of the reliability and validity of the study. Lastly, Section 3 consists of presentations of findings, recommendations, areas for future research, and application of results to professional practice as well as the social impact of the study.

Section 2: The Project

With increasing use of smart technology in various sectors of the economy to increase value (Makridakis, 2018), Buhalis and Leung (2018), as well as Pizam (2017), scholars must investigate and explore the role of the IoT in the hotel industry as it pertains to increasing business performance. Since the goal of this doctoral study was to research the types of strategies which hoteliers use to develop and implement IoT systems to increase profit, Section 2 includes an explanation of the role of the researcher, participant selection process, and justification of the research methodology and design. Furthermore, this section includes a detailed explanation of the population sample as well as processes to manage qualitative data ethically and keeping it reliable, dependable, confirmable, and transferable.

Purpose Statement

The purpose of this qualitative single case study was to explore the strategies hoteliers use to develop and implement IoT systems to increase profit. The targeted population consisted of leaders who developed and successfully implemented IoT system implementation strategies within their businesses in four hotels located in the eastern United States. Implications for positive social change include the potential to understand IoT systems development and implementation strategies in terms of increasing profit, thus increasing sustainability of hotel businesses. Consequently, findings from the study could lead to sustainable socioeconomic growth for regions where the hotel industry is a major contributor of employment in local communities.

Role of the Researcher

The research philosophy of the researcher is significant in qualitative research. In the scope of collecting rich and in-depth data, qualitative researchers engage deeply in the phenomenon to explain participant's experience in the most accurate manner (Patton, 2002; Stake, 2010). As such, the researcher is bound to become the research instrument to explore the why of social sciences from the interpretations of participants in natural settings (Marshall & Rossman, 2016). Wolcott (2002) said that when the researcher observes participants and takes field notes, they are considered the primary research instrument. Since this study was about lived experiences of hoteliers who used the IoT as part of their hotel strategies to improve profit, I was the primary research instrument.

As the researcher, my role was to select participants in alignment with the study topic, use appropriate processes aligning with the research design, use multiple data collection methods to reach data saturation and triangulation, and recognize potential personal biases to interpret data collected from participants. Fusch (2001) argued that if the researcher understands their research philosophy, it is possible to reduce research bias from hearing and interpreting behaviors as well as reflections of participants. Consequently, I knew that my previous experience as a hotelier and personal philosophy can influence the outcome of the study.

Reflecting on my career as a hotelier and pragmatist, I tended to accentuate practical solutions and outcomes. For example, in my former position of a hotel manager, to create a culture of service, I used both objectivism and subjectivism and a variety of research strategies to solve the challenge of poor service resulting from stress among

hotel employees. As a scholar-practitioner, my role as a researcher was more about finding knowledge related to my business problem rather than influencing the questions and answers based on personal experiences. While I used my experience in the hotel industry to ask relevant probing questions and make appropriate notes through observations, my research philosophy enabled me to interpret the culture and reflections of my participants better, hence reducing research bias.

Goswami (2014), as well as Onwuegbuzie and Leech (2005) argued that a flexible approach was necessary to select the appropriate research methodology and strategy in answering the research question. Rubin and Rubin (2012) that having a refine interview protocol was a good guideline for researchers to follow to ensure that the interview process generated good qualitative data. In my doctoral study, since qualitative research questions determined the richness and complexity of the data , the credibility of the research emanated from an interview protocol.

By having an interview protocol, where (a) I selected relevant participants, (b) build rapport with participants, (c) selected the appropriate location and time, and (d) used a coherent list of questions aligned with the topic; I generated quality in my findings. Through semistructured interviews, I used open ended questions supported by probing questions to collect rich data focusing on the topic. Carlson (2010), as well as Fusch and Ness (2015) argued that methodological triangulation was an excellent process in qualitative research to reach data saturation. In the scope of dependability, credibility, confirmability, and transferability, to have a better evaluation of the findings, I used member checking, various data collection methods, and methodological triangulation to

reach data saturation. Hence, I used (a) semi structured interviews, (b) direct observation, (c) participant observation, and (d) documentations to collect data.

In adherence to ethical codes concerning this study, post the approval of the University Research Reviewer (URR), I ensured to preserve the privacy of the participants through informed consent forms based on the Belmont Report protocol. As such, I used the Belmont Report Ethical Principles and Guidelines for the Protection of Human Subjects of Research (1979) committee which ensured that the informed consent form follow the protocol in terms of (a) clear explanation on purpose of study, (b) risks and benefits information, (c) cessation of participation in the study. Additionally, I had measures such as safe data keeping of recorded interviews, transcripts, the organization's documentation to preserve the trust between the researcher and the participants. Therefore, by adhering to ethical standards in the research process, I enhanced the quality of the research.

Participants

Choosing the appropriate participants for the purpose and context of research was a significant step in ensuring that data collected was pertinent to the quality of research. Concerning the eligibility of the participants, while Szolnoki and Hoffmann (2013) noted the characteristics of the participants must align with the central research question, Yin (2018) posited that setting a specific benchmark to participant's selection is critical to effective data collection. Therefore, the eligibility criteria for study participants was that they work in a hotel making up the population in this case study, and that they were hoteliers who had developed and successfully implemented IoT system strategies.

Gaining access to participants involved establishing trust and transparency through formal consent of senior hoteliers leading to an agreement between participants and researchers. Hull and Wilson Diné (2017) posited that before accessing participants, researchers had to ensure that they obtained administrative approval from gatekeepers such as senior leaders of companies at which the study would take place. As such, through my professional network, I seek site approvals from the hotel companies' senior leaders or owners before approval from the Institutional Review Board (IRB).

After the approval of the IRB, I got a list of the hoteliers from my site contact that gave me permission to do the study in their hotel. Then, I sent an email of the brief description of the research asking the hotelier to participate in the study. Once the hotelier agreed to participate, I scheduled a time for an interview through phone or email. I presented informed consent forms to participants in person and went through them at the beginning of interviews to obtain formal agreements from participants protecting their identity and rights and informing them of their right to withdraw from interviews at any time.

Aside from using informed consent to establish trust and transparency, establishing a working relationship was essential to collect rich data. In the case of the sensitive study topic, while Elmir, Schmied, Jackson, and Wilkes (2011) noted the significance of establishing trust and openness during interviews, Jack, DiCenso, and Lohfeld (2016) also stated that a good rapport with participants prevented the withholding of information. To establish a working relationship with participants, one of the first step was to assure the participants of their confidentiality and safety. Secondly, I

shared my experiences as a practitioner of hotel management and explain the potential impact of the study onto the hotel industry and society. Lastly, to enhance the working relationship, I ensured that the interview took place in a private office when face-to-face and when online in a private location on both ends.

Research Method and Design

The purpose of this study was to explore the strategies hoteliers use to develop and implement IoT systems to increase profit. Choosing the appropriate research methodology and research design depends on the alignment with central elements of the research study. Stake (2010) as well as Yin (2018) posited that the selection of the research method and design was significant for the researcher whose objective was to complete relevant research which enhanced society's knowledge. To address the goal of this study, using a qualitative research methodology, I used a single case study design.

Research Method

Qualitative, quantitative, and mixed methods are the three main types of research methods that researchers use to explore or investigate a business research problem (Saunders et al., 2015). Through a qualitative research methodology, researchers analyze and generate meanings from the participant's experience within their natural settings (Marshall & Rossman, 2016; Stake, 2010). Consequently, as Wolcott (2005) explained, to obtain rich and in-depth insights from a social phenomenon, a qualitative research methodology is appropriate. Because the objective of this study is to explore the hoteliers' experience and perspectives about the use of IoT system strategies within their business activities, as a researcher it was essential to collect rich and in-depth

data. Moreover, qualitative methods are best to answer open-ended questions from the human experiences within an observed phenomenon (Patton, 2002). Since the objective of the study was to gain a thorough comprehension of the phenomenon through open-ended questions, a qualitative research method was most suitable to explore new concepts and acquire new insights on the topic of study.

Although qualitative research methodology was the best fit for this study, it was essential to consider the appropriateness of other research methodologies. While the context and purpose of the research questions often influenced the research methodology, Kelemen and Rumens (2012) argued that the researchers' philosophy was an influence. For researchers with an interpretive philosophy, examining the relationships between dependent and independent variables might be the best way to conduct research, especially if the outcome of the study is to generalize the findings (Firestone, 1987; Onwuegbuzie & Leech, 2005). Unlike qualitative studies which are explorative, for a logical experimental investigation of a phenomenon quantitative research consists of using statistical measurements to determine the significance, correlation, and relationship among selected variables (Yin, 2018). Hence, quantitative researchers used analytical approaches, test hypotheses, and ask closed-ended questions to (a) examine variables' relationships, (b) establish cause and effect of observed variables, (c) conduct experiments and quasi-experimental of a test, and (d) test the predictive outcomes (Cokley & Awad, 2013; Corner, 2002). Concerning my research study, since the purpose is not to test hypotheses through closed-ended questions nor to reach generalization of findings, a quantitative research method was not appropriate.

The mixed methods approach combines both quantitative and qualitative methods (Pluye et al., 2018; Saunders et al., 2015). Mixed methods type of research is useful when a researcher tests the theoretical construct or to test previously tested hypotheses in combination with obtaining rich and thick data about a phenomenon (Salehi & Golafshani, 2010). Despite considering using a mixed methodology for this study, it did not fit in the context and purpose of the research outcomes. Therefore, to answer the overarching research question appropriately, I used a qualitative research method instead of a quantitative or mixed-method to gain rich and in-depth data through open-ended questions.

Research Design

The selection of a research design is crucial for the successful completion of a doctoral study. Reflecting on the qualitative research process of conducting a mini-ethnographic case study, Fusch et al. (2017, 2018) argued that the selection of the research design was crucial because, despite alignment within the significant elements of a doctoral study, novice researchers often failed to use the most appropriate research design to answer the research question. To make the proper selection of research design, Fusch et al. suggested choosing a design which (a) best answered the research question, (b) enabled data saturation, and (c) had reasonable completion time as well as affordable. As such, upon the selection of a qualitative research methodology, I pondered on three types of research designs which were (a) ethnographic, (b) phenomenological, and (c) case study.

Ethnographic research design usually involves time and can be costly if access to observe participants is remote. Fields and Kafai (2009) explained that an ethnographic research design was best to see and report cultural factors and human behaviors which are nonquantifiable over an extended period. Since listening was a considerable research instrument in ethnography, Forsey (2010) noted that time was a significant element in an ethnographic design. However, Fusch et al. (2017) further described a mini ethnography to have the advantage of shorter completion time and being cost effective for the doctoral students seeking to understand the cultural behaviors and values of participants. In this study, since I did not explore the social behaviors of hoteliers concerning their use of IoT, an ethnographic design did not fit the context of the study.

After considering an ethnographic design, another option to collect rich and thick data was a phenomenological research design. To identify and explore a participants' profound life experiences, Giorgi (2009, 2012) suggested using a phenomenological research design. Like an ethnographic design, a phenomenological design involved an extended period. Time is necessary as the researcher is to observe and explore the phenomenon in light of the participant's human experience over an extended period to reach data saturation (Moustakas,1994). Consequently, with phenomenological research design, researchers can find it challenging to reach data saturation in a short period. Despite the advantage of collecting in-depth quality data with a phenomenological design, Chicoine (2018) acknowledged potential shortcomings such as (a) researcher bias, (b) time, and (c) cost. Because I did not focus on the human experiences of the hoteliers, but instead focusing on the types of successful strategies about smart

technology, after evaluating the fit of a phenomenological design I considered a case study design.

Unlike other qualitative research designs, a case study design is flexible as the researcher can blend it with a different design in the scope of answering the research question in the best possible manner. With an unexpressed quantitative research background and taking a post-positivism worldview, Yin (2018) explained in great details on how to use a case study research for both qualitative and mixed methods. However, the guidelines and the four design parameters (construct validity, internal validity, external validity & reliability) which Yin specified to use in single case studies made it complex and confusing for novice researchers to understand the application of external validity in qualitative research (Fusch et al., 2018). In contrast, as Yazan (2015) and Fusch et al. (2018) explained, from Stake's (2010) worldview of the nature of reality, researchers could interpret their study findings through multiple facts of truth. Consequently, the epistemology for researchers of post-positivism data collection is from direct observation and measurement of the phenomenon (Yin, 2018); whereas for the constructivists, the researcher collects data through the interaction of participants within their environment (Stake, 2010). Because a case study design is bounded by space and time (Baxter & Jack, 2008; Yin, 2018) and typically enables the researcher to reach data saturation through triangulation (Stake, 2010), a case study design was appropriate for addressing my study's purpose.

As a qualitative novice researcher, I understood that through my lens of being the research instruments in collecting data through interviews, research bias would be

inevitable. Concerning the applicability of the case study design to my research, because of the newness of IoT systems strategies in the hotel industry (Pizam, 2017), I selected a successful hotel site from which ample qualitative data is available from various sources to determine the role of IoT systems on hotel's profitability, I used a single case study design with methodological triangulation method to help reach data saturation. Because the personal lens of the researcher was a significant contributor of research bias (Fields & Kafai, 2009), to mitigate such partiality and increase validity in qualitative studies; to give various lenses to the audience, I used methodological triangulation as Denzin (1978) advocated. Thus, I used multiple sources of data such as (a) semistructured interviews, (b) observations, and (c) documentation provided by the observed organizations within the design to give the audience with rich and thick data. Furthermore, within the different methods of collecting data, for interviews, I used an interview protocol, member checking to enhance the quality of data collected. As for observations, I used journaling and field note taking to ensure that I reported the data with the least amount of subjectivity. Finally, for documentation, I ensured that there is a trail of evidence which reflects some similarities with the other methods of data collections. Thus, by using a single case study design consisting of various data collection methods, the use of triangulation provided numerous lenses as well as rich and thick data to assess the quality of this study.

Population and Sampling

Properly defining the population was a pre-requisite to choosing the right population and sample of experienced hoteliers that have successfully used strategies to

develop and implement IoT systems to increase profit. Yin (2018) posited that the

population and sample of a study was a crucial element in case study design. Since a case

study design is bounded by space and time (Baxter & Jack, 2008), the justification for the

selection of the population and its sample size should be reflective of the purpose of the

study and the goal to reach data saturation (Fusch & Ness, 2015). Consequently, the

population of this study comprised of hoteliers who had developed and successfully

implemented IoT system implementation strategies within their business activities in the

hotel selected. In this study, the hotel which bounded the population was the unit of study

and consisted of four of hoteliers.

In research, the choice of sampling method requires justification to show validity

and reliability. Although there were no specific guidelines on the number of participants

for case study designs (Yin, 2018), it was crucial for researchers to select a sample size

which can lead to data saturation (Fusch & Ness, 2015). Concerning sample size in

qualitative research, while Fugard and Potts (2015) explained that the sample size had to

be sufficient to obtain rich data and adequate in quantity to reach data saturation,

Robinson (2014) suggested a range between three and sixteen for the sample size often

led to data saturation. Since the research design of this qualitative study consisted of a

single case study, the strategy to determine the sample size was to ensure the collection of

rich and thick data.

Although there were several sampling methods (Polit & Beck, 2017), I considered

evaluating the fit of (a) convenience sampling, (b) snowball sampling, and (c) purposeful

sampling for this context of the study. Etikan, Musa, and Alkassim (2016) argued that in

both quantitative and qualitative research, the choice of sampling methods depended on the nature and type of study. Convenience sampling, which is a nonprobability sampling method, can be subjective as the researcher chooses participants based on handiness and ease of accessibility (Moser & Korstjens, 2018). On the other hand, snowball sampling also known as referral sampling is a method upon which the researcher relies on current participants to recommend other individuals to become participants (Marcus, Weigelt, Hergert, Gurt, & Gelléri, 2017). As a result of the reliance on participants recommendations in the snowball sampling methods, research findings can have a high level of research bias, which impede research credibility and dependability. On the other hand, purposeful sampling which is a non-probability sampling method of selecting participants from a specific population for a particular study can be very subjective (Etikan et al., 2016). While most sampling methods have a degree of subjectivity and biases, Etikan et al. (YEAR?) argued that purposeful sampling was best for qualitative research, especially when time and money were constraints.

However, after considering the use of sampling for this study and its implication to attain data saturation, I decided to use a census method to gather full data from the population. As Ruddin (2006) explained, a small population that is well defined can be studied in its entirety. Since implementing IoT systems strategies in hotels is in its beginning stage (Pizam, 2017), the population is likely to be small. As such, I used a census method to interview four hoteliers which made up the entire population of the study. If for some reason qualified member of population decided not to participate, I could have used a purposeful sample of those who participated.

To obtain content validity and ensure the completion of a quality study, achieving data saturation is critical. As Stake (2010) explained, achieving data saturation within the research process is a sign of academic rigor and quality of research. Because of the challenge of qualitative researchers to reach data saturation, post the use of sample-to-population, in a case of well-defined small population, Firestone (1993) suggested that interviewing the entire population could be better to reach data saturation and eliminate any potential bias occurring through sampling technique. Thus, by including all hoteliers from the population, I was able to collect deep and rich data to help in reaching data saturation. Regarding reaching data saturation, Noohi, Peyrovi, Goghary, and Kazemi (2016) explained that researchers should collect data until they found no new information or ideas from data collected. Therefore, I ensured that I achieved data saturation through a rigorous process of interviewing, member checking, as well as using other data collection techniques to use triangulation in the effort of reaching data saturation.

For eligibility of participation in the interview process, I selected interviewees (hoteliers) who were key decision-makers in the design and execution of IoT systems strategies. In a hotel organizational structure, decision making pertaining to IoT systems strategies are usually limited to three to four hoteliers. Hence, the criteria for participation in the interview process was for hoteliers holding the positions of (a) General manager, (b) director of operations, and (c) corporate leader/owners.

Moreover, having the appropriate interview setting was critical to collect rich data. Elmir, Schmied, Jackson, and Wilkes (2011) posited that setting the right conditions an interview were vital contributing factors to build rapport, and trust to participate fully

in answering the interview questions. Concerning the interview environment, because of the pandemic, while one interview was face-to-face in a private office, the rest of the interviews were online as a consequence of the stay at home order. However, I conducted the interviews in a private location to avoid interruptions.

Ethical Research

Researchers have a fundamental responsibility to promote moral and social values towards the parties impacted by their research process and findings. Roth and von Unger (2018) argued that in the pursuit of attaining credibility and trustworthiness in research, researchers had to seek new knowledge centered around the truth with minimal error and damage onto stakeholders. To ensure credibility in the research process, as the researcher I adhered to ethical guidelines by (a) representing research data with truth, (b) promoting moral and social values critical to collaborative work, and (c) showing accountability to the public and institutions impacted by the study.

I conducted this study under the Walden University IRB approval number 03-11-20-0156601. The role of the IRB is to protect the rights and welfare of participants involved in research affiliated with the institution (Brett et al., 2014; Hull & Wilson Diné, 2017). To ensure participants protection, I used an informed consent form from Walden University as an ethical guide to adhere to the protocol of the Belmont Report Ethical Principles and Guidelines for the Protection of Human Subjects of Research (1979) committee. Within the informed consent form, I provided a detailed explanation on the (a) purpose of study, (b) risks and benefits information, and (c) cessation of participation. Yoshizawa, Sasongko, Ho, and Kato (2017) posited, the informed consent

form is more than just a legal document between the researcher and the participant as it

connects the research communities with the public by abiding by moral, social

values. Aside from emailing the informed consent form to the participants for review,

before conducting the interview, I walked through the informed consent form with the

participant at the site location before signing for both face-to-face and online. Concerning

the participant procedures for withdrawing from the study, if the participant elected to

retire during an interview, I planned to give the participant the interview notes to destroy

as well as letting the participant delete the records on the recording device. As such, I

assured the participants of confidentiality, data privacy, protection during the research

process, and right of withdrawal from the study.

An agreement to protect the confidentiality of participants in research can build

trust and rapport with participants. Allen and Wiles (2016) explained that the term

confidentiality referred to the commitment of the researcher towards those in the study

not to reveal their participation and personal identity. Allen and Wiles also argued that in

qualitative research, researchers should consider engaging participants in their selection

of pseudonyms in research. While alphanumeric codes are acceptable in qualitative

research, Allen and Wiles stated that the use of pseudonyms increases the human aspect

of the study. Thus, during the data collection process, I used codes, and during the data

organization process, I changed the codes to pseudonyms to keep their real name

unknown within the study.

Aside from the guidelines for confidentiality to the participants, I also informed

the participants that there was no incentive or reward to participate in the study and

explain the safety and security management of the data collected of the research process. While protecting the participant's identity was an essential part of the ethical research process, Yin (2018) posited that researchers should have safety and security measures for the data gathering and storage process. For this study, data collected interviews, direct observations and participant observations was securely kept on a personal external password-protected hard drive as well as encrypted when saved digitally. Additionally, data pertaining to the interview and observations would be discarded after 5 years. Therefore, by adhering to ethical standards in the research process, I enhanced the quality of the research.

Data Collection Instruments

Choosing the appropriate quantity and type of data collection instrument in qualitative research is crucial to the researcher's objective to enhance the reliability and validity of the study. Marshall and Rossman (2016) posited that it was essential for researchers to use more than one data collection methods to collect rich and in-depth data leading to data saturation with minimal research bias. While the use of an interview is a great data collection method for information, it has some level of bias which the researcher needs to address. As Wolcott (2005) mentioned that interviews were just one of several data collection methods in research designs such as ethnography and case studies, it would be useful to consider other data collection methods.

Hence, as the sole researcher, I used interviews, direct observations, participants observations and performance records as data collection methods to explore (a) the IoT systems in action within different areas of the hotel operations, (b) the interactions of

stakeholders as it pertains to using IoT devices and its impact on performance and decision makings, and (c) the behaviors of people in their natural environment of dealing with IoT systems.

As the sole researcher of this single case study, I was the primary research instrument. Wolcott (2005) explained the significance of the researcher in qualitative research as the primary data collection to personally collect and analyze rich and in-depth data. Using an interview protocol framework (see Appendix A), I ensured that I optimized the quality of data collected through semistructured interviews. As Marshall and Rossman (2016) explained, through semistructured interviews, researchers can manage the flow of conversation with the interviewees who feel comfortable to express their perspectives. Unlike a structured interview, by using probing questions in a semistructured interview, I collected rich data. Castillo-Montoya (2011) suggested using an interview protocol framework to have (a) an introductory question, (b) transition questions, (e) key questions, and finishing with (f) closing issues. Consequently, I used the approach of Castillo-Montoya to establish a flexible guideline where the patterns and types of questions lead to rich data focused on the central research question.

Despite the benefits of using probing questions to collect rich data and an interview protocol to guide the interview process, I used member checking to ensure the maximum benefit for reliability and validity. Fusch and Ness (2015) argued that member checking was more effective and rigorous than transcript review, as member checking enabled the researcher to ensure more than verbatim accuracy checking and enabled the researcher to have a follow-up interview thereby enabling the collection of rich data

leading to data saturation. Consequently, post the initial interview, I interpreted what the participant shared and share back their interpretation for validation during a follow-up interview for member checking.

Direct observations and participants observations enabled me as the researcher to collect and analyze rich data of the dynamics of the organization in operation as well as observing participants in their natural environment. Carter (2002) and Denzin (2002) posited that for researchers whose philosophy was about reporting the truth through the description of the experience, direct observation leading to fieldnote taking was a useful data collection technique. Through direct observation as the researcher and observer, I reported the various participants' contrasting perspectives with minimal interruption. Additionally, one of the advantages of direct observation was that the researcher could use reflexivity to interpret the participant's experience of a phenomenon, thereby remaining objective and still presenting rich and in-depth data (Wolcott, 2005). Consequently, to reduce research bias, during my observation at the hotels, as I took a non-participative role, I did not interfere with the hotel operations and their stakeholders, as I used direct observation protocol (see Appendix B), fieldnotes, and reflexivity to report the most accurate data from observations of hoteliers who were my participants.

Although direct observation was a useful technique to write detailed fieldnotes immediately as the researcher observe the participants, it had some drawbacks. Kawulich (2005) argued that while the observer writes detailed notes at the scene because the researcher did not partake in the event, data collected might not contain the participants'

feelings and emotions leading to the behavior. Henceforth, adding other data collection method like participant observation, added to the richness of the data.

While interviews, documentation, and direct observations are rich data collection methods to reach qualitative findings, adding participant observation will improve the richness and depth of findings. Participant observation differs from direct observation as the researcher take a participative role in the observed phenomenon (Stake, 2010; Wolcott, 2002). Thus, I stayed at the hotel to experience the IoT systems strategies used to guests and report the data from the perspective of a hotel guest without disrupting any other stakeholder of the hotel. Adding participant observation enabled the researcher to give a better interpretation of what happened, why it happened, and most importantly allows for future methodological triangulation which was useful to reach data saturation (Barnard, 1994; Marshall & Rossman, 2016). To explore the processes of IoT systems strategies and the behavior of participants in action at the hotel site, I used participant observation.

However, participant observation has some disadvantages leading to research bias such as (a) observer interference in the flow of the participants' action, (b) acceptance of the observer at the beginning stage of observation, (c) the inability to write fieldnotes during participation (Kawulich, 2005). Since I was a paying hotel guest participating in the use of IoT systems in the hotel during my stay, I did not cause any disruption to any hotel stakeholders. Thus, I intend to use an observation protocol (See Appendix B) to ensure that I meet the objective of the study, mitigate potential research bias, and adhere to ethical guidelines. Kawulich (2005) explained the significance of using participant

observation protocol to (a) reduce research bias, (b) avoid ethical issues, and (c) maintain the focus of the study. I also used reflective journaling when data collection begins, post participant observation to ensure that I captured rich and in-depth data before data analysis.

Other data collection methods which I used are performance records in the form of financial reports, and online guest satisfaction surveys related to the use of IoT systems strategies. Fusch and Ness (2015) advocated the use of several data collection methods for future methodological triangulation leading to data saturation. The advantage of using performance records is that it could lead to correlating the findings from interviews, direct observation, and participant observation, which might provide quality evidence to the findings. However, a drawback from secondary data is that it has some bias caused by other parties who collected the data rather than the researcher (Saunders et al., 2015). After disclosing the source of my data, I analyzed the reports to look for common themes related to the impact of the strategies which hoteliers used to develop and implement IoT systems to increase profit. While there was an element of bias from such secondary data, to reach data saturation, I used data collected from the interviews in combination with other data collection methods for triangulation.

Data Collection Technique

To explore the strategies hoteliers used to develop and implement IoT systems to increase profit, while I used semistructured interviews, direct observations, participant observations, and performance documents to collect data, I had a rigorous data collection technique which are cohesive. Researchers should ensure that they use protocol and

specific data collection technique to get rich and in-depth data useful for the study (Marshall & Rossman, 2016). Consequently, for each semistructured interview, I adhered to an interview protocol (see Appendix A) and schedule a follow-up member checking interview. To collect the raw data, I used a voice recorder, fieldnotes, reflective journal, and interview notes.

For the semistructured interviews, I took steps to build rigor, rapport, and trustworthiness in the interview protocol. While there are various types of interviews, the advantage of semistructured interviews is that it gives autonomy for the interviewee to express their experience and perspective through open-ended questions and probing questions (Morse, 2015). To collect the data from the interviews, in addition to using a voice recorder, interview notes, and reflective journal, I adhered to an interview protocol followed by member checking. Unlike transcript review, which is far less effective than member checking, to confirm for accuracy, clarification, or provide additional data, member checking is a more effective step for confirmability (Fusch & Ness, 2015). While I converted the recorded responses into the verbatim transcript, through thematic analysis (TA), I analyzed and synthesize the participant's response for member checking. Thus, before departing the interview session, I scheduled each participant within a week from the date of the initial interview to confirm the accuracy and validity of the synthesized responses.

While I thought of completing a pilot study to test the interview protocol, it was not be necessary for the semistructured interviews. Morse (2015) and Rosenthal (2016) posited that typically, one does not use a pilot study in qualitative research using

semistructured interviews because one can paraphrase the question and follow up with probing questions as applicable to the participant. To confirm that the content of the interview protocol was appropriate, as Elmir, Schmied, Jackson, and Wilkes (2011) recommended, integrated elements to build trust and rapport. As such, within the interview protocol to build trust and rapport, I incorporated essential items such as (a) setting the stage over a meal or simple beverage outside of the work environment, (b) observing non-verbal cues, and (c) paraphrasing and probing questions as needed, (d) closing the interview and scheduling follow-up member checking interview.

Although semistructured interviews with the adherence to an interview protocol and member checking could lead to rich and in-depth data, a disadvantage from this data collection technique is that there is no guarantee of participants sharing the entirety of their experience. While Denzin (1970, 1978) advocated the use of multiple sources of qualitative data to mitigate research bias, Bernard (1994) suggested using observation techniques to get a better understanding of what transpired from the process, people behaviors, and why the phenomenon materialized. For direct observation, I used an observation protocol (see Appendix B) to maintain focus on the purpose of the study as well as to follow a structured system to collect data about the background, people, and action in a chronological manner. While I intended to spend 3-4 hours, three times a week over three weeks to take extensive fieldnotes of observations of interactions among hoteliers, hotel employees, and guests without interrupting participants in action, the COVID-19 was an impediment to live access. As such, I while I was able to observe the participants three times live the other session was through WhatsApp video.

Despite the advantage of direct observation to witness the participants in action, the fieldnotes from this data collection method can be a lengthy process and one dimensional. Wolcott (2005) explained that while direct observation was an excellent data collection method in social research, it required the researcher to have experience in writing cohesive fieldnotes over an extended period. Since fieldnotes from direct observation gave a partial understanding of the observed case study, for triangulation purpose, I used fieldnotes and reflective journal from participant observation.

As it pertained to participant observation, I spent an average of 20-30 hours participating as paying hotel guest to experience the IoT systems strategies used during a hotel stay and will take fieldnotes post each activity of using IoT systems. In participant observation, after earning acceptance among participants, the observer takes an active role and uses a reflective journal and take fieldnotes immediately after each participating activity (Kawulich, 2005). Hence, to ensure that I adhered to the hotel policies to ask the appropriate questions about the participant involvement with IoT systems strategy, and write consistent fieldnotes post each observation, I used a protocol as well (see Appendix B).

Finally, for the data mining of performance document related to the case study, I used key performance metrics from investor presentations dating from 2017-2020, guest comment cards, and marketing materials involving the impact of IoT systems. While these documents could add to the validity of the findings from the other primary qualitative data collection methods, a disadvantage from collecting secondary data, was

that it could carry errors from the source and requires time to sort out meaningful data pertaining to the objective of study.

Data Organization Technique

Data organization is an essential phase in the qualitative research process. Good data organization involves selecting a logical system to name and categorize files as well as a dependable way to save data securely (Yin, 2018). From the time the researcher received IRB approval to its disposal after 5 years as part of data organization, Baškarada (2014) posited that the researcher should discuss the management and monitoring of all data collected by categories or coded list. Consequently, to manage a large amount of electronic and physical data from all the data collection techniques, I named and organized data files in a consistent way for easy accessibility of specific categories of data. As such, by having a data organization system, I avoided frustration from locating data while adhering to the protocol about participants' data protection.

As part of the data organization, I used coding to assist with data organization. Through a systematic data organization by categories and coded list, the categorization of data gathered from multiple sources can facilitate the research process to methodological triangulation (Belotto, 2018; Blair, 2016). Additionally, Castleberry and Nolen (2018) posited that before data analysis, organization of extensive raw data into categories and a coded list from all types of data collection methods were essential activities that lead to gleaning meaningful patterns from the data. Consequently, to begin the methodological triangulation and prepare for data analysis, I used a Computer-Assisted Qualitative Data

Analysis Software (CAQDAS) NVivo for mac12, to sort the concepts and ideas from all the data collection methods into coded categories.

In a software program such as NVivo, one can sort the concepts and ideas into coded categories (Belotto, 2018; Blair, 2016; Wong, 2008). Hence, I categorized the ideas and concepts from all the data collection methods, which were direct observation, participant observation, company performance documents, and reflective journal to prepare for data analysis. For example, I used coding to organize the ideas and concepts from interview transcripts, interview notes, fieldnotes, and my reflective journal.

Aside from keeping separate records for data collected by categories and ideas, Robins and Eisen (2017) argued that researchers should ensure that they saved data logically and consistently for privacy as well as for confidentiality. Using a coherent and consistent way to name electronic documents and files, for each participant from interviews, I assigned a pseudonym, a case number for the site of the interview, and date to save the data on my hard drive. Moreover, Yin (2018) reinforced the significance of keeping research data safe and secure to protect stakeholders of the research. Thus, I had a consistent structure to save raw qualitative data securely into a specific electronic encrypted filing system. For security purpose, as the only person with access to the data collected, I stored all digital data on a password-protected external hard drive, with a copy of the encrypted information on the cloud drive and kept all physical documents or artifacts into my fireproof safe at home. Furthermore, after 5 years of completion of the study, I will destroy all electronic and physical data about this study.

Data Analysis

Data analysis is a significant step in the research process of qualitative case studies as it enables the researcher to explore the organized data and reduce extensive data into meaningful patterns which lead to rich data. To process data collected through interviews, direct observation, participant observation, and performance documents in the scope of qualitative case study design, Yin (2018) advocated the use of a five stages data analysis to generate patterns. Using the five steps analysis of qualitative data which are (a) compiling, (b) disassembling, (c) reassembling, (d) interpreting, and (e) concluding, I will provide a systematic approach to ensure rigor in the thematic analysis (TA). While the five stages data analysis is useful to find common topics within each data collection methods, to enhance validity in qualitative research the researcher can triangulate multiple sources of data to help reach data saturation (Fusch, Fusch & Ness, 2018). There are four types of triangulation, which is (a) data triangulation, (b) investigator triangulation, (c) theory triangulation and methodological triangulation (Denzin, 2009). In the context of this single case study design research, since I used more than three data collection methods, I opted to use methodological triangulation.

Within the process of data analysis, to maintain rigor, I explored and investigated through reading and subsequent rereading of the data from all the data collection methods in the categories/coded list which continued into the methodological triangulation process. Castleberry and Nolen (2018) argued that because of the significant implication of TA to generate quality findings researchers were to maintain rigor. By going through the five steps analysis of qualitative data, I gave detailed explanation of how (a)

transcripts followed by member checking from interviewees was essential in the compiling step, (b) how categorizing and coding were critical within disassembling, (c) how the generation of concepts and ideas into sub-categories were primary into the reassembling stage to build hierarchies and matrices, (d) how interpretation was complete, fair, and accurate, and (e) concluding with triangulating the findings could lead to data saturation. Castleberry and Nolen further explained that aside from transcript reviews, and member checking post interviews, data collected in the form of fieldnotes post a direct observation or participant observation could also go through classic data analysis method or Computer-Assisted Qualitative Data Analysis (CAQDAS). Lockett, Currie, Finn, Martin, and Waring (2014) as well as Marshall (2014), posited that sensemaking was the act in which individuals communicated and made sense together framed by a common culture. Despite using CAQDAS to conduct TA, as the objective was to become more intimate with the data for an interpretative purpose, I read the data several times before, before and during the entire data analysis process to make sense of the common behavior and strategies hoteliers used.

Since the primary data of my study came from interviews, direct observation, participant observation, and secondary data was from data mining of the company's performance documents. I used Microsoft Excel and Nvivo for mac12 for the five stages of data analysis. Feng and Behar-Horenstein (2019) advocated the use of CAQDAS like NVivo in addition to the classic data analysis method as it enabled the researcher to analyze the longitudinal qualitative dataset. To mine extensive data set, from the use of

Nvivo, I (a) analyzed the word frequency from the raw data, (b) completed text search, and (c) use matrix coding features.

For the *compiling stage,* I copied the raw data from the (a) verbatim transcript of the interview, (b) fieldnotes post direct observations, and (c) reflective journal data post participant observation into individual excel sheets using categories and headings to identify the data. For instance, I separated and compile the data using the type of data collected, participant's pseudonym, questions, and responses.

In the *disassembling stage,* by taking apart raw data for the purpose of creating meaningful groupings, the researcher is able to use coding to filter the meaning (Austin & Sutton, 2014). I was flexible to the emergent meaning from the raw data as I used descriptive code to identify the role, process, and various action pertaining to the research questions. Hence, after using a new tab in my Excel workbook, I used color code the qualitative raw data by theme. Additionally, I made use of the use of NVivo to analyze the (a) word frequency, (b) text search, and (c) matrix coding features; allowing the elimination of unnecessary data not about the purpose of the study.

In the *reassembling stage,* Braun and Clarke (2006) posited that once researchers separated the usable data by code, reassembling them by common patterns was crucial for identifying concepts and ideas. I used hierarchies and matrices to develop a structure which leads to the identification of relationships among participants, groups, contexts, and codes. Additionally, I conducted member checking with participants to affirm that I represented their experiences accurately.

Despite interpretation happening in the three previous stages of data analysis, in the *interpretation stage,* I identified thematic patterns in light of the research questions, the purpose of the study and the literature related to the research topic. Following Yin's (2018) recommendations on interpretation, I ensured that the qualitative data interpreted was fair, complete, and accurate. Furthermore, I used a pictorial map to give a visual representation of the relationship between the ideas and concepts through codes.

Finally, in the *concluding stage,* I responded to the overarching research question and the purpose of study, which was to explore the strategies hoteliers used to develop and implemented IoT systems to increase profit. To enhance credibility and dependability of research findings, Denzin (1970, 1978) advocated triangulating multiple sources of data to reach data saturation, as no single method, theory or researcher could capture all relevant data about the observed phenomenon without bias. As I used interviews, direct observations, participants observation, and performance documents, I triangulated my findings from the various data collection methods using a rigorous thematic analysis process to mitigate research bias.

Padgett (2016) advocated the use of thematic analysis to categorize important ideas and concepts in alignment with the purpose of study. After evaluating the common ideas and concepts from the four data collection methods used, through CAQDAS I developed key codes which will enable me to understand what the data is telling me from key coded list. Moreover, after reading through the key codes list numerous times, I interpreted the meaning of key codes list and develop theme from the data analysis. I discussed my research findings in the context of Porter's value chain model used as a

conceptual framework for this study in addition to supporting and opposing theories. Likewise, I emphasized how the findings align with key current existent literature, including literature published since the writing of this proposal. Consequently, post the data analysis process I showed rich and in-depth findings from multiple sources ensuring the validity of the study results.

Reliability and Validity

Reliability and validity are essential concepts in research, as researchers focus on meeting quality criteria within all the major elements of the research process and presentation of findings. As Fusch and Ness (2015) explained, to ensure quality and reduce bias in research, qualitative researchers should (a) implement rigorous criteria like member checking, interview and observation protocol within the research process, (b) use different data collection methods, and (c) use triangulation to reach data saturation. Lincoln and Guba (1985) recommended demonstrating dependability, credibility, transferability, and confirmability as measures of reliability and validity. Hence, I demonstrated dependability, credibility, transferability, and confirmability in this qualitative study.

Reliability

Since researchers need to show elements of reliability within the research process, the objective is to confirm the coherence of the research findings. Consistency and replicability are elements which researchers use to determine the reliability of research findings (Heale & Twycross, 2015; Yin, 2018). Consequently, researchers present evidence of reliability by showing that their research instrument and process would lead

to the same result in the event of replication. However, seminal researchers (Denzin, 1978; Marshall & Rossman, 2016; Stake, 2010) argued that reliability did not apply to qualitative research because of the subjectivity of participants to answer similar questions differently. Instead, Lincoln and Guba (1985) proposed using dependability to assure consistency and transparency in the data collection process to reflect on the position of the researcher as the research instrument. For this study, I used (a) reflexivity, (b) member checking, and (c) triangulation to mitigate research bias and assure the audience that the findings were dependable.

Researchers need to be transparent and open to their audience in their reflective process. Since complete detachment from participants is unrealistic, especially when the objective of the researchers is to collect rich and in-depth data, researchers use reflexivity to mitigate research bias (Jootun, McGhee & Marland, 2009). Hence, I maintained a reflective journal to provide the readers with a critical self-reflection of the research process. To validate the accuracy of the interpretation of the respondent's perspectives gained via the interview process, I completed member checking interviews. These follow up interviews enabled me to ensure the relevancy and accuracy of the summarized interview findings.

Denzin (2002), as well as Sim and Sharp (1998), advocated that the use of multiple sources of data for triangulation purpose lead to data saturation. To improve the consistency of findings, using semistructured interviews, direct observation, participant observation, and company performance documents, I used methodological triangulation to report consistent findings.

Validity

Accuracy, appropriateness, and relevance are the key criteri to define the validity of the research process leading to its findings (Marshall & Rossman, 2016). In comparison to qualitative research, quantitative researchers can test for validity through numerical accuracy of their research instrument as they reject the possibility that there is a reality external to our perception (Heale & Twycross, 2015). Using the approach of Lincoln and Guba (1982) to establish validity in qualitative research, I ensured that the research findings for this study were credible, transferable, and confirmable.

Credibility. Credibility in qualitative studies is an indicator of trustworthiness as it reduces research bias and is similar to the concept of internal validity in quantitative research (Sim & Sharp, 1998). To ensure credibility, Korstjens and Moser (2018) suggested using strategies like prolonged engagement, persistent observation, triangulation, and member checking. In this study, I used (a) member checking to enhance accuracy, (b) a rigorous data collection process for direct and participant observation, and (c) methodological triangulation.

Transferability. Transferability is achievable when the reader and future researchers are able to demonstrate and decide that the set of findings found in a research are applicable to another context (Marshall & Rossman, 2016; Saab, Landers, & Hegarty, 2017). Korstjens and Moser (2018) explained the existence of transferability in qualitative research occurred when researchers provided a thick description of the research process good enough for an outsider to decide on the transfer of meaningful data to a different context. In this study, to enhance the potential for the findings to be

transferable, I provided extensive details concerning the data collection technique, data organization technique, and data analysis; leaving the transferability of the findings to the reader and future researchers to determine.

Confirmability. Confirmability indicates the extent to which results from data collected reflects the relevance and accuracy of findings from the perspective of participants and observation (Lincoln & Guba, 1982, 1985). Jootun et al. (2009) argued that when the researcher and participants influence each other in the data collection process, it was essential to making the relationship explicit to the audience to mitigate research bias resulting from subjectivity. Consequently, I followed up soon after the initial interview with my interpretation of the participant's original responses for member checking while also using a reflective journal to document any possible research bias post direct and participant observation.

Data Saturation

Data saturation is a significant component of the research process, as it provides enough evidence that the researchers collected enough data for analysis before making a valid conclusion (Denzin, 1978; Merriam, 1998; Yin, 2018). While Stake (2010) explained that reaching data saturation was possible when no new information resulted from data collected, Smith (2018) argued that the complete reliance on a single data collection method like interviews, as well as the failure to discuss other sources of evidence, affected quality in research. Since I used semistructured interviews, direct observation, participant observation, and review of company performance documents to

collect data, following protocols and using methodological triangulation, I strived to obtain data saturation.

Transition and Summary

In Section 2, I deliberated on the research design and process of my doctoral study to ensure that I present credible, dependable, confirmable, and transferable findings. As I selected a qualitative single case study design to explore the IoT strategies which hoteliers used to increase profit, I also elaborated on using multiple sources of data aside from semistructured interviews to ensure the presentation of rich and in-depth data. Additionally, as the primary data collection instrument, I explained my role as the researcher, which is to adhere to an ethical research process in the collection of data from participants post IRB approval. Moreover, following protocols and using methodological triangulation, I explained how I would strive to obtain data saturation. In Section 3, I presented the findings of the study, the application to professional practice, the implications for social change, recommendations for action and further research, and reflections.

Section 3: Application to Professional Practice and Implications for Change

Introduction

The purpose of this qualitative single case study was to explore the strategies hoteliers used to develop and implement IoT systems to increase profit. The targeted population consisted of hoteliers who developed and successfully implemented IoT systems implementation strategies within their business activities in a hotel located in the eastern United States. Four participants representing the entire population of this study participated in both face-to-face and online semistructured interviews. Besides use of rich and thick data from semistructured interviews, through other data collection methods consisting of participant observations, direct observations, company documents, and reflective journaling, triangulation provided numerous lenses to assess the quality of this study. Despite the benefits of using probing questions to collect rich data and an interview protocol to guide the interview process, I used member checking and methodological triangulation to ensure reliability and validity.

After conducting data analysis, the three emerging themes were (a) offering end-to-end guest experiences through innovation, (b) eliminating need for transactional activity, and unlocking free time for meaningful human-only work. The findings of this study revealed strategies hoteliers can use to develop and implement IoT systems to increase profit. This section also includes a critical analysis and synthesis of new literature published since the proposal and correlations with findings. I will explain how the findings tie with Porter's) value chain model as a conceptual framework, the

applicability of the study to professional practice, implications for social change, recommendations for further research, and a reflection and conclusion.

Presentation of the Findings

The overarching research question of this single case study was: What strategies do hoteliers use to develop and implement IoT systems to increase profit? For this study, which occurred in the eastern United States, I selected a franchised hotel where hoteliers were successful at increasing profit by implementing IoT systems strategies. Using a census method, I conducted both face-to-face and online semistructured interviews with four participants. These participants held the positions of Vice President of Food and Beverage Operations, general manager, hotel manager, and front office manager, and were all involved with development and implementation of IoT systems strategies.

Since Marshall and Rossman (2016) stated that in qualitative research the researcher is often the research instrument and one cannot separate oneself from the research, which inevitably includes the researcher's personal perspective and biases (Wolcott, 2009), In this study, I used several data collection techniques together with member checking and a clear statement of my role. As a scholar-practitioner, my role as a researcher was about finding knowledge related to my business problem rather than influencing questions and answers based on personal experience as a former hotelier and now hospitality educator. Fusch and Ness (2015) argued that using multiple data collection techniques will help one obtain deep and rich data as well as potentially enhance reliability and validity through data saturation. As the sole researcher of this qualitative study, to enhance reliability and validity through data saturation and mitigate

research bias, I used member checking after interviews as well as multiple sources of

qualitative data.

Consequently, after the initial interview, I interpreted what participants discussed

and shared back my interpretations for validation during followup interviews for member

checking. Denzin (1970, 1978) advocated the use of multiple sources of qualitative data

to mitigate research bias. Besides semistructured interviews, other sources of data came

from direct observations, participant observation, and company documents, as well as a

reflective journal.

Allen and Wiles (2016) explained that the term confidentiality referred to the

commitment of the researcher towards those in the study to not reveal their participation

and personal identity. For confidentiality, I initially labeled the participants as P1, P2, P3,

and P4. During the data organization process, I changed them to pseudonyms (John, Paul,

Jim, and Sarah). After collection of all qualitative data and achieving data saturation from

the interviews as well as member checking, I used Microsoft Words, as well as CAQDAS

and NVivo 12 for Mac as tools to organize data. I used an integrated approach to coding

as this strategy enabled me to (retain the benefits of inductive coding, acknowledge

certain code types that were useful in developing certain forms of output, and begin with

broad types and then develop subcodes from data. Using the five steps of qualitative data,

which were compiling, disassembling, reassembling, interpreting, and concluding, I was

able to provide a systematic approach to ensure rigor in the thematic analysis.

During the compiling stage, I copied raw data from verbatim transcripts of

interviews, field notes, reflective journal data, and company performance documents

annual report presentations and other marketing materials into NVivo using categories

and headings to identify the data. I separated and compiled data using type of data

collected, participants' pseudonyms, questions, and responses.

During the disassembling stage, by taking apart raw data to create meaningful

groupings, I used coding to filter meaning during the early stage of my initial coding (see

Figure 5).
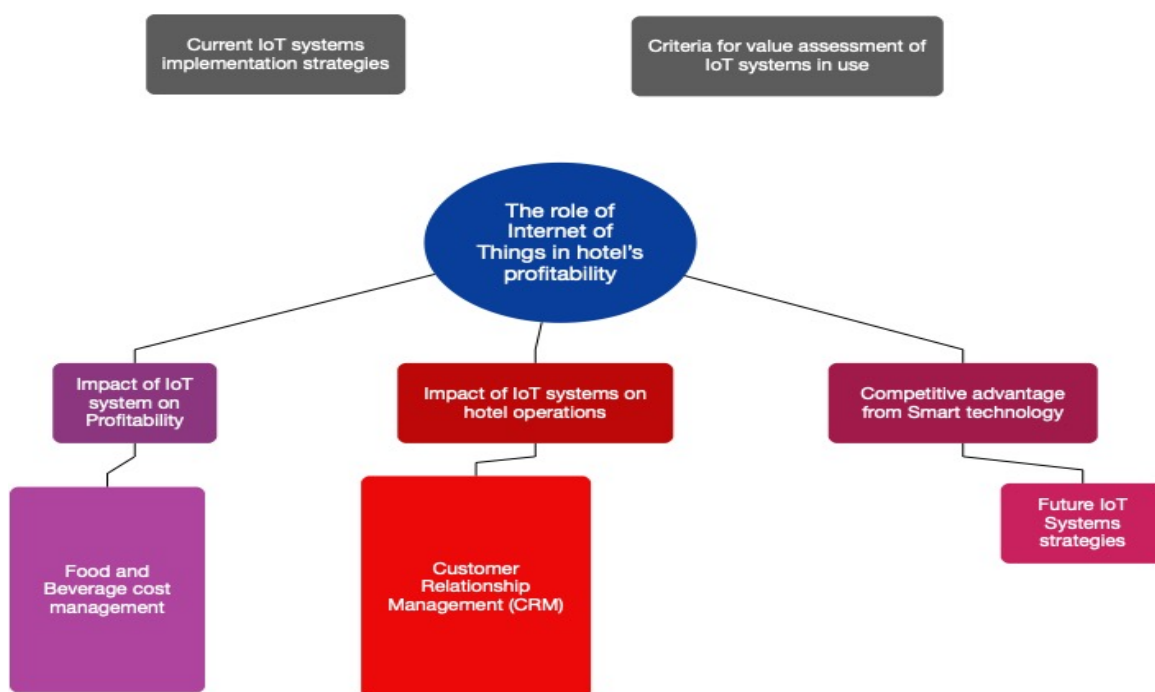
*Figure 5.* Depiction of early thoughts on coding.

I was flexible to the emergent meaning from the raw data as I used descriptive

code to identify the role, process, and various action pertaining to the research question. I

used NVivo to analyze word frequency, text, and matrix coding features, allowing the

elimination of unnecessary data not about the purpose of the study. This activity in the

data analysis process enabled me to reassemble and combine codes for a better

organization of the data analysis to come (see Figure 6).
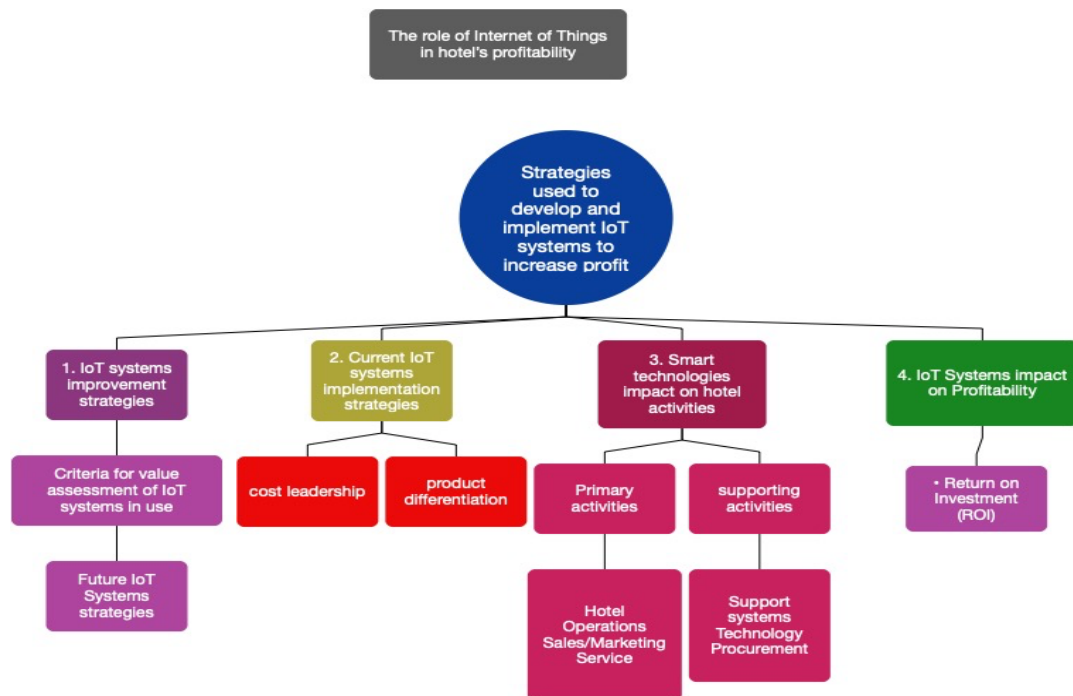
Figure 6. Depiction of adjusted coding map.

In the *reassembling stage,* I used hierarchies and matrices to develop a structure

which lead to the identification of relationships among participants, groups, contexts, and

codes. Despite interpretation happening in the three previous stages of data analysis, in

the *interpretation stage*, I identified thematic patterns in light of the research questions,

the purpose of the study and the literature related to the research topic. Following Yin's

(2018) recommendations on interpretation, I ensured that the qualitative data interpreted

was fair, complete, and accurate. Moreover, I linked the related categories of coded

concepts and ideas using lines through a pictorial map to give a visual representation of the relationship between the ideas and concepts through codes (see Figure 7).
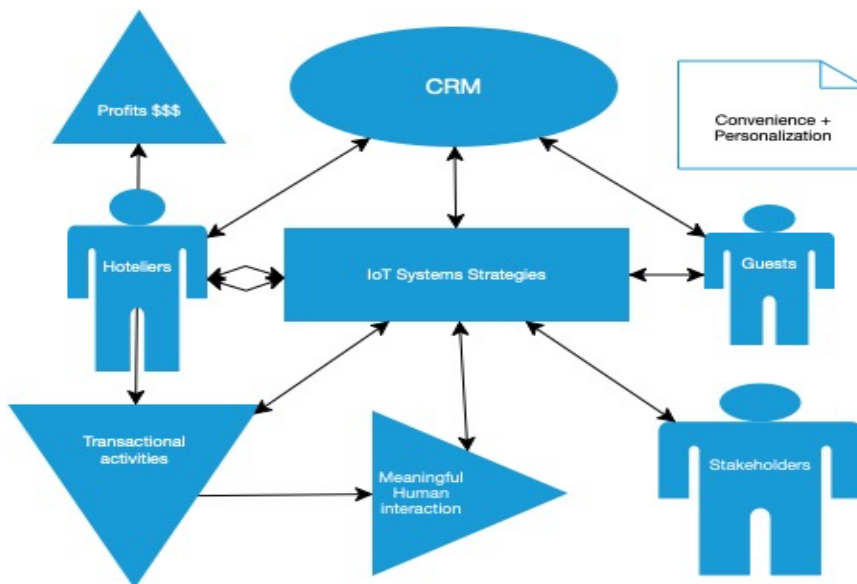
Figure 7. Depiction of concepts and ideas.

Finally, in the *concluding stage,* using sensemaking I responded to the overarching research question and the purpose of study, which was to explore the strategies hoteliers use to develop and implement IoT systems to increase profit. As I used semistructured interviews, direct observations, participants observation, company performance documents, and a reflective journal, I triangulated my findings from the various data collection methods using a rigorous thematic analysis process to mitigate research bias. Lockett, Currie, Finn, Martin, and Waring (2014) as well as Marshall (2014), posited that sensemaking was the act in which individuals communicated and made sense together framed by a common culture. With this ongoing process, I reviewed the themes, concepts and ideas several times before providing my final perspective on the

three emerging themes. As such, the three emerging themes were (a) offer end-to-end guest experiences through innovation, (b) eliminate need for transactional activity, (c) unlock free time for meaningful human-only work.

Theme 1: Offer end-to-end guest experiences through innovation

From the data analysis offering end-to-end guest experiences through innovation was the first theme that transpired with the background idea of convenience and personalization needs. Post the analysis of all the participant's response, the offering of end-to-end guest experiences through innovation was an essential strategy which hoteliers consistently used when developing and implementing IoT systems strategies to increase profit. The first theme was also present in the direct observation of the Front office manager, participant observation, several performance companies' documents as well as my reflective journal.

Evidence to offer end-to-end guest experiences through innovation was through the use of the digital key system and the virtual assistant. Jim (pseudonym), the front office manager stated:

> Especially for our business travelers, convenience is a priority. They can go up to the room, using their digital key, set up their computer and get on a conference call, communicate with us through the virtual assistant and get to the meeting that they have within the next fifteen minutes. So, from their perspective, it's a convenience.

Such a statement was also apparent with John (pseudonym), the general manager of the hotel said:

Millennials and the younger generations love to use their smartphone for pretty much everything these days. So, for us, sometimes we have guests who never come to the front desk. They made their reservations with ease through the hotel app, check-in with the digital key, communicate and personalize services through the cellphone, and leave without formal check-out.

Additionally, during the participant observation as a hotel guest experiencing the IoT systems strategies in application from reservation to check out, I found that the use of the digital key and the hotel virtual smart assistant to be useful. Post my participant observation, I found the digital key to be a convenient benefit for being a member of the hotel loyalty program. Finally, in several company documents, this theme was evident with snippet of information like, "with services like virtual assistance and digital key, our guests have similar control that they have at home, and it makes for a seamless end-to-end experience."

Precisely, this strategy aligns with Porter's (1985) value chain model as a conceptual framework, as the hoteliers were able to improve an essential traditional primary activity (reservation, check-in, concierge service, and check-out) with the supporting activity of technology which is the IoT system. In an empirical study between 2013-2016 about strategies adopted by North American hoteliers, Sun et al. (2018) found Porter's value chain theory to be the most applicable strategy implementation model to the hotel industry because of the interaction of guests and employees creating value. Subsequently, as it pertains to the customer experience, from searching for a hotel destination, selecting a room, making a reservation, performing seamless check-in

through digital key, and receiving virtual assistance during the stay and post the visit, the increased customer value and profit was a result of IoT system implementation technology. As such, Porter's value chain model as a tool to offer end-to-end guest experiences through innovation was evident.

Since the time of the proposal, this finding correlates with the most recent studies. For instance, Lim et al. (2018) who found that going keyless in hotels created a seamless experience in hotels located in Asia. Additionally, in another study pertaining to the relationship between the use of hotel smart technology in hotels and customer experience, Casais, Fernandes, and Sarmento (2020) posited that relationship marketing and value co-creation impacted profitability in hotels. Lim et al. (2018) found that a unified hotel access control system like the digital key for hotel check-in and room access, allowed hoteliers to offer unique value in as pre-purchase, purchase, and post-purchase. The use of the digital key in this case study had a similar result as Jim stated:

> In addition to checking in digitally, selecting their room from a floor plan or list and using their smartphone as their key, members can further customize their stay via the app by requesting amenities - like extra pillows, snacks or drinks.

Concerning the positive impact of value co-creation and relationship marketing on hotel operations (Casais et al., 2020), there was a correlation with the first theme of my study. For instance, John stated, "Knowing in advance the profile of our guests enabled us to provide customized service. With customization, we can welcome and serve each guest better, improving the chance of creating loyal customers."

To implement the strategy of offering end-to-end guest experience, participants mentioned the use of IoT system technology enabled through smartphones supporting with examples like the digital key, and the virtual assistant. The offering of the end-to-end guest experience through IoT system innovation as a strategy to increase company performance aligned with the published literature (Beldona et al., 2018; Lim et al., 2018; Rihova, Buhalis, Gouthro, & Moital, 2018; Wang, Xiang, Law & Ki, 2016). Wang et al. (2016), assessed hotel-related smartphone apps using online reviews, they found that the demand for customization and personalized service had a direct relation with increasing customer value and company performance. Beldona et al. (2018) further noted that in strategic planning of hotel operations, hoteliers were to understand that most hotel guests evaluate their stay on the correlation of home and hotel experience. Sarah (pseudonym), the hotel manager, said, "Our goal is to be the most innovative hotel company, leading in delivering personalized experiences for guests in every interaction they have with our brand."

 Moreover, such an implementation of this strategy, which focused on offering end-to-end guest experience, was similar to the findings of Rihova et al. (2018), who found that aside from the online reviews, constant interpersonal contact between guests and hoteliers during the stay significantly improved the guest experience.

Theme 1 ties with Porter's value chain model as a conceptual framework, the published literature, as well as recent research studies regarding the offering end-to-end guest experience through innovative technology like IoT systems. Offering end-to-end guest experience through innovation (technology of IoT system) enables hoteliers not

only opportunities to improve service which is a primary activity in the SCM but also

with cost leadership and product differentiation strategies to enhance company

performance (Casais et al., 2020; Lim et al., 2018; Rihova et al., 2018). Post the data

analysis; it was evident that hoteliers in this study developed and implemented the

strategy of offering end-to-end guest experiences profitably through the use of IoT

system.

Theme 2: Eliminate need for transactional activity

A second theme that emerged from the data analysis was to eliminate the need for

transactional activity within the hotel operations, through IoT systems. Transactional

activities in hotel operations which are also known as the primary activities in the supply

chain of the hotel businesses, consist of managing reservation, room revenue, food and

beverage, front office, housekeeping, maintenance, security, and other guest services

(Beldona et al., 2018; Pizam, 2017). The four hoteliers that I interviewed on the strategies

they used to develop and implement IoT system strategies articulated that eliminating the

need for transactional activity within the primary hotel activities led to increasing profit.

From the semistructured interviews, participants mentioned that when they

eliminated the need for transactional activity, they saved on labor cost, increased

productivity, improved the consistency of hotel products, which all help in achieving a

return on investment (ROI) as well as increased profit. This theme was also evident from

the direct observations of the General manager and Front office manager, who always

referred to live streaming performance reports from the IoT system to implement their

strategy. Additionally, this strategy was evident in the analysis of the past four years of

investor presentations, as the hotel company achieved consistent growth in market share, cash flow, preserved a strong balance sheet, accelerate return of capital, and maintain the increase in net income as a result of IoT system strategies. The strategy of eliminating the need for transactional activity through the IoT system aligned with the published literature (Melian-Gonzalez & Bulchand-Gidumal, 2017; Queiroz, Tallon, Sharma& Coltman, 2018; Pizam, 2017; Shin et al., 2019.

For reducing labor costs and improving productivity, all participants implemented this strategy by using the data analytics derived from each activity where employees, vendors, and consumers were involved in using IoT systems to make business decisions relevant to optimizing the performance of the hotels. In the context of managing hotel operations through smart technology, Queiroz et al. (2018) noted that ROI was not the sole measure for the optimization of capital investment but instead recommended technological capability. John stated:

> With the digital key systems, the virtual assistant, and the smart hotel app, we have been able to save on labor cost, material costs for key cards, and reduce customer complaints from nonfunctional keys and wait time at the desks.
>
> Paul (pseudonym)., the Vice President of food and beverage operations, said:
>
> With a food management software based on IoT system technology's supplier portal, ordering, budgeting, inventory managing, and planned purchases for all of our recipes, the savings were on labor and reduction of food costs. My chefs can deliver custom real-time data analysis informing me when to raise prices, cut waste, and much more.

Additionally, Jim stated:

IoT helps with the age-old problem of getting heads in beds. Revenue managers at the hotels use the IoT system to decide on the price of rooms each night based on a series of factors such as competitors' pricing, events in the area, weather, and more, all in real time.

Finally, from the analysis of the company performance documents, from 2017-2020, using smart technology to reduce transactional activities to create a more meaningful human relationship was a consistent strategy which leaders communicated to their investors. This strategy to eliminate transactional activities through the IoT system correlates with the most recent study by Lim et al. (2018), who also found that through advanced IT system capability, hoteliers managed to improve service and reduced cost.

Concerning improving the hotel product and services offering, by the elimination of transactional activities, both Paul and Jim stated that in the field of food and beverage as well as front office, guest's satisfaction went up as a result of more efficient service and a consistency in the quality hotel product. Through competitive intelligence harnessed through big data analytics derived from the IoT system in hotel operations, hoteliers can enhance their hotel product sustainably (Melián-Alzola, Fernández-Monroy, & Hidalgo-Peñate, 2020). Paul said:

In my culinary world, the time spent on our primary activities consist of food ordering, receiving food, crafting recipe cards, costing food, executing dishes, monitoring price changes, have been reduced opening time for more creativity and quality focus on food and beverage output.

Jim stated:

What the use of digital key does on a daily basis; it allows the guests to have the

convenience and the choice that if they want to, they don't have to stop by the

desk to do the normal checking process.

Moreover, from the company performance documents, via investor presentations,

the slogan of "guestroom technology platform allows guests to feel at home while away

and drives operational efficiencies" was always present in several online marketing

materials. As shown in previous studies, the strategy of eliminating transactional

activities through smart technology like the IoT system is also present in current business

practice (Köseoglu et al., 2019; Melián-Alzola et al., 2019). Furthermore, this theme

aligned with the latest study of Köseoglu et al. (2020), who posited, through competitive

intelligence derived from big data analytics and IoT systems, front-line employees could

unlock productivity barriers and deliver better hotel products and services.

The strategy of eliminating the need for transactional activity in hotel operations

ties to the conceptual framework of Porter's value chain model. Changes in SCM

resulting from supporting activities like technology as well as primary activities like

operation and service lead to increase margin (Porter, 1985). The common themes from

all participants as well as the analysis of company performance documents and

observations pointed towards the strategy that eliminating the need for transactional

activity (improvement in operations and service) through IoT system (technology)

resulted in a similar result as expected in Porter's value chain model. Consequently,

eliminating the need for transactional activity through the use of IoT systems is a useful

strategy for hoteliers developing and implementing IoT system strategies to increase profit.

While theme 2 ties with the conceptual framework and the published literature (Köseoglu et al., 2019; Lim et al., 2018; Melián-Alzola et al., 2019), it was a compelling element as part of the different strategies used by hoteliers when developing and implementing IoT system strategies to improve company performance. To increase profit through this strategy successfully, hoteliers should review the technological capability of the IoT system, before eliminating superfluous transactional activities in their hotel operations.

Theme 3: Unlock free time for meaningful human-only work.

A third theme that emerged from the semistructured interviews, observations, and company performance documents was to unlock free time for meaningful human-only work. The data analysis revealed that when hoteliers developed and implemented IoT system strategies to unlock free time for meaningful human-only work among stakeholders like employees, vendors, and guests, there were more opportunities for increased profits. By unlocking free time for meaningful human-only work, hoteliers could create opportunities for their hotel staff to create long-lasting memories for their hotel guests and more time for the guests to co-create value with the hotel brand (Harrington et al., 2019). All four participants stated that the most significant impact of using smart technologies like the IoT system in their hotel operation was the newly available time for their employees to execute meaningful human-only work as a result of less transactional activities.

Participants mentioned that the strategy to unlock free time for meaningful human-only work improved guest interaction, employee creativity, and service innovation. In memory dominant industries like hospitality, meaningful human interaction is a significant factor in enhancing customer value, which ultimately creates a sustainable competitive advantage through increased brand loyalty. Harrington et al. (2019) argued that to create long-lasting memories for hotel guests, employees could use technology to create more time to interact on a personnel level with guests. In this study, after analyzing the participant's response within the front office and food and beverage department, the use of IoT system technologies did create more time for front-line employees to provide more personalized service as well as delight their guests. As Paul stated, "From digitizing the food and beverage procurement processes, chefs are now able to ensure the quality and consistency of our product with consistency on service and opportunity to wow customers through creative dishes."

Moreover, Jim said, "Since using the digital key system, we have been able to have more time to interact with guests under less pressure, but most importantly doing so under less stress."

Since the hospitality industry is highly dependent on people's interaction to cocreate value (Morosan & DeFranco, 2019), globally, hoteliers continuously look for opportunities to improve their SCM with a focus on employees and customers. By creating sustainable value in the hotel's primary activities in departments like sales and marketing, food and beverage, rooms division, reservations, and guest relations, hoteliers improve profitability (Leung, 2019; Lim et al., 2018; Shin et al., 2019). Therefore, using

IoT systems to unlock free time for meaningful human-only work in memory dominant industry like a hotel is significant when the goal is to increase sustainable profit.

The strategy to unlock free time for meaningful human-only work aligns with the most recently published literature as an effective way to use the IoT system to increase profit in the service industry (Shin et al., 2019; Tajeddini., Martin & Altinay, 2020). In a study which assessed the human-related factors on service innovation and performance in the Japanese hospitality industry, Tajeddini et al. (2020) found that despite the use of smart technology and the availability of knowledge management, improved hotel performance was dependent on employees commitment to interact in a meaningful way with customers. As John stated:

> I still believe that face to face communication and the people aspect of hospitality is the most important. When a guest arrives at the hotel, no technology can replace a nice welcome. Our hotel is known to provide warm cookies upon arrival. Since the digital key, we have more cookies leftover. Which means guests are not interacting with front desk agents upon arrival.

> Conversely, Paul said:

> Through newly available time, our chefs have been able to build the local relationship with local fishermen, and farmers ultimately enabling enormous creative opportunities for our chefs using their product, which ultimately benefits our guests with real-time storytelling about their food.

Furthermore, Jim stated, "Since the implementation of IoT system strategies, we can focus on far more important activities such as tracking, trends, and behaviors of guests and have been able to have more time to interact with guests under less pressure."

While participants expressed somewhat similar insights on the impact from unlocking free time for meaningful human-only work, within the company performance documents, the purpose of using smart technology like the IoT was also about creating available time for associates to interact meaningfully with guests. Because the hospitality industry is people-driven (Pizam, 2017), the concepts and ideas developed from such responses during the interviews, led to the strategy of using smart technology to unlock free time for meaningful human interaction with guests. The fact that not all hoteliers agreed that their employees effectively used the newly available time to innovate service expectations and enhance customer expectation is proof that the level of commitment from both front-line employees and managers is critical. As such, the new literature published by Tajeddini et al. (2020) about the positive relationship between employees' level of commitment to effectively use human-only work and service innovation correlates with the findings in this study.

Unlock free time for meaningful human-only work also ties to the conceptual framework as it relates to the service element of the list of primary activities in Porter's value chain model. Porter (1985) argued that improvement in primary activities supported by other enhancement supporting activities led to increasing profit. In this instance, unlocking free time for meaningful human-only work relates to service as one of the five primary activities which influenced the margin of a company. As such, if a hotelier can

improve service in its supply chain of activities, supported by technological improvement through IoT systems, the value chain model holds that an increase in profit will be the likely outcome.

From the discussion behind the reasoning for theme 3, it is evident that unlock free time for meaningful human work aligns with the published literature (Harrington et al., 2019; Morosan & DeFranco, 2019; Shin et al., 2019; Tajeddini et al., 2020 and Porter's value chain model as a conceptual framework. To implement this strategy, hoteliers ought to ensure that their managers and front-line staff are effective in using the newly free time for quality guest interaction and service innovation. By implementing IoT systems strategies in hotel operations, hoteliers can unlock free time for their service staff to have meaningful human work, which ultimately leads to improving company performance for all stakeholders.

Applications to Professional Practice

I explored the strategies hoteliers used to develop and implement IoT systems to increase profit using Porter's value chain model as a conceptual framework because hotel leaders often lack such strategies. Despite a significant increase in the use of smart technology in our society (National Science Board, 2018; Radoglou Grammatikis et al., 2019), the development and implementation of IoT system strategies took a longer level of acceptance in the hospitality industry because of its reliance on affordable labor and a focus value co-creation between guests and front-line employees (Casais, 2020; Pizam, 2017). However, with an increase in the level of guest's expectation of smart technologies in hotel rooms to be better than technologies they have at home (Buhalis,

2018), coupled with the need for personalization and convenience (Lim et al., 2018; Rihova et al., 2018), the business opportunities from developing and implementing IoT system strategies in hotels go beyond increased profits solely. The findings of this study include pertinent qualitative data as well as practical strategies that hoteliers can use to develop and implement IoT system strategies profitably. Additionally, this research study may provide useful insight for hotel organizations planning to use smart technology within their supply chain of activities to create sustainable value and possible competitive advantage.

In the scope of enhancing professional business practice, the findings from this study may provide hoteliers with feasible recommendations to increase profits through the development and application of IoT system strategies in hotel operations. Three themes materialized from this research study performed at a franchised hotel located in the eastern United States. These successful strategies were to offer end-to-end guest experiences through innovation, eliminate need for transactional activity, unlock free time for meaningful human-only work.

To implement the strategy of offering end-to-end guest experiences through innovation, hoteliers can use IoT system, which focuses on the need and expectation of their hotel guests from pre-purchase, during consumption to post-purchase (Casais et al., 2020; Lim et al., 2018). In this single case study, from the data collected, the hotel used a mobile application which enabled the guest to make a reservation, select the room, download the digital check-in without stopping at the front desk and using the virtual concierge through the phone to benefit from services during the stay. By using an IoT

system to offer end-to-end guest experiences, hoteliers would improve the level of personalization of service and open several opportunities for customization of the hotel products and services, ultimately leading to increased profits.

To eliminate the need for transactional activity through IoT system, hotel leaders should reevaluate the different mundane tasks which their employees complete and look into how smart technology could increase the productivity, lower labor cost, and create opportunities for product differentiation (Köseoglu et al., 2019; Lim et al., 2018; Melián-Alzola et al., 2019). From the data analysis, the use of the digital key system, which enabled direct booking with the hotel, self-check-in, and check-out, was a clear example of how hoteliers eliminated the transactional activity within the reservation and front office area of the hotel. For future hoteliers planning to develop and implement a similar strategy, the technological capability of the type of smart technology which hotel leaders plan to use should serve a relevant purpose to hotel operations without negatively impacting the customer experience.

While IoT system technology can assist with eliminating transactional activity, hoteliers ought to understand that it enables them to unlock free time for meaningful human-only work. In memory dominant industries like hospitality, meaningful human interaction is a significant factor (Harrington et al., 2019). From the data collected related to the hotel site, while the intent of the hotel leaders was to create more opportunities for hotel guests to interact more with front-line staff in a meaningful way, it was not always the case as some guests preferred to focus on the convenience of technology and avoid personal communication with the front desk staff. In professional practice, to unlock free

time for meaningful human-only work, hoteliers may want to think creatively on how front-line staff can innovate their service, especially when smart technology disrupts traditional value co-creation opportunities like traditional front desk check-in.

Data from semistructured interviews, observations, and company performance documents revealed that hoteliers could benefit profitably from the development and implementation of IoT system strategies. As consumers increase the use of smart technologies, hoteliers are looking for ways to utilize smart technologies like the IoT to improve the value proposition for their guests (Buhalis & Leung, 2018; Wu & Cheng, 2018). By applying research findings to business practices, hoteliers may develop and implement IoT systems strategies, which lead to increase profit but, most importantly, the new value proposition for hotel guests who assessed hotels based on memories and experience.

Implications for Social Change

The findings from exploring strategies hoteliers used to develop and implement IoT systems to increase profit may have implications for positive social change. Aside from creating employment in the local area, if a hotel is financially successful in the long run, hoteliers can afford to increase employee benefits as well as contribute to the socioeconomic needs of the community (Mitchell et al., 2015). While the successful IoT system strategies from this study may help hoteliers improve their supply chain activities to enhance the value proposition and increase profit, the overall success of the hotel industry may assist in job creation, which is a socioeconomic contribution.

Pavlou (2018) noted that IoT in the industry and everyday life could improve performance and quality of life. As observed from the findings of this research study, the implementation of IoT system strategies will not take away the job within the hotel operations. As the hoteliers use IoT system strategies to improve their supply chain, the concept of shared value (Driver, 2012) which is about social entrepreneurship, could benefit all stakeholders of the hotel business because of the financial capability to create new jobs which leads to positive social change (Caplan, Dutta & Lawson, 2016; Mitchell et al., 2015). Through IoT system strategies, hoteliers may tap into new opportunities to enhance the value of the hotel product and services by innovating service and creating meaningful human-only work jobs. Additionally, as each hotelier implements IoT system strategies and becomes financially successful, the long-term outcome may be in the form of hotel expansions, creating jobs for several local communities. Thus, the implications for social change are that through the financial success and job creation emanating from the development and implementation of IoT system strategies in hotels; hoteliers may increase local employment for the local community as a result of sustainable business growth.

Recommendations for Action

With the fourth industrial revolution, our society is experiencing a significant increase in the use of smart technology devices in several industries like health care, public transportation, banking, security, agriculture, and the service industry, requiring a need for business leaders to develop and implement IoT system strategies within their supply chain of activities. The most recent pandemic of COVID-19 showed that more

than ever, businesses that have the most robust IoT system strategies would be able to survive in a society where less face-to-face business activity is required to avoid contamination.

The findings of this study revealed successful strategies developed and implemented by hoteliers to increase profit. Current hotel leaders who are planning or already using IoT system strategies within their hotel operations may consider the recommendations from this study to increase their profit as well as improved their customer value proposition. In the scope of implementing and developing IoT system strategies for hotels, I recommend three approaches, which are to (a) offer end-to-end guest experiences through innovation, (b) eliminate the need for transactional activity, (c) unlock free time for meaningful human-only work.

A first recommendation is to offer end-to-end guest experiences through innovation. Hoteliers may focus on the need and expectation of their hotel guests from pre-purchase, during consumption to post-purchase, to ensure that the entire experience of the guest is seamless and memorable enough to repeat the hotel stay. By using IoT system technology in the different steps of the business model of the hotel product and services, hoteliers may benefit from cost leadership as well as product differentiation, which are two catalysts for competitive advantage.

Another recommendation is to eliminate the need for transactional activity. Within the hotel operations, several mundane activities may be removed to increase consistency in service, lower cost of action, and create opportunities for personalization of products and services. For instance, hoteliers may re-evaluate the different

transactional activities which their employees complete and look into how smart technology could enhance company performance.

The final recommendation is to unlock free time for meaningful human-only work. Hoteliers need to understand that the IoT system does not replace customer service and that significant human interaction remains a critical element of the hotel business. To implement this strategy, hoteliers may want to think creatively on how front-line staff can innovate their service, especially when smart technology disrupts traditional value co-creation opportunities like regular front desk check-in.

To develop and implement IoT systems strategies profitably in the hotel industry, I recommend that hoteliers aligned their strategy with the three identified themes from this study. I intend to disseminate the findings of this study to both the academic and professional community of the hospitality and the smart technology industry through publication in academic journals, trade journals, as well as at conference presentations.

Recommendations for Further Research

The purpose of this qualitative single case study was to explore the strategies hoteliers used to develop and implement IoT systems to increase profit using Porter's value chain as a conceptual framework. The qualitative data emerged from a single franchised hotel located in the eastern United States, through multiple sources consisting of semistructured interviews, participant observations, direct observations, company documents, and reflective journaling. Because of the qualitative research methodology, and the single case study design, a limitation was the inability to generalize the research findings. Moreover, because of the novelty aspect of IoT in the hospitality industry, not

many hotels and hoteliers had the IoT systems in use within their operation to be eligible to participate in this study.

As such, further research related to the development and implementation of IoT system strategies to increase profit in hotels should occur in other geographical areas or contexts. Furthermore, to generalize the research findings, further quantitative research could examine the relationship between IoT system strategies and hotel profit. New research focusing on the strategy used to develop the technological and instructional design of IoT systems for hotels may also be useful for hoteliers who want to optimize the technical capability of IoT devices in use for different purposes rather than profit. Further research could also include studying the perspectives of hoteliers outside of eastern United States, or from the insight of all line employees, versus just hoteliers. Furthermore, using an alternative conceptual framework to ground the study about the development and implementation of IoT system strategy in hotels could benefit both the academic and professional community of the hospitality industry. Hence, my final recommendation to future researchers exploring or examining the role of IoT on hotel profitability is to identify other research possibilities identified in this study, which benefit the hospitality industry.

Reflections

The completion of this doctoral study goes beyond the accolade of graduation and the designation to be a doctor. As a former hotelier and now a hospitality educator, I always wanted to contribute to both the academic and professional bodies in a meaningful way. With the increased use of smart technology in several industries, I

believe that my decision to explore the IoT systems strategies hoteliers used to increase

profit will benefit the hospitality industry. Because the hotel industry is a slow adaptor of

smart technology, exploring the successful strategies which a franchised hotel currently

used, brought new insights as well as confirmed the current findings from the most recent

literature related to a similar topic. As the sole researcher of this qualitative study, to

mitigate personal biases, I focused on finding knowledge about my business problem

rather than influencing the questions and answers based on personal experience.

Completing the DBA with Walden University has been one the most rewarding

challenge for my family and me. The structure of the doctoral study program allowed me

to improve my level of discipline, work ethic, and drive to succeed. During the data

collection process, I understood the value of the IRB, as I adhere to the protection of all

parties involved in the research process. However, the COVID-19 had a significant

impact on the data collection as the hotel site laid off 70% of their employees as a result

of a stay at home orders in the location of my hotel site. During my participant

observation and a couple of direct observations, as well as my first face-to-face interview,

both my participants and I wore a mask, glasses, and gloves. Most of the planned face-to-

face interviews and member checking happened using virtual technology. While this was

a challenging time for me to collect data, this would not have been possible without the

guidance of my Chair Dr. Fusch who was very concerned for my safety and gave

valuable guidance on data collection. On a positive note, the topic of my research showed

that in the future, hoteliers might rely more on IoT system strategies to eliminate

transactional activities that involved human interaction and focus more on the meaningful

human relationship among the stakeholders. Reflecting on the DBA program at Walden University, I embrace every experience, as it made me a better independent scholar ready to implement positive social change.

Conclusion

The purpose of this qualitative single case study was to explore the strategies hoteliers used to develop and implement IoT systems to increase profit. After selecting a franchised hotel which did implement IoT system strategy within their hotel operation, using a census method, I selected four participants holding the position Vice President of Food and Beverage operation, General manager, Hotel Manager, and Front office manager, all of whom are decision-makers in developing or implementing IoT system strategies at the study site location. After using multiple sources of qualitative data consisting of semistructured interviews, observations, company performance documents, and reflective journal, the rich and thick data triangulated to three themes reflecting the successful strategies. The findings of this study showed three strategies to increase profit through the use of IoT system technology: offer end-to-end guest experiences through innovation, eliminate the need for transactional activity, and unlock free time for meaningful human-only work.

Offering end-to-end guest experience through innovation enables hoteliers not only opportunities to benefit from cost leadership and product differentiation but with opportunities to enhance long term customer value and profit. For reducing labor costs and improving productivity, hoteliers can eliminate the need for transactional activity through the use of IoT system technology in several departments of the hotel. Finally,

when IoT system usage leads to unlocking free time for meaningful human-only work, hoteliers may benefit from service innovation and new opportunities to create a memorable experience with their hotel guests. Therefore, by using the findings of this study, hoteliers may increase profit through the development and implementation of IoT system strategies and may contribute to positive social change by providing job stability and new employment as a result of growth emanating from the successful application of smart hotel technology.

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Appendix A: Interview Protocol

Interview Protocol	
What you will do	**What you will say—script**
Introduce the interview and set the stage—often over a meal or coffee	Greetings… My name is Gershwin Narraidoo and I am a doctoral candidate at Walden University. I am conducting my research on the role of Internet of Things in hotel's profitability as part of the requirements to complete my Doctor of Business Administration degree. Thank you for your time. The preliminary step to conduct this interview is to obtain your consent. I would like to review the consent form with you and ask you to sign, confirming your agreement as a participant. *Present a copy of the informed consent form, review the contents of the form with the participant, and secure signature.* What you say is important to me, so I'd like to take notes. To make sure the notes correctly represent what you say, I would also like to take a sound recording. If, during this interview, you would like me to stop recording, please let me know. If you have no objections, I'll proceed with the questions? Please note that the interview transcript will be edited, and I will replace your name with a pseudonym for confidentiality. After synthesizing the interview, you will have a chance to review, correct, amend and approve (or not approve) the interpretation. If it is fine with you, I would like to start the interview.
Watch for non-verbal queues Paraphrase as needed Ask follow-up probing questions to get more indepth responses	1. How did the implementation of smart technologies like the IoT systems improve the overall hotel operation in terms of its primary activities?
	2. What IoT system development and implementation strategies are you using in your hotel operations to increase profit?
	3. What IoT system development and implementation strategies are most effective in increasing value for your hotel guests?
	4. How do you assess the effectiveness of your IoT system development and implementation strategies within your primary business activities to achieve increase profits?
	5. What impacts are you seeing from implementing the IoT in your primary hotel activities?

	6. What additional information would you like to share about your organization's strategies for developing and implementing IoT systems to increase hotel profits?
Wrap up interview thanking participant	Thank you so much for taking the time to meet with me today about giving clarification on what strategies hoteliers use to develop and implement IoT systems to increase profit. Please be assured that the information you have share with me will be kept private and confidential during all phases of this study.
Schedule follow-up member checking interview	I would like to meet with you again in the next couple weeks to quickly review my summary of our interview to ensure that I correctly understood your responses. Would two weeks from today work for you?
Follow–up Member Checking Interview	
Introduce follow-up interview and set the stage	Greetings… I appreciate your time to meet with me for a second time to follow-up on my interpretation of your responses from our previous interview.
Share a copy of the succinct synthesis for each individual question Bring in probing questions Walk through each question, read the interpretation and ask: Did I miss anything? Or, What would you like to add?	I have a copy of the interview questions along with a synthesis of your responses. I will review each question, read the interpretation and ask some questions purely for elaboration purpose. That is, I will ask if you would like to add anything and give you the opportunity to adjust your responses.
	1. How did the implementation of smart technologies like the IoT systems improve the overall hotel operation in terms of its primary activities? *Synthesis*:_____
	2. What IoT system development and implementation strategies are you using in your hotel operations to increase profit? *Synthesis*:_____
	3. What IoT system development and implementation strategies are most effective in increasing value for your hotel guests? *Synthesis*:_____

	4. How do you assess the effectiveness of your IoT system development and implementation strategies within your primary business activities to achieve increase profits? *Synthesis*:_____
	5. What impacts are you seeing from implementing the IoT in your primary hotel activities? *Synthesis*:_____
	6. What additional information would you like to share about your organization's strategies for developing and implementing IoT systems to increase hotel profits? *Synthesis*:_____

Appendix B: Observation Protocol

The purpose of this observation protocol is to provide a step action table (job aide, checklist) to help me stay focused on the data and other details that observe in the setting. For direct observation as the researcher I will have a non-participative role and will observe for data collection only the participants who are the hoteliers during their implementation of IoT systems strategies. I will not observe for data collection other stakeholders of the hotel or interact with other hotel employees who are not my participants

Directions: Spend 2 hours a day, once a week over three weeks to collect ample field notes of my observations of interactions of the hoteliers during their implementation of IoT systems strategies during and their interaction with their stakeholders. Since the only participants are the hoteliers.

Note: During observation, the focus will be on three critical areas including: (a) the background, (b) the people, and (c) the action of the observed individuals. The table below indicates the proposed the key steps to perform the observation process. Using the table on the next page, note the approximate time frames that you make the observations along with notes describing what I see occurring and any other details that you consider to be important. After the observation, review your notes and begin to identify key points (concepts and ideas) that may help me later in the data analysis.

Directions: To start each observation, write a comprehensive description the setting following the table below.

Tentative Schedule	(i.e., M, W, F, 8:00am-4:00pm) for 3 weeks

Date:	
(a) The Background: Physical setting (Describe in thick rich detail what it looks like, sounds like, and any other details. Record what you know about the participants and their roles, if known). Who is there? What are they doing?	
(b) The People: How do they interact? What are they wearing? What are they saying? What does their body language tell you?	
The Action: What happens? What is the sequence? Is there a cause and effect? If so, provide details.	

(c) Time:	**(d) Observation:**