Guest Experience Personalizer (GEP):
Using Data to Improve Loyal Guest Retention and Revenue

RDADA Final Concept
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{guest-experience-personalizer}

Abstract

Members of hotel loyalty programs are the guests that traditionally bring in the most revenue for hotel businesses. These frequent guests require and expect more personalized service as a reward for their loyalty to the brand. In the face of new competition from home-sharing sites like Airbnb, hotels need a more precise and scalable method to customize these experiences for their most loyal guests. Fortunately, by utilizing data science technologies such as multiple linear regression and k-means clustering, our data science team made full use of the existing data (reservations, guests' saved preferences, in-hotel transactions, public camera data, etc.) to create the Guest Experience Personalizer (GEP) platform. This platform builds individualized profiles for the most loyal and valuable hotel guests, which enable hotel groups and sales teams to provide personalized services to those guests and improve overall guest satisfaction, revenue per guest, and hotel revenue. At hotels where this platform has been piloted, the average guest satisfaction score has improved by 12 points from 70 (on a scale of 100) and average revenue per guest account has increased by 86 USD per year. Future extensions of the GEP platform include forecasting market demands, offering promotions and campaigns at scale, and providing scheduled reports and recommendations to hotel managers at participating hotels.

Keywords

Hospitality, loyalty, pricing, guest retention, personalized service, data analysis, machine learning, linear regression, clustering

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A Gap in Understanding Customers

Loyal repeat customers are the goldmine across many industries, and nowhere is that more apparent than within the hospitality industry. The structure of hotel loyalty program is based on the famous Pareto principle, the 80-20 rule, which indicates that that a small proportion of a firm's customers contribute a large share of the firm's revenue (Pareto 1897; McCall and Voorhees 2010) 1, 2. Even the act of joining a brand loyalty program changes guest behavior for the better. One Cornell study found that among guests who joined loyalty programs, number of stays per year, nights per year and revenue per year all increased by an average of 50% (McCall and Carroll 2014) 3. These trends hold across the behemoths within the hotel industry, as well as in smaller hotel groups and individually-owned/independent hotels.

Independent hotels like the Leading Hotels of the World experienced an average 50% increase in annual revenue when customers joined their loyalty programs (Voorhees, McCall and Carroll 2014) 4. On the other side of the spectrum, the Marriott – Starwood merger in 2016 created the world's biggest hotel group that now has one of the most powerful frequent traveler programs in the lodging industry, with 100 million loyal members and $3.0B in revenue (Marriott 2016 Annual Report) 5. Thus, it is becoming more and more important to implement top-notch loyalty programs, for both hotel groups and independent hotels.

In the face of new competition from home-sharing sites like Airbnb and HomeAway, hotels are in need of a more precise and scalable method in customizing these loyal member experiences. These sites offer more than three times the available rooms than even Marriott-Starwood, and cut into the hospitality market with lower rates, comparable accommodations, and a personalized touch that hotels have a hard time replicating (STR Report 2016) 6. To face the new competition and achieve sustainable growth, hoteliers must develop a deep understanding of the type of customers they want to attract, and then offer an experience that is tailored to that specific group. (Daniela Yu and John Timmerman 2014) 7. Second, according to the "A Conceptual Model of Loyalty Program Effectiveness" (Appendix C) , with the given structure of loyalty program and rewards, the only way to increase the loyalty program effectiveness is to work on the customer factors, such as whether the consumer can identify the benefits that hotel

offers, and how prior experience(s) with reward programs influence loyalty, commitment, and reward accumulating behavior (McCall and Voorhees 2010) 2.

As members of the Data Science and Research team at the ABC Hotel Group, the authors were tasked with finding a solution to learn more about the most loyal and valuable hotel guests and subsequently improve overall guest satisfaction and increase average revenue per guest and overall hotel revenue. Given their organizational position under the Vice President of Revenue, the Data Science and Research team is in an influential position that can directly communicate results and receive feedback from hotel managers of ABC hotel branches.

The Future of Loyalty Programs: The GEP

To solve the emerging problem of more personalized loyalty programs, the authors developed the Guest Experience Personalizer (GEP) platform: an all-in-one solution that utilizes the data of our highest-paying customers to build individualized profiles, predict and anticipate customer behavior, and recommend personalized pricing. The outputs from this product go directly to the hotel managers, who can start using the recommendations and insights to improve customer experiences immediately.

The GEP platform is made up of two solutions: a AI-powered virtual assistant (AVA) mobile app used by on-the-floor hotel staff for real-time updates on important guests, as well as a desktop-based augmented guest profile (AGP) used by the sales, revenue and marketing teams to build a 360-degree view of each loyalty member.

Through its access of the hotel customer databases, AVA (or “Ava”, as she’s called within the app notifications) can provide hotel staff with loyal guest profiles including a photo and an overview of their saved preferences, like room type, bedding choices and amenity needs. With hourly and daily weather forecasts, the hotel can prepare umbrellas and car service in the case of rain, or sunscreen and cold water on hotter days. With airline information, the concierge can keep track of delays, departures or early arrivals and prepare welcome services upon a guests estimated arrival or reminder calls for upcoming departures. As staff interact with the hotel guests, they also have the option to tell Ava any new information gathered, helping make the customer profile more comprehensive and thorough. Furthermore, after each stay, Ava will ask the staff to rate their own service and the guests will be sent an email asking them to rate their experience. If there is a notable discrepancy between the ratings, the hotel manager can follow-up and inquire on how the staff can improve, and bring the feedback back to the staff to ensure future improvements.

The AGP desktop interface, used by the sales, marketing and revenue team, depends on the integration with the hotel’s existing pricing system to calculate its personalized pricing recommendations. Currently, the existing pricing system utilizes data including historical booking, pricing and transactions from hotel PMS system, current competitors’ prices from

booking services (such as hotel websites and Expedia), and manually input data (such as customer segmentations, public holidays, big local events data, variable cost of each room night, walk cost of overbooking a guest, etc) to calculate corporate and individual retail room prices. The AGP interface connects with this existing system and uses this information in its loyal guest price calculation. Taking the projected retail price, the guest's historical payment average, average length of stay, loyalty membership level, customer cluster, and indicator variables of 0 or 1 for popular events, holidays, and weather during the projected stay period, the AGP uses a multiple regression model to predict a reasonable loyal guest price. Such a statistical approach is used as it reduces complexity and offers a dependable level of accuracy. The sales and marketing team can then view this recommended and personalized price as part of the loyalty member's guest profile to better plan promotions and discounts for those members.

On the sales and marketing side, the guest profile provides all of the information needed to determine the level of engagement, both past and present, of this guest with the hotel group. This information includes email open and click-through rates, a sentiment analysis on the guest's social media interaction history with the hotel, website behavior, transaction and cart history, and phone call logs. The platform also uses k-means clustering to segment loyalty customers based on their behavioral data including spend history and engagement history. The *k*-means clustering technique was suitable as it can efficiently handle large datasets and iterates quickly to good solutions. (Coffey 2016) 8 With the customer's defined cluster, the marketing team can customize their phone, email, and website campaign content to better align with the guest's interests. Furthermore, the AGP can immediately begin clustering new customers once they join the loyalty program by using any historical transaction or interaction information that was collected about them prior to joining the program. This enables sales agents to understand new members at the moment they join, rather than having to start from scratch.

It is important to note that though the methods of data-gathering used to source both GEP solutions are extensive, they may be biased towards the younger generations of loyalty guests who will take advantage of the primarily digital methods in which we collect data. As this program develops, the authors hope to integrate more traditional communication methods such as guest phone conversations to bridge the potential generational gap.

Pilot Program and Beyond

Imagine this scenario: Top level loyalty guests, Mr. and Mrs. Zhang, are looking to make a reservation for a week-long vacation with their children in a resort hotel. Using GEP, the hotel manager can plan ahead and make the Zhangs' stay a perfect one. GEP ensures this through four key steps:

(1) Pre-Booking Recommendations: By viewing the Zhangs' personal account dashboard, the hotel can see the Zhangs' booking history; they see that they have taken an annual vacation trip

at the same period for the last three years and that they tend to book their stay two months ahead. The hotel group uses this information to send Mr. and Mrs. Zhang a promotional email even before they've started planning their next vacation, with multiple luxury hotels in their frequented destinations that are within their budget. The Zhangs are delighted with the personalized price, and book their stay at one of the ABC hotels.

(2) Personalized Preparation: Also included in the Zhangs' account profile is a record of each family member's preferences; armed with this knowledge and a push notification from Ava that the Zhang family has arrived, the hotel staff then prepares their room with welcome fruit and ice cream in their children's favorite flavor. The room prepared for them has a city view and is far away from the elevator according to their previous room preference, as Mrs. Zhang likes a quiet place with nice views. When they are dining in the hotel restaurant, the waiter recommends dishes to meet their satisfaction, based on their previous visits.

(3) Attentive and Knowledgeable Staff: As the Zhang family visits the different amenities within the hotel, Ava pushes notifications to staff with their current location, expected needs at each amenity, as well as requests for service if any help is needed.

(4) Continual Learning and Improvements: After the Zhangs complete their wonderful stay at the hotel, all of the data gathered during their trip is analyzed and added to their personalized account dashboard, ready to use on their next trip.

By providing high-value loyalty guests (like the Zhang family) with a unique service and personalized price, all powered by data science, overall guest experience and satisfaction has improved dramatically. At hotels where this platform has been piloted, the average guest satisfaction score has improved by 12 points from 70 (on a scale of 100), average revenue per guest account has increased by 86 USD per year, and average total revenue for each hotel has increased by 5%.

While the GEP platform has surpassed expectations at our pilot locations, there are some adjustments and concerns need to be addressed prior to rolling out the platform to the hotel group as a whole. (1) To prevent potential issues of guest data privacy, hotels must offer guests the option to opt-out of some levels of the program, including any audiovisual data gathered from within the hotel. (2) To discourage cross-use of loyalty membership cards, hotels must require an ID upon guest check-in to verify member identity. (3) To ensure financial viability of GEP implementation, participating hotels will need to select the level of granularity of the service provided based on projected revenue. (4) Lastly, to avoid the bias of "Law of Small Numbers", data of unusually high-end guests, such as celebrities, politicians, and guests with unique preferences should not be used in aggregations of guest clusters, as it may skew the recommended actions/prices for that group.

The GEP platform provides the Data Science and Research team with the building blocks needed to begin forecasting market demands, offering promotions and campaigns at scale, and providing scheduled reports and recommendations to hotel managers at participating hotels.

About the Authors

Authors Chen, Huang, and Podracky are members of the Data Science and Research team at the ABC Hotel Group. The authors oversaw the implementation of the GEP pilot program in a selection of hotels in the Berkeley, CA area, and will continue to oversee the full rollout of the program in all ABC hotels across the United States.

Author Charlene Chen was the nature leader on this project, passionate about data science in Hospitality industry. As a hotelier for six years, Chen has experienced knowledge in Hospitality industry, especially in Hotel, Restaurant, Online Travel Agency, and Rental Car, focusing on marketing, pricing and strategy making. Chen gained the master's degree of Management in Hospitality (MMH) from Cornell University and is pursuing for the Master of information in Data Science (MIDS) at UC Berkeley. She believes that by leveraging the state of the art data science technology, hospitality companies can generate better business outcome in the short future.

Author Joanna Huang was a collaborator on this project. Joanna specializes in leveraging data to help businesses better understand their customers in a marketing context. She has five years of experience in digital marketing for hospitality brands in areas including social media marketing, email marketing and content creation. Most recently, she worked in the outdoor events space where she became deeply curious about how online behaviors translate to offline sales. In her free time, she is a food lover who enjoys testing new recipes in her kitchen and checking out new restaurants in the city. Huang received her bachelor's degree in Communications from Boston College and is currently pursuing a Masters of Information in Data Science (MIDS) at UC Berkeley.

Author Jennifer Podracky was a collaborator on this project. Podracky specializes in product design and implementation, with a focus on products that utilize data science technologies to solve problems within the hotel and hospitality industries. She has several years' experience in custom software development and design for utility companies and sports/entertainment properties. In her free time, she works on small data science projects related to sports team and individual performance, as well as trying out new types of cuisines in her hometown of Boston, MA. Podracky received her bachelor's degree in Computer Science from Duke University and is currently pursuing a Masters of Information in Data Science (MIDS) at UC Berkeley.

Appendices

A. Updated Prompt

Act I: Set the stage and define your problem

Identify a problem within your selected industry that can be solved or improved with data science.

- Define the problem and how it's affecting your target audience
- What's the current state of the industry and how, if at all, is the problem currently being solved?
- Define a role for yourself within this domain and provide a detailed problem statement that you are trying to answer.

Act II: Define solution

Now that you've set the stage for your problem question and the context in which it lives, restate the value proposition and define a solution to this problem. Include:

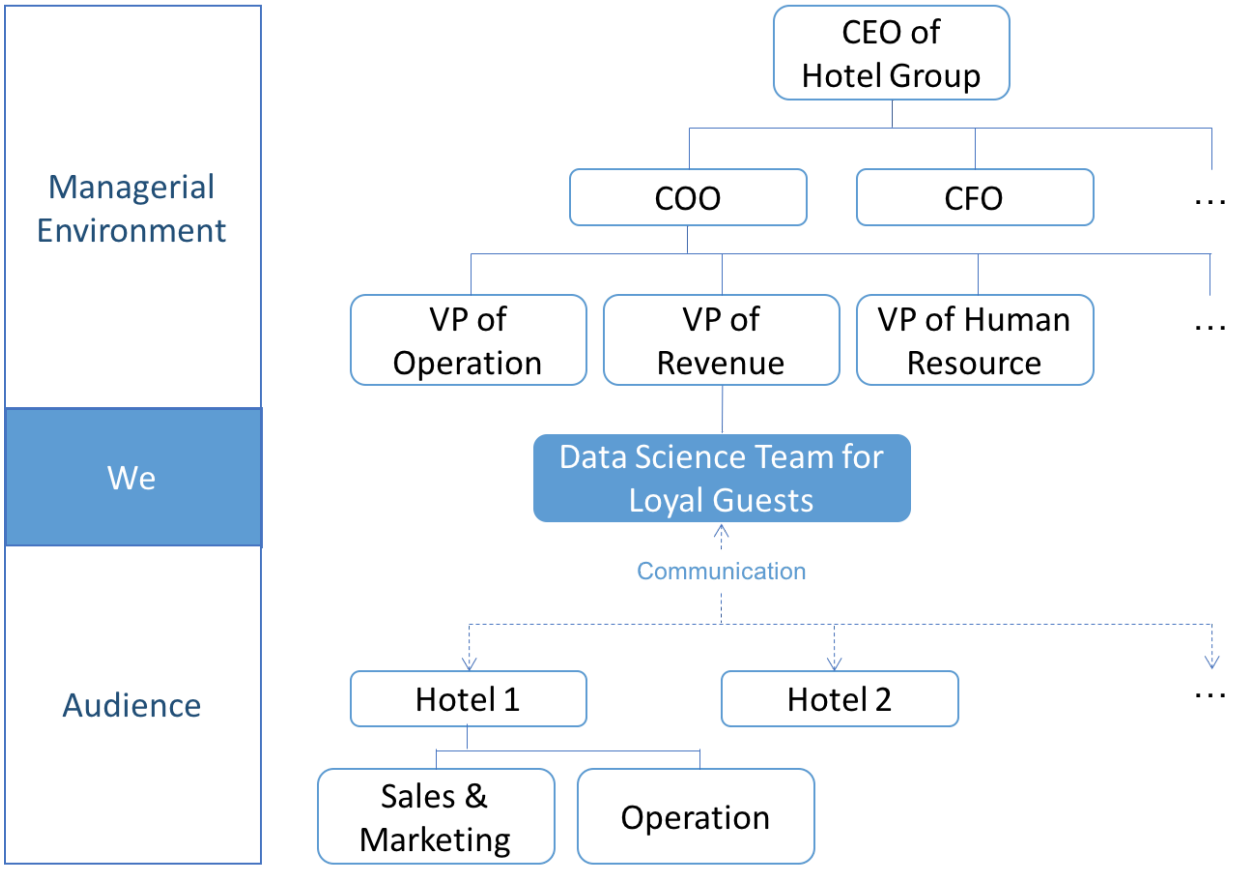
- Who is the intended audience for your solution?
- What is your solution?
    - Include details such as data needed and process for acquiring the data
- How will the solution be implemented?
- How will findings be presented to the audience?

Act III: Impact, limitations, and future areas of research

Finally, describe how your solution will improve or change the state of the world that you described in your introduction.

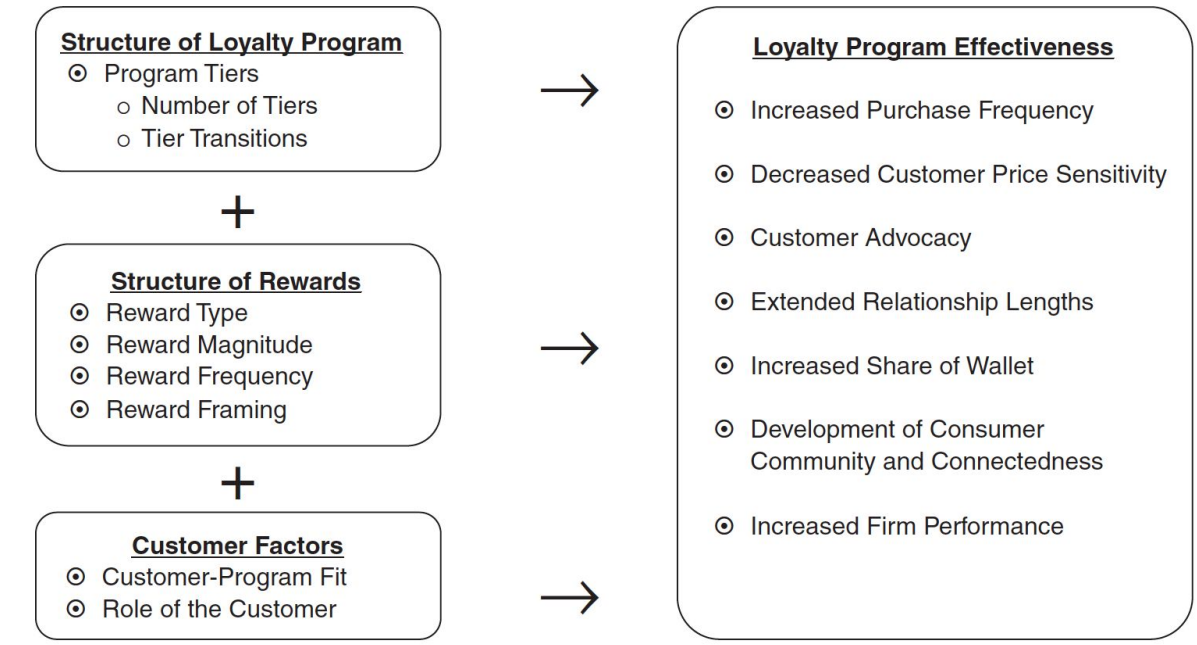
- Identify potential risks for this project, such as data access or data quality challenges, organizational and decision impediments to action, and potential ethical/legal implications. Describe your contingencies given these risks.
- Address any limitations (intentional or not) of your solution.
- Define any related questions or problems that could be addressed in the future.

B. Organizational Hierarchy of ABC Hotels



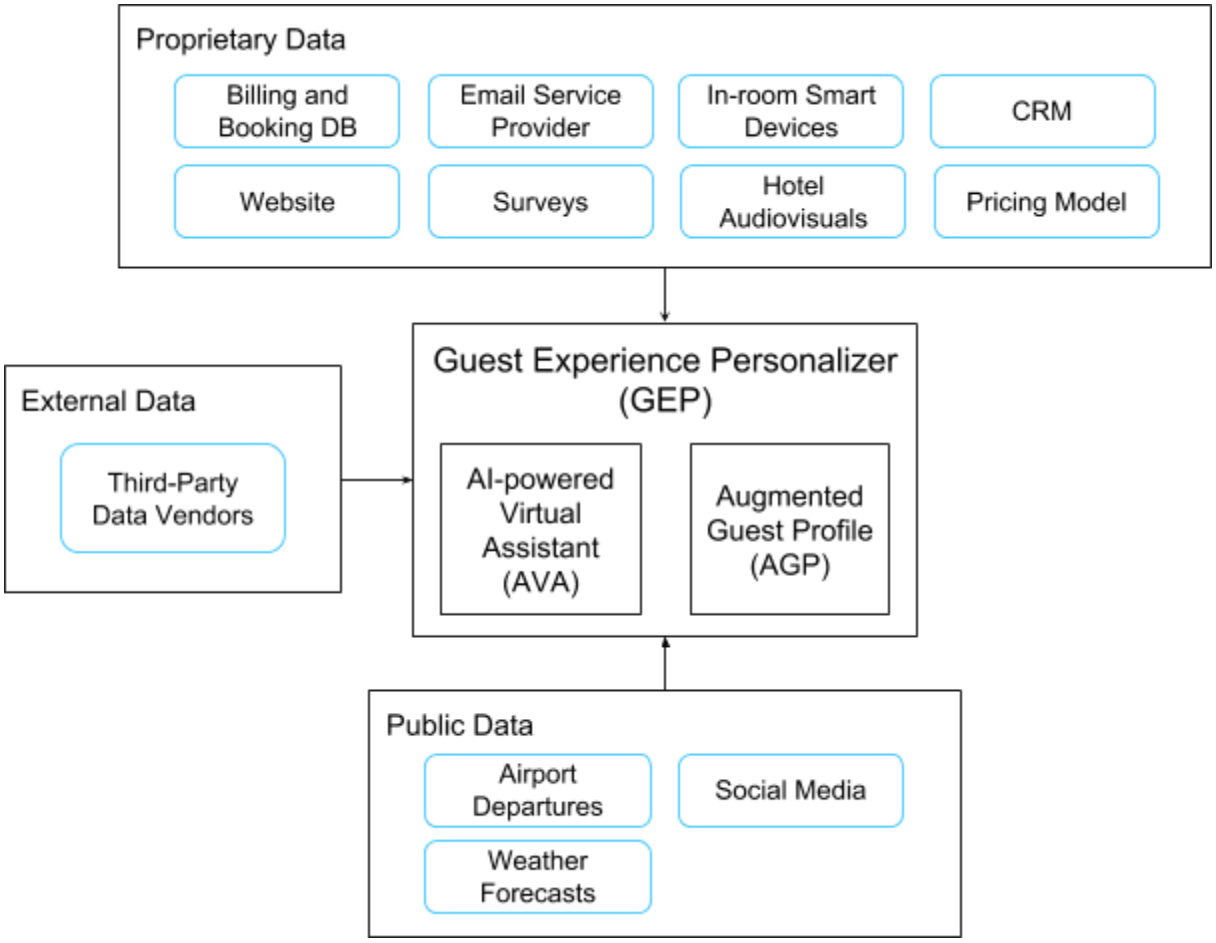
C. Loyalty Program Effectiveness Model

A Conceptual Model of Loyalty Program Effectiveness



Source: 2 McCall, M., & Voorhees, C. (2010). The drivers of loyalty program success: An organizing framework and research agenda [Electronic version]. Cornell Hospitality Quarterly, 51(1), 35-52. Retrieved [insert date], from Cornell University, School of Hospitality Administration site: http://scholarship.sha.cornell.edu/articles/165/

D. Data Flow Diagram



References

1 Pareto, W. 1897. The new theories of economics. Journal of Political Economy 5:485–502.

2 McCall, M., & Voorhees, C. (2010). The drivers of loyalty program success: An organizing framework and research agenda [Electronic version]. Cornell Hospitality Quarterly, 51(1), 35-52. Retrieved [insert date], from Cornell University, School of Hospitality Administration site: http://scholarship.sha.cornell.edu/articles/165/

3 Voorhees, C., McCall, M., & Carroll, B. (2014). Assessing the benefits of reward programs: A recommended approach and case study from the lodging industry [Electronic article]. Cornell Hospitality Report, 14(1), 6-12.

4 Voorhees, C., McCall, M., & Carroll, B. (2014). Assessing the benefits of reward programs: A recommended approach and case study from the lodging industry [Electronic article]. Cornell Hospitality Report, 14(1), 6-12.

5 Marriott International, Inc.. (2016). Marriott International, Inc.. Annual Report.. Retrieved from: http://investor.shareholder.com/MAR/reports.cfm.

6 STR, Inc (2017). STR, Inc. Airbnb & Hotel Performance. Retrieved from: http://www.str.com/Media/Default/Research/STR_AirbnbHotelPerformance.pdf

7 Daniela Yu, John Timmerman (2014). From Economy to Luxury, What Matters Most to Hotel Guests [Electronic article]. Gallup Business Journal. Retrieved from: http://news.gallup.com/businessjournal/175568/economy-luxury-matters-hotel-guests.aspx

8 Kimberly Coffey (2016). k-means Clustering for Customer Segmentation: A Practical Example [Electronic article]. Retrieved from: http://www.kimberlycoffey.com/blog/2016/8/k-means-clustering-for-customer-segmentation