The implementation of business intelligence using data analytics and its effects towards performance in hotel industry in Thailand

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ABSTRACT

The hotel industry is one of Thailand's most important economic sectors and is in a fiercely competitive market these days. It is flooded with new technologies as driver for innovation. The hotel industry is a data-intensive industry that collects large amounts of data in various forms. The study aims to investigate business intelligence activities using data analytics and the impact on corporate performance in the hotel industry in Thailand. The qualitative methodology is employed to explain the relationship between business intelligence-data analytics and performance in Thailand's hotel organizations, in-depth interviews is conducted with eight purposive samples of hotel managers and finance controllers in Thailand. The study's findings revealed that business intelligence and data analytics impacted the business performance of hotel industry in Thailand. The respondents expressed an interest in artificial intelligence and believed that the rapid advancement of artificial intelligence in hotel management should be considered to improve corporate performance

Keywords: *Data Analytics, Business Intelligence (BI), Artificial Intelligence (AI) Corporate Performance, Qualitative Study*

1. INTRODUCTION

1.1 Background of the Research

Hotel organizations in today's world contend with a highly competitive environment. It is saturated with new technologies, the customers who expect superior service, acts as significance source of innovation, and continuously facing the challenges of ever-increasing costs. The survival of these hotels often depends on their overall financial performance, their ability to adapt to the changing environment, and how they transform and expand their services to meet their customers' needs (Van Niekerk, 2016). Technology and data analytics are seen as a transformative force in the business world. As a result, many companies are integrating business intelligence & analytics technology to help with reporting and decision-making (Rikhardsson & Yigitbasioglu, 2018). Data-driven

decision-making, business intelligence, and analytics (BI&A) have been shown in many researches to be able to prove the companies with a competitive advantage. It is only possible if the business is embracing and using business intelligence and analytics effectively (Jaklič et al., 2018). Over the years, the term "enterprise performance management" (CPM) has become popular. Organization-driven metrics must be used to ensure that company management understands the necessity of enforcing the attainment of goals outlined in their strategy. Compliance and automatic control and a transaction recording system and operation process management are related (Aho, 2010).

The volume of data available in the organization led to the creation of advanced analytics functions that we called as Business Analytics-BA, using aggregate data mining methods to find visible patterns using a standard business intelligence tool called the Business Intelligence system (Richards et al., 2019). The hotel industry is a data-heavy industry that collects massive amounts of various forms of data. However, data remains underutilized and undervalued for most hoteliers. Many captures loyalty information, but few go deep in analytics to deepen their customer knowledge and develop a more granular understanding of customer needs. Preferences and identifying new opportunities to attract new patrons are crucial. Some examples of analytical applications are essential for the hotel industry in customer segmentation, profiling, and associations, menu engineering, productivity indexing, forecasting, customer value, energy consumption, etc. (Big Data Analytics, 2021).

Big data has an increasing frontier of opportunity in enhancing corporate performance. However, it is still in the early introduction stages, and many enterprises are still un-decisive in its adoption. A theoretical model based on the integration of Human-Organization-Technology fit and Technology-Organization- Environment frameworks to identify the key factors affecting extensive data adoption and its consequent impact on the firm performance. The significant factors are gained from the literature, in which the research model is developed (Yadegaridehkordi et al., 2020).

1.2 Problem Statement

Although business intelligence and knowledge extraction methods are employed in current applications and deal with different business processes lead to a proposed novel approach for business intelligence-based cross-process knowledge extraction and decision support for businesses. The system consists of (a) a homogeneous and comprehensive data model that serves as the basis of a data warehouse, (b) extracting data from heterogeneous sources and integrating data into the data warehouse's uniform data structures, and (c) analysis techniques that identify significant connections and patterns between various business processes and thus result in the discovery of previously unknown information (Höpken et al., 2015). Big data analytics can help improve supply chain management in various ways, including improving efficiency, improving planning, improving inventory control and risk management, improving market intelligence, and providing real-time tailored service (Ram et al., 2016). The massive question on many people's minds right now is whether robotics and AI will lead to a job crisis as clever machines replace more people. When robots replace people, business and industry executives and the stock market realize that profits increase as labor expenses decrease (Pierce, n.d.). Therefore, corporate (business) performance is the ability of a firm to gain profit and growth to achieve its general strategic objectives. Big data analytics is to enhance corporate performance. Effective use of big data analytics can improve the efficiency of internal processes with enhanced decision making and have competitive offerings, implementing new strategies, business models, and higher transparency of information.

1.3 Research Objective

The study aims to investigate the implementation of business intelligence using data analytics and its effect on business performance in Thailand's hotel industry. It is intended to provide the basic lead for decision making to improve business performance of Thailand's hotel industry.

1.4 Research Question

How the Business Intelligence-Data Analytics is related to the business performance of the hotel industry in Thailand?

2. LITERATURE REVIEW

2.1 Data Analytics

Big data analytics has been hailed as a game-changing strategy. Despite the growing number of companies undertaking considerable data efforts, the knowledge of how these technologies may generate economic value is still lacking. Based on some literature findings, organizations must have extensive solid data analytics capabilities to exploit big data analytics and reap performance advantages (Mikalef et al., 2019). The enormity of Big Data is the first thing that comes to mind for most people. After all, the word "large" is right there in the name. For decades, managing enormous and fast-expanding volumes of data has been a difficult task. In the past, of this problem was solved by faster computer processors, which followed Moore's law and provided with the resources we needed to deal with growing data volumes. But there is a fundamental shift underway now: data volume is scaling faster than compute resources, while CPU speeds are static (Varshney et al., 2017). Most of definitions of big data centered around the amount of data in storage. Big data has other vital characteristics, such as data diversity and velocity, in addition to its size. The three big data (volume, variety, and velocity) form a comprehensive definition that debunks the idea that big data is solely about volume. Furthermore, each of the three data has its analytics implications (Russom, 2011). Many recent analysis methodologies necessitate a thorough understanding of computer programming languages or database management systems that are not often used among tourist scholars. In the same way, good Business Intelligence techniques necessitate well-designed, organized, and managed information systems. Hospitality and tourism researchers must form cross-disciplinary and multidisciplinary research teams that include computer and data scientists (Mariani et al., 2018).

2.2 Business Intelligence (BI)

Business intelligence (BI) is used as one of IT solutions for transforming data from massive data sets into intelligence through sales, marketing, services, and support operations. Customer Relationship Management (CRM), Enterprise Resource Planning (ERP), and E-commerce are all examples of business intelligence applications that use data mining techniques (Nyabuti, 2018). Identifying key performance indicators (KPIs), data warehousing, data mining, digital dashboards, and data visualization reporting are all part of a standard Business intelligence (BI) & Artificial Intelligence (AI) system (Llave, 2017). In today's economy and business leisure, hotels occupy a position that cannot be overlooked. As a result, the relevance and value of hotel management cannot be overstated. Modern hotel management systems need to be developed as well. The management of hotels, restaurants and tourism-related businesses is known as hotel management. Information technology (IT) is a broad phrase that encompasses a wide range of technologies to using technology to solve problems. Information technology is a broad phrase that refers to the management and processing of information. Computer science and communication technologies are mainly

used to design, develop, build, and install information systems and applications. (Lai & Hung, 2018). It is essential in the Business Intelligence (BI) system to satisfy the hotels and consumer needs, consolidating all the relevant data to be used by the analytical tools. In this sense, BI systems have some challenges in defining an adequate methodology to integrate and store the retrieved data into a hotel Big Data Warehouse. The challenges and necessary steps to overcome the problems associated with information management and consolidation in a hotel big data warehouse (Padberg, 2015). When concentrating on Big Data, a slightly different issue emerges. Over the years 2000-2016, a search on Scopus (29,101 academic papers) and Web of Science (18,159 academic papers) yielded, using the keyword "Big Data" in the titles, abstracts, and keywords. The time distribution is mainly uneven, indicating that interest in the issue has only recently grown (Mariani et al., 2018:9).

Artificial intelligence (AI) applications in the hotel industry have taken an enormous percentage of service provision, helping automate most of the involved processes, such as booking and purchasing, improving the guest experience, tracking guest preferences and interests, etc. The importance is to understand the roles, benefits, and issues with improving business intelligence (BI) in hotel booking and accommodation and focuses on hotel guest experience, business operations, and guest satisfaction (Shahini, 2020). Our lives, as well as the hotel sector, are being reshaped by technological advancements. Artificial intelligence (AI), data-driven systems, and service robots are becoming more common in hotels, albeit sophisticated technology and implementation levels vary for every hotel. Furthermore, hotels are establishing themselves as full-service providers in the realm of intelligent technologies by fully utilizing currently available high-tech products and services to provide a superior customer experience. More specifically, smart hotel technologies include chatbots, facial or fingerprint identification to unlock the door, robots delivering room amenities, holograms for information, voice commands to control lighting or window curtains, a robot concierge, and many more features (Kim & Han, 2020).

2.3 Corporate (Business) Performance

Organizations and enterprises became more extensive and more prominent during the last four decades. By its very nature, they had been undergoing massive changes in their environment. Managers do not like to stay at home or experience new unknown and unexplored markets and take more risks. If they sail on a mighty stormy sea, they must know how to ride their ships and incorporate the knowledge they have taken in. To survive, the captain must have a comprehensive understanding of the ship. Radar and other navigation systems give enough information to find the way. The captain must know every minute about the weather, the ship, and much more. Communication plays a significant role, and of course, more information reduces uncertainty and leads to a quick and correct decision (Daryaei et al., 2013).

The intertwined development of AI adoption to data mining and predictive analytics might translate into effective digital business models to support product, process, and business model innovation. (Mariani, 2019) The hotel industry has been exploring and implementing business intelligence to utilize data to its advantage. IT systems are a foundation utility that can be easily imitated, and business intelligence is a tool to maintain sustained competitive advantage over competitors in the hotel industry. It can serve means of preserving existing customer loyalty while facing competitive pressures (Korte, 2013). Therefore, the adoption of technology should affect performance.

The effective use of big data analytics for a hotel depends on the factors involved in each technology being appropriate. The personal knowledge and analytical skills match the skills required by using Big Data Analysis to support analysis and decision making. Because of this big

data analytics technology climate assessment, matching is a critical element of the day-to-day decision-making process. It is essential to consider that individual users in an organization that properly adopt new technology may fail if it is later than the enterprise level. However, individuals are often urged to adopt new technology and drive to develop the performance and skillsets needed to compete in the marketplace. More personal technology is appropriate. The perceived benefits and ease of use become more accurate as more knowledgeable and proficient users can better understand the benefits of big data analytics technology and be convenient in practice. This study thereby looked to explore the extent of influence of big data analytics to enhance business performance.

3. RESEARCH METHODOLOGY

3.1 Research Method

Qualitative studies such as in-depth interview are helpful to collect data. The two-way communication throughout the interview aids in acquiring additional data, and in-depth knowledge is necessary. It allows the researcher to ask questions outside of the semi-structured surveys for better data gathering and follow-up. This communication flexibility may aid in the discovery of unexpected insights. The qualitative approach includes four primary research steps: question design, data collection, data analysis, and report writing. (Ram et al., 2016)

3.2 Data Collection

The data collection employs eight respondents in the position of the hotel's manager or finance controller. And the respondents communicate in Thai during interviews. The transcribe was translated from the Thai language into English for content analysis. The interviews consisting of two parts. The first section gathers information about the respondents, such as their title, company size, and the company. The survey's second component consists of six questions that span a wide range of topics to understand better how big data analytics affects business intelligence and corporate performance.

3.3 The sample's criteria

The target populations are the hotels managers or finance controllers. The researcher will collect the data and employ various methodologies, including face-to-face and online interviews conducted over the phone or via Line Application channels. The criteria of purposive samples are 1) the manager who works in the hotel 2) has a minimum of 1-year of work in the hotel 3) who manage with data analytics and BI in the hotel. The interview questions were based on Marina (2019) as follows.

Q1. What are Big Data and Business Intelligence's key contributions to your hotel?
Q2. What types of data in your hotel are you most interested in?
Q3. Which department in your hotel generates the Big Data?
Q4. What is your hotel's preferred way of collecting Big Data?
Q5. Who oversees analyzing Big Data at your hotel?
Q6. How frequently do hotel management and personnel examine Big Data?

4. FINDINGS

The sample hotels are shown in Table 1.

Table 1. Demographic profile of the respondents.

No.	Area	Sex	Position	Working Experience	Age
1	Eastern/Central/Bangkok	Male	Financial Controller	More than 10 years	40 years
2	Eastern/Central/Bangkok	Female	Financial Controller	More than 20 years	62 years
3	Southern	Female	Finance and Accounting Manager	More than 14 years	39 years
4	Northern	Female	Finance and Accounting Manager	More than 30 years	57 years
5	Eastern/Central/Bangkok	Male	Learning and Development Manager	More than 7 years	48 years
6	Northeast	Female	PR & Marketing Communication Manager	More than 2 years	45 years
7	Northern	Male	Hotel Manager	More than 25 years	51 years
8	Southern	Female	Business Development Director	More than 10 years	37 years

This findings below shows the results and discussion from interviews. The explanation is about the role of business intelligence-data analytics to develop the business performance of hotels in Thailand. The content analysis is as follows.

Theme 1: Big Data-Analytics and Business Performance in the hotel business, Thailand.
Theme 2: Business Intelligence and Business Performance in the hotel business, Thailand.

4.1 Theme 1: Big data-data analytics and corporate performance in the hotel business, Thailand.

The hotels pay attention to big data analytics. The big data of hotels, such as financial analysis and customer's purchasing decisions, benefit hotels to plan and operate to achieve the goals according to mission and vision. Whether in accounting, finance, operation, and management. The data of hotels is prioritized differently depending on tasks and departments. The Accounting and Finance department pays a lot of attention to income, pricing, expenses, and data management to be used in the hotel's financial management planning and investment. The Operations team focuses on customer data, quality services, room management, pricing, and business development to survive in the market. As a result, it will help the hotel manager and finance controller make both short-run and long-term plans.

> *"In the accounting and finance department, we use the information in financial planning and budget planning of both the short and long term of the organization. to set direction in terms of management and pricing and investments in the future."*
> Respondent 1: Eastern/Central/Bangkok hotel setting, 40 years old Male Financial

Controller, working experience more than ten years. Interviewed date 26/08/2021 via Line called**.**

"Information in finance, sales revenue, cost of service, competitive procurement, personnel administration. To bring smooth comparison of various data and make corrections. according to company policy"
Respondent 2: Eastern/Central/Bangkok hotel setting, 62 years old Female Financial
Controller, working experience more than 20 years. Interviewed date 26/08/2021 via Line called.

"Big data Information it an important role in the performance of financial accounting. Such as income and expenses. It can be used to help plan income and reduce expenses in the implementation of annual budget planning."
Respondent 3: Southern hotel setting, 39 years old Female Finance and Accounting
Manager, working experience more than 14 years. Interviewed date 26/08/2021 via Line called.

"Big data is very important to my organization. Because it must be used as information in every department. in job management and create transparency, accuracy, and impartiality and is placed in both the short term and long term of the organization in the accounting and finance section Used to plan income and expenses."
Respondent 4: Northern hotel setting, 57 years old Female Finance and Accounting
Manager, working experience more than 30 years.

"Big data is to be used to analyst the past issues and also forecast the future trend in the areas like customer Issues / Sales Chanel / Booking Chanel / Room Occupancies / Competitive advantage and disadvantage against hotel competitors."
Respondent 5: Eastern/Central/Bangkok hotel setting, 48 years old Male Learning and
Development Manager, working experience more than 7 years.

"Big data analytics can help the managers and financial controller analyze customer behavior in each nationality and age group. It makes it possible to evaluate marketing and sales plans to meet the needs of customers. However, since it is a boutique hotel, there is not much database. Staying behavior data, including duration of stay break period number of people staying per room. It can make it possible for trends to assess room bookings, seasons, and promotions. The shopping information makes you know the order, especially the food at the various outlets. This preference menu could be useful to develop products that meet the needs of the target group and room inventory property."
Respondent 6: Northeastern hotel setting, 45 years old Female PR & Marketing

Communication Manager, working experience more than two years. Interviewed date 28/08/2021 via Line called.

"Revenue Management, Targeted Market, Customer Experiences, Competition Scouting and from Additional Services all the information will help my team and me to generate the report and can help me make a discussion to operate and planning the hotel."
Respondent 7: Northern hotel setting, 51 years old Male Hotel Manager, working experience more than 25 years. Interviewed date 28/08/2021

4.2 Theme 2: Business Intelligence and Corporate Performance in the hotel business, Thailand

Business intelligence is about human intelligence and AI related to the hotel's data collection and analysis using software packages generally used in hotels regarding entering data on the revenue side. The operation team will enter the system, and part of expenses and costs is an entry by the finance and accounting team. And in making reports to know the performance of the business, most of them are in the form of using MS office programs. Referring to verify the accuracy of the information, the frequency and duties of auditors vary according to hotel responsibilities and policies. It may be checked daily, weekly, monthly, quarterly, and annually. It depends on the enormous data information benefits from Business Intelligence (BI). Many hotels are not investing much BI in the hotel industry. Because the hotel programs in data management could be used to analyze the reports effectively, some hotels intend to use the BI system to improve customer satisfaction and competitors' selling price analysis.

"The hotel's accounting and finance department have a collection of information and mainly used to design reports in excel format. The presentation and up-to-date data respond to the change and needs of the report viewers all the time. We use data collection methods in programs commonly used in hotels, and we need to pay an annual fee. The use in data is needed to allow permission by each department to access its relevant information."
Respondent 1: Eastern/Central/Bangkok hotel setting, 40 years old male Financial Controller, working experience more than ten years. Interview date 26/08/2021 by Line called**.**

"AI is an interesting option to apply in business because it may make the business more flexible more modern. But the important factor is the investment that may be expensive. In terms of services, I still think that direct interaction with customers is more sincere and impresses customers than AI services such as food service. By the way, I think. The service by the staff will be more impressive and can be felt rather than Robot."
Respondent 2: Eastern/Central/Bangkok, 62 years old Female Financial Controler, working experience more than 20 years.

"The hotel employs human and software (BI) for data management, and reporting is made from Excel, Word, PowerPoint as we call MS Office. It is convenient and

does not require much investment. But in the future, if the hotel has studied and fully understood AI, that could improve the business. The hotel can invest in the future"
Respondent 4: Northern, 57 years old Female Finance and Accounting Manager, working experience more than 30 years.

"Each department s folder, Company Share Drive and also the data be kept via the system called ReviewPro (Business Intelligence-Data Analytics), but we use this system only part of development learning, competitor rate, and customer review."
Respondent 5: Eastern/Central/Bangkok hotel setting, 48 years old Male Learning and Development Manager, working experience more than 7 years and 48 years old.

"If the hotel has the funds, it may look to BI to help collect and evaluate the data. but in the field of service."
Respondent 8: Southern, 25 years old female Business Development Director, working experience more than 51 years. Interviewed date 28/08/2021 via Line called.

5. DISCUSSION AND CONCLUSION

5.1 Discussion

Business intelligence (BI) is human intelligence and artificial intelligence (AI) that could benefit the hotel industry. The results support Shahini (2020) that AI systems have been used in hotel management in booking and purchasing, improving the guest experience, tracking preferences and interests, etc. The importance is to understand BI benefits and issues that could enhance corporate performance in hotel booking and accommodation and focus on hotel guest experience, business operations, and customer satisfaction. Furthermore, it also supported Kim & Han (2020) that hotels are establishing full-service providers in the realm of intelligent technologies by fully utilizing currently available high-tech products and services to provide a superior customer experience. More specifically, smart hotel technologies include chatbots, facial or fingerprint identification to unlock the door, robots delivering room amenities, holograms for information, voice commands to control lighting or window curtains, a robot concierge, and many more features. Business intelligence is essential to big data analytics providing services to the customers to satisfy them and for a predictive analytics purpose. The respondents perceived interest in AI. Many hotels plan to use AI in hotel management. The investment of AI in hotels' management should be considered to improve corporate performance. It is related to services and control in any dimension. Big data analytics and AI applications help managers promptly solve digital era transformation and corporate performance issues.

5.2 Limitations & Recommendation

A few limitations exist throughout the research, resulting in some gaps in this study. First, the research methodology focuses on qualitative methods for gaining a general understanding of the key respondents. It is unable to provide quantitative data and value this aspect. The COVID-19 pandemic and the time constraint may not cover other related business intelligence, data analytics

aspects, and corporate performance. Achieving clarify the role of business intelligence and data analytics, additional research in a quantitative design is required for further study.

The relationship between corporate social responsibility (CSR) and branding strategy, according to Siripipatthanakul & Sixl-Daniel (2021), was recommended. Additionally, service quality, customer satisfaction, and customer loyalty (Siripipatthanakul, 2021; Siripipatthanakul & Bhandar, 2021), and service marketing mix and customer Satisfaction (Siripipatthanakul, 2021). (Sriipipatthanakul & Puttharaak, 2021, Siripipathtnakul & Chana, 2021). As a result, topics such as corporate social responsibility, digital communication, service quality, data analytics artificial intelligence, and hotel branding (including brand satisfaction and brand loyalty) are very worthwhile to investigate further.

5.3 Conclusion

The findings confirm that business intelligence and data analytics can help hotel managers and financial controllers improve financial performance or corporate performance in the hotel industry. The hotel managers and financial controllers realized that business intelligence and data analytics could benefit their organizations. Data analytics can assist businesses in describing their operations, investigating why positive or negative events occurred, generating information they may not have, and advising on potential action plans to take. Business intelligence tools can assist businesses in conducting these types of analyses, monitoring key performance indicators, and producing accurate reports. Analysts can turn their insights into action by using these tools to communicate their findings to stakeholders. Furthermore, decisions made in multiple other departments and functions across the organizations can be influenced by business intelligence. Business intelligence insights can help improve marketing, sales, and customer service to generating competitive intelligence. Hotel occupancy trends, guest demographics, market position, and channel profitability can all be monitored. To conclude, hotel managers and financial controllers could be able to improve their company's corporate performance. Besides, with business intelligence and data analytics, organizations can take advantage of these tools at every size and stage.

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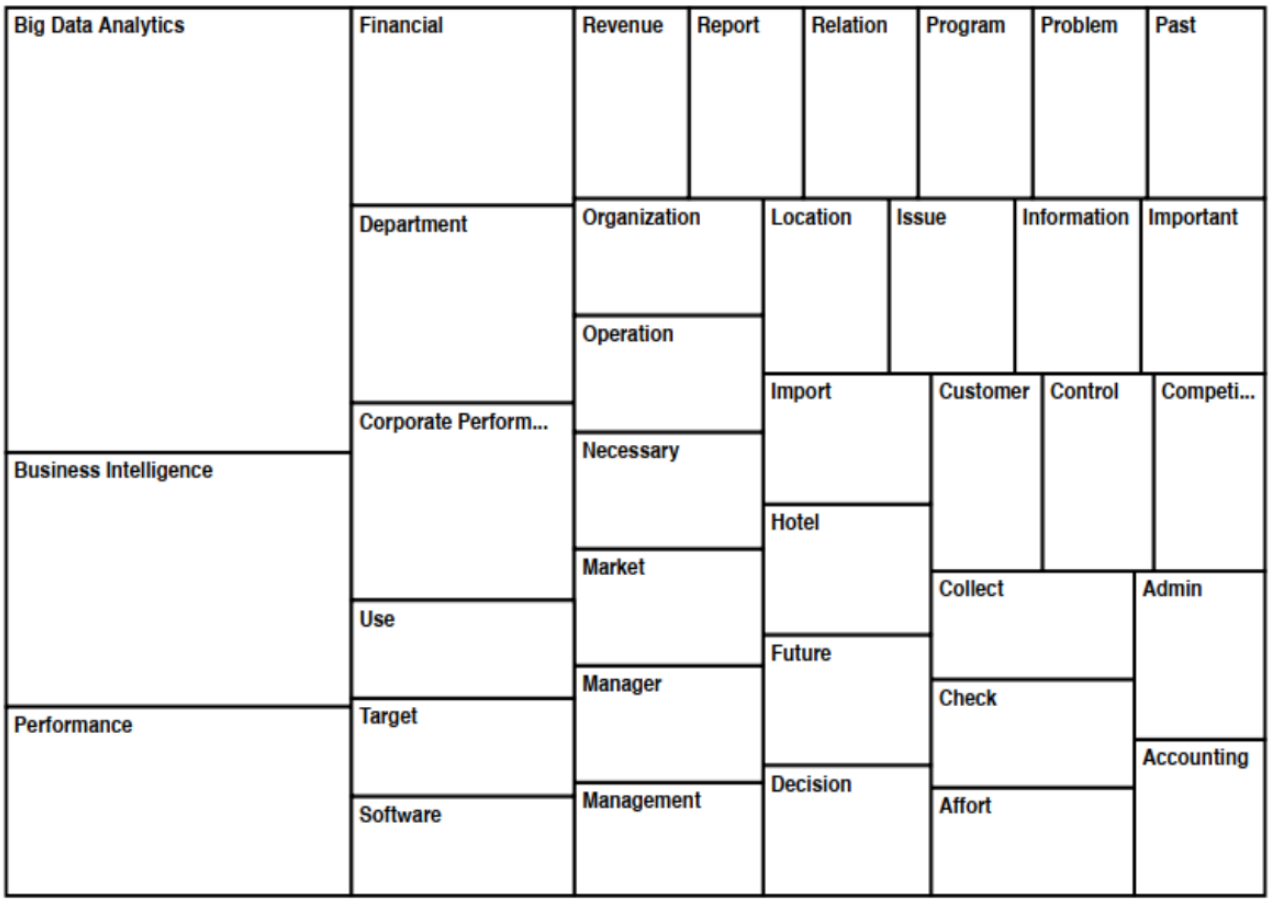
APPENDIX



Tree Map

Word Cloud by Interviews

Word Cloud by Themes

Explore


Customer stay information sales price
department can access its relevant
departments that generate the most
each department will analyze their
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hotel like standard . To collect
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interested in ? Answer Customer stay
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Let's check again and make
Q5 Who is in charge
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customer source daily income generated
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for the business and concern
from different departments . It is
every department . in job
in
finance , sales revenue , cost
financial planning and budget
that department to propose
is very important because it
it an important role in
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of the customer since the
sales price information customer source
such as rate competitor .
to be processed to make
was collected in the form
checked regularly . To
will
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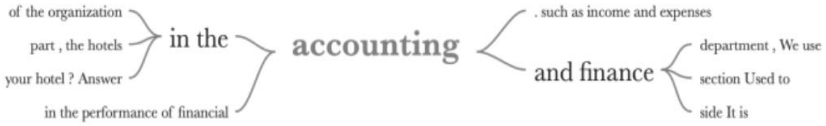
gathered and analyzed
help me and my

Word Tree

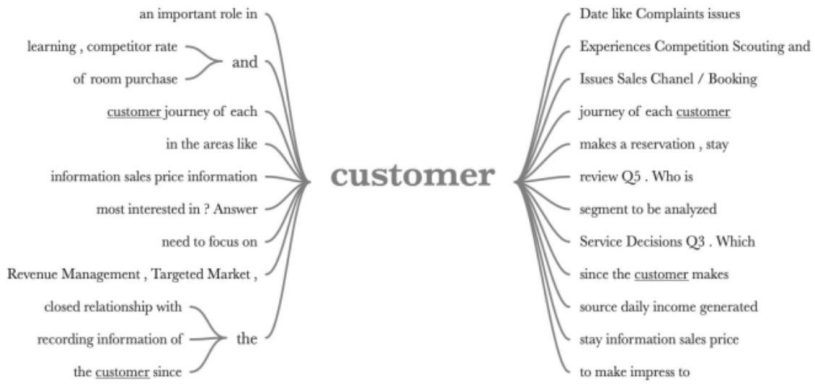

can be felt . BI = Typically ,
in programs commonly used in
In the BI part , the
Operation Excellence Team , However some
that is used in general
to maximize the benefits of
hotels
and
to influence short - term
we need to pay
as usual to collect data
in the accounting and finance
may do by L & D
use the software that is


of the organization
part , the hotels
your hotel ? Answer
in the
in the performance of financial
accounting
. such as income and expenses
and finance
department , We use
section Used to
side It is


Data at your hotel
the most Big Data
? Answer
a weekly based for internal
consulting with Hotel Manager and
Every week there will be
on the Hotel function . The
operation
. and discuss any issue of
Excellence Team , However some hotels
Meeting to present reports and
team
because the initial data
may need to focus
Q6 . How frequently do


and thorough in
use BI for
data
every department . in job
How frequently do hotel
direction
law .
in terms of
your hotel ? Answer Revenue
management
,
it will be a
Targeted Market , Customer Experiences ,
and
create transparency , accuracy ,
personnel examine Big
pricing and investments
reporting . we will
Because this point will


each customer segment to be
information will be gathered and
interested in ? Answer Guest's data
or development unless it is
present reports and share the
analyzed
and used for plan and
by the Financial Controller before
data with the concerned team
from the market segment , study
to meet with real customers


an important role in
learning , competitor rate
of room purchase
and
customer journey of each
in the areas like
information sales price information
most interested in ? Answer
need to focus on
Revenue Management , Targeted Market ,
closed relationship with
recording information of
the customer since
the
customer
Date like Complaints issues
Experiences Competition Scouting and
Issues Sales Chanel / Booking
journey of each customer
makes a reservation , stay
review Q5 . Who is
segment to be analyzed
Service Decisions Q3 . Which
since the customer makes
source daily income generated
stay information sales price
to make impress to