

The Association Rules of Factors on Customer Choices of Accommodation:

Pak Chong, Nakhon Ratchasima

กฎความสัมพันธ์ของปัจจัยการเลือกที่พักแรมของนักท่องเที่ยว อำเภอปากช่อง
จังหวัดนนทบุรี

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อาจารย์สาขาวิชานวัตกรรมการท่องเที่ยวและการบริการ คณะศิลปศาสตร์

สถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบัง

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Abstract

Accommodation plays a crucial role in facilitating visitors when they are traveling. It can be noticed that the hotel is the main factor which affects a lot on visitors' decisions. If any tourist attractions are not able to provide good accommodation, it will decrease the number of visitors who would travel and spend the nights. Thus, to indicate the factors which affect customer choices on accommodation. The research had been conducted based on the 452 online surveys targeting the tourists who spent more than one night in Pak Chong area, Nakhon Ratchasima province. A Qualitative research method, the association rules, investigates the relationship of factors which consists of the personal information and some improvement factors; Accommodation, Attraction, Activities, Amenities, and Accessibility. The research objective is to provide accommodation improvement guidance which concluded from the rules of the association for increasing the number of visitors in the Pak Chong area. The outcome suggests the effective accommodation should provide interesting activities such as paintball, rafting, biking and other facilities such as free internet connection, free transportation to the hotel. The cleanliness, well-prepared decoration, and safety of accommodation is an important factor that should keep in consideration firstly. In summary, all mentioned factors are the main factors that directly affect the customer choices.

Keywords: Customer Choices, Accommodation, Association Rules, Pak Chong,

Nakhon Ratchasima

บทคัดย่อ

ในอุตสาหกรรมการท่องเที่ยว ที่พักแรมมีบทบาทสำคัญในอำนวยความสะดวกแก่นักท่องเที่ยว จากการศึกษาพบว่า โรงแรมหรือที่พักแรมเป็นปัจจัยหลักที่ส่งผลต่อการเลือกสถานที่ท่องเที่ยวแบบค้างคืน หากสถานที่ท่องเที่ยวขาดที่พักแรมคุณภาพดีจะส่งผลกระทบโดยตรงต่อจำนวนนักท่องเที่ยวและจำนวนคืนพักแรม ดังนั้นเพื่อรับปัจจัยที่ส่งผลกระทบต่อการเลือกที่พักแรมของนักท่องเที่ยว ผู้วิจัยจึงทำการศึกษาความเกี่ยวข้องระหว่างปัจจัยโดยใช้ทฤษฎีกฎความสัมพันธ์จากข้อมูลแบบสอบถามออนไลน์จำนวน 452 ตัวอย่างทั้งนี้ผู้ตอบแบบสอบถามคือ นักท่องเที่ยวที่เคยพักแรมมากกว่าหนึ่งคืนในบริเวณอำเภอปากช่อง จังหวัดนครราชสีมา การวิจัยนี้เป็นการวิจัยเชิงปริมาณโดยใช้ทฤษฎีกฎความสัมพันธ์เพื่อวิเคราะห์ความสัมพันธ์ของปัจจัยด้านประชากรศาสตร์และองค์ประกอบการท่องเที่ยว ประกอบด้วย ที่พัก สิ่งดึงดูดใจ กิจกรรม สิ่งอำนวยความสะดวก และความสามารถในการเข้าถึง โดยมีวัตถุประสงค์เพื่อเสนอข้อเสนอแนะ การพัฒนาสถานที่ท่องเที่ยวและที่พักแรมเพื่อเพิ่มจำนวนนักท่องเที่ยว ผลวิจัยชี้ว่า นักท่องเที่ยวสนใจพักแรม ระยะทางหากที่พักแรมสามารถจัดกิจกรรม ล่องแก่ง ปั่นจักรยาน หรือเพนนบลล และมีการบริการอินเทอร์เน็ต ไวร์ลส์ฟรี หรือมีบริการรถรับส่งระหว่างโรงแรมสู่สถานที่ต่าง ๆ ในขณะที่ความปลอดภัยในที่พัก ความสะอาด และการจัดตกแต่งที่พักมีอิทธิพลย่างมากต่อการตัดสินใจเลือกที่พักเป็นอันดับต้น ๆ

คำสำคัญ : การเลือกที่พักแรม ที่พักแรม ทฤษฎีกฎความสัมพันธ์ ปากช่อง นครราชสีมา

Introduction

Tourism industry generates a great amount of income. From the report of Turner, the contribution of tourism income to Thailand GDP is USD 36.7 billion, 9.2% of total GDP in 2016 and is forecast to increase continuously (Turner, 2017). Many businesses are contributing directly to the tourism. It consists of accommodation business, transportation, food and beverage services, telecommunication and souvenir business et cetera. The accommodation has been significant since visitors can spend the nights, buy food and beverage services, spa, provide fitness room, swimming pool and so on. Therefore, accommodation directly affects customer choices. If any tourist attractions were not able to link with good accommodation, it would decrease the number of visitors who would travel and spend the nights.

Presently, traveling is very popular because people nowadays pay more attention to have vacation and get away from seriousness by being out of town. So, the main factors affect customer choices to choose the tourist attraction are revealed as the preparation of accommodation that also provide interesting activities, safety, amenities and getting to easily. Since Pak Chong area, Nakhon Ratchasima province is the favorite destination for many tourists. In 2016, the number of tourists in this area are around 3.23 million (MOTS, 2016). It is

significantly influent the accommodation revenue. However, with some varieties of accommodation in Pak Chong, so the competition among this business is increasing.

From research study, many findings are showing some local accommodation businesses cannot capture the visitor interests and eventually lead to a low number of visitors or business shutdown. To win in accommodation business, the business owner needs to understand the process of tourist decision and aims to deliver the service as what they require. The understanding of the factors influencing the customers' choices toward choosing accommodation in Pak Chong can guide the business owner in business development in many aspects, which can be the locations, services, and activities. The development can increase the number of customers significantly.

To enable the business growth with the right investment on the influencing factors, the association rule is used to identify the factors affecting customer accommodation choices. In other words. The group of influencing factors towards customer's choice are determined by using the association rules method. The research finding including summary are drawing from 452 questionnaires which evaluated by descriptive statistic and the association rules. Also, the suggestions focusing on the rule of factors provide the idea and how to apply this research work in practical. The useful recommendation for accommodation improvement can be found in this research.

Literary Review

The tourist destination and experience choice are the focused research area aiming to understand the effect of factors toward the destination. The decision sequence effects the destination selection (Oppewal, Huybers, & Crouch, 2015). The process of tourist decision is the formulation of several elements; when and where to travel, what to do, how much to spend, how long to stay. Therefore, the decision on the destination can be changed per the interesting of elements (Dellaert, Ettema, & Lindh, 1998; Hyde, 2008; Woodside & Lysonski, 1989). From the tourist decision process, accommodation involved in 3 elements; how long to stay, how much to spend, and what to do. To understand on decision making of tourist towards accommodation, many research setups the work to get insight the reason for the decision. Research on information processing and touring planning theory (Hyde, 2008) claimed that three distinct activities which consist of information search, vacation plan, and vacation booking, making the tourist decided on the destination and accommodation.

The vacation plan and information search have a link to amenity and activities provided by the accommodation. From the research of (McCleary, Weaver, & Hutchinson, 1993; Taninecz, 1990), the important attributes influencing tourist decision on the accommodation are cleanliness and location. It is good evidence confirmed by (Knutson, 1988) that the tourist considered convenient location, safe and secure environment, clean, comfortable, well-maintained rooms, prompt and courteous service, and the polite and friendly employee as the factors for hotel selection. All factors are then loaded for accommodation evaluation in Pak Chong. Moreover, the favorite activities provided in Pak Chong are selected as the factors for evaluation as well.

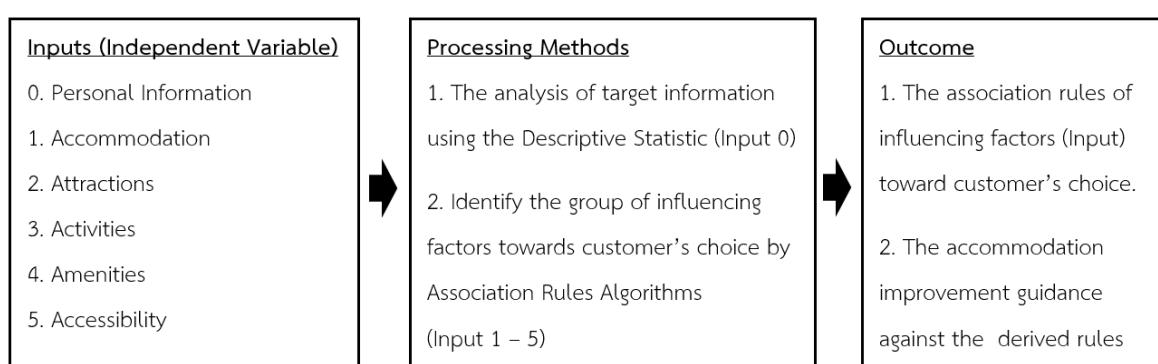
There are many methods had been used for relationship finding among factors. The correlation method is statistical tool providing the insight on the interaction of factors. The hotel choices were tested to understand the effect of environment-friendly activities against the decision planning of tourist on the green hotel (Han, Hsu, & Sheu, 2010). The association rule was addressed as a data mining tool for hotel firms to formulate probabilistic rules for subsequent activity and purchase (Magnini, Earl D. Honeycutt, & Hodge, 2003). Moreover, the association rules can be found as a tool for the hotel expenditure decision rules (Law & Au, 1998). The reasoned action on hotel marking strategy was discovered and confirmed by association rule (Francis & Bungkwon, 1996). As this research aims to understand the association of factors, therefore, the association rule is the method that matches with the research objective. Hence, the association rules are considered as the research tool for this research work.

In Pak Chong, Nakhon Ratchasima province, there is the small number of research in tourism. Most of the research is focused on Argo-tourism (Phandee & Pinthong, 2012; Tungprasert, 2014), rural development (Kaewpitoon, Loyd, & Kaewpitoon, 2015), plantation (Sodsai, Kosol, Samran, Somchai, & Somchai, 2012) and health promotion (Boonvarasatit, Homsin, & Srisuriyawet, 2016). Those result of the research are mostly interpreted from descriptive statistic which does not detail in the association of factors while the association rules is an alternative methods that can highlight the influencing factors for accommodation improvement which contributes to local business enhancement.

Methodology

Research Questions: As indicated in the introduction, the association of factors which influence toward the customers' choices on accommodation in Pak Chong, is explored. The benefits of this study are useful for an entrepreneur who do the business in this area. The finding can be used as a guideline for accommodation improvement in many aspects, which can be the location, services, and interesting activities. The improvement aims to increase the numbers of customers significantly

Conceptual Framework: The conceptual framework presents the relationship between research outcome, processing methods and independent variables which are the personal information and the improvement factors (Dickman, 1997); Accommodation, Attraction, Activities, Amenities, and Accessibility. All independent variables are used as the input of this research. The research outcome is the association rules and the recommendation for future improvement of accommodation in Pak Chong. We conduct the research follow the conceptual framework below.



The online survey is a data collecting tool for this research. The survey was setup on surveymonkey.com and tourist segmentation performed to cover all nations on facebook.com allowing only the tourist who had visited Pak Chong. The survey consists of two sections; personal information and binary scale of 38 sub-factors, which groups into five factors per Dickman's research (Dickman, 1997). About binary-scale survey, the principal component analysis (PCA) checked for factor loading. PCA shows the factors loading value for all factors starting from +0.74 and higher. It means all factors are with the proper sub-factors loading. Moreover, Cronbach's Alpha (CA) plays its role in checking the internal consistency of sub-factors, which in the same factor. CA values are 0.88 and higher. We launch 100 online pilot surveys by systematic sampling for questionnaire validation. PCA and CA were calculated

based on pilot data set. Regarding the high CA values, it indicated the excellent internal consistency on the survey. PCA and CA also showed that these survey questions are proper to be used as the tool for data collection.

Algorithms and Methods: In this research, the association rules (Agrawal, Imieliski, & Swami, 1993) investigate the relationship between sub-factors. The individual sub-factor is treated as an itemset on the rule. The association rule method consists of five components as follows; the first component is the association rules, the second component is itemset, support and confidence value. The third component consists of control variables or association rule parameters. The fourth component is the algorithm in rules formulation; it is apriori algorithm. The last component, analysis and design, this component shows the steps of rule formulation. The detail of algorithms and methods are discussed following.

Association Rules

Association rules is the theory investigating the pattern of occurrence. It presents the relationship of sub-factors in the form of transaction. In this research, each of survey feedback is treated as a transaction. A transaction consists of sub-factors which are considered as the itemset. The result would be presented in the form of rules coupled with its support and confidence value under the conditions of the control variables. The control variables indicated the interesting of the rules, for example, if tourist chooses accommodation because of any factors, the researcher would know the number of support and confidence value, which relates to the factors. The association rules usually start by studying the itemset, support and confidence value.

Itemset, Support Value and Confidence Value

The binary relation between the transaction and all items in the transaction can represent by mathematics notation as follows; transaction $d \in D$, and item $i \in I$ where D denotes the universal set of transactions, and I denotes the universal set of items. The item in a transaction which was chosen by customers can be noted as $(d, i) \in R$ where R is the universal set of relationship between d and i . Itemset X and X_j are the set of i_1, i_2, \dots, i_k where its number of items is equal to k . Therefore, $|X| = k$ where $X \subseteq I$. The support of itemset X is the ratio between the number of D with itemset X and number of D , denoting as $\text{Support}(X)$. The calculation is shown as follows;

$$Support(X) = \frac{Count(X)}{|D|}$$

The confidence of itemset can be calculated by the equation below

$$Confidence(X_j \rightarrow X) = \frac{Support(X_j \cap X)}{Support(X)}$$

From the definition and equations above, the itemset, support value and confidence value are the part of Apriori algorithm.

Control Variables

There are two control variables in association rules. The expert in data mining field recommends these values; the minimum support threshold is 0.2, min-sup = 0.2 and the minimum confident threshold is 0.8, min-conf = 0.8. The association rule of sub-factors with support value greater than min-sup and confidence value higher than min-conf is considered as a valid rule.

Apriori Algorithm

Apriori (Rao & Gupta, 2012) is a fundamental algorithm which used for relationship study of the itemset in transactions by identifying the frequent transaction. The algorithm counts the occurrence of itemset starting from 1-itemset to n-itemset. If the support value of any itemset less than the control variables, the itemset would be eliminated and would not be used to create larger-itemset.

Analysis and Design

There are three steps in association rule formulation. Step 1, count the number of itemset occurrence and calculate the support value. Step 2, compare the support value of each frequent itemset with min-sup. If the frequent itemset with support value is less than min-sup, delete the itemset. Otherwise, use the frequent itemset to create the next-itemset frequent set. Repeat step 1 and 2 until no frequent itemset can be created. Step 3, create the association rule by considering the confidence value and min-conf. If the confidence value is less than min-conf, that rule will be eliminated otherwise; we accept the association rule.

Data : From the statistic of tourist who visited Pak Chong from all nations in 2016, there are 3.23 million tourists (MOTS, 2016). The sampling size from Yamane' formula (Yamane, 1973) where 95% confidence level with the margin of error $\pm 5\%$ is setup per the statistical practice.

Therefore 384 survey feedbacks can represent all tourists in the 2016 year. We received the survey feedback 512 sets by systematic sampling from multi-national tourists. The outliers were removed, the number of feedbacks without outlier is 452 sets which is higher than 384. So, all feedbacks are then loaded as the input.

The survey consists of two sections; the first section, personal information, the descriptive statistic summarizes 452 responses in a percentage form which provides the overview of the population. The second section, binary-scale questionnaire or yes/no question asked tourist who spent at less one night at Pak Chong during January 1st, 2016 to December 30th, 2016. The questions addressed on the sub-factors that can influence them to revisit or decide on accommodation at the first time. The association rules were conducted and discussed in the next section.

Research Results

For the research finding from 452 questionnaires, a descriptive statistic provides the summary of tourist's personal information as shown in table 1. The majority of tourists who shared their opinion can be summarized into the percentage form. The association rules present the association of sub-factors on customer choices of accommodation. The detail is presented in the next section.

Table 1 : The personal information of the survey respondents

Personal Information		Number of tourist	Percentage	Personal Information		Number of tourist	Percentage																																																																																																																				
Gender																																																																																																																											
1) Male		171	37.84%	1) Certificate or equivalence		9	1.99%																																																																																																																				
2) Female		280	61.94%	2) Graduated or equivalence		324	71.68%																																																																																																																				
3) Not declare		1	0.22%	3) Post graduated		112	24.78%																																																																																																																				
Total		451	100.00%	4) Not declare		7	1.55%																																																																																																																				
Age																																																																																																																											
1) Less than 18 years old		1	0.22%	Total		452	100.00%																																																																																																																				
2) 18 - 25 years old		9	1.99%	Annual Income																																																																																																																							
3) 25 - 30 years old		68	15.04%	4) 30 - 35 years old		135	29.87%	1) Less than USD 10'000		3	0.66%	5) 35 - 40 years old		87	19.25%	2) USD 10'000 - 12'000		3	0.66%	6) 40 - 45 years old		39	8.63%	3) USD 12'000 - 14'000		18	3.98%	7) 45 - 50 years old		33	7.30%	4) USD 14'000 - 16'000		51	11.28%	8) 50 - 55 years old		17	3.76%	5) USD 16'000 - 18'000		12	2.65%	9) 55 - 60 years old		32	7.08%	6) USD 18'000 - 20'000		85	18.81%	10) More than 60 years old		31	6.86%	7) USD 20'000 - 22'000		122	26.99%	Total		452	100.00%	8) USD 22'000 - 24'000		47	10.40%	Marital Status								1) Single		241	53.32%	9) USD 24'000 - 26'000		65	14.38%	2) Married		153	33.85%	10) USD 26'000 - 30'000		31	6.86%	3) Divorced		50	11.06%	11) USD 30'000 - 40'000		13	2.88%	4) Not declare		8	1.77%	12) More than USD 40'000		2	0.44%	Total		452	100.00%	Total		452	100.00%	Average of stay in Pak Chong = 2.64, S.D. = 0.69							
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Summary of Findings:

Survey Section 1: Personal Information

From table 1, most of the survey respondents are female, which is 61.94% of participants. The tourist with age between 30 to 35 years old is 29.87%. For marital status, up to 53.32% is single. The tourist who graduated from the university is the most respondents, 71.68%. Moreover, 26.99% of tourists have the average income in range USD 20'000 – 22'000 per year. The average of stay in Pak Chong is 2.64 nights with SD = 0.69.

Survey Section 2: Association Rules of Factors on Customer Choices of Accommodation

In this research, the control variables of association rules are set up following the expert recommendation; a minimum support threshold is 0.2, and a minimum confidence threshold is 0.8. The formulated rules are grouped by Dickman's criteria (Dickman, 1997). The derived association rules are shown in table 2 and the interpretation of rules are described following;

Table 2 The calculation of association rules of factors on customer choices of accommodation.

Factor	Rules	Support	Confidence
Accommodations	{ cleanliness, safety } \rightarrow { decoration }	0.45	0.86
	{ decoration, safety } \rightarrow { cleanliness }	0.45	0.86
	{ cleanliness } \rightarrow { decoration }	0.50	0.87
Attraction	{ Khao Yai National Park, Ban Tha Chang Spring } \rightarrow { Khao Yai Panorama Farm }	0.38	0.83
	{ Primo Piazza } \rightarrow { Palio Khao Yai, Chok Chai Farm }	0.47	0.94
	{ Bloom by TV Pool, Palio Khao Yai } \rightarrow { Khao Yai Art Museum }	0.21	0.87
	{ Farm Chok Chai } \rightarrow { Primo Piazza }	0.27	0.94
	{ Farm Chok Chai } \rightarrow { Sheep Land Farm }	0.32	0.90
	{ PB Valley Khao Yai Winery, National Research Center of Millet and Corn } \rightarrow { Khaoyai Floating Market }	0.36	0.83
	{ play water park } \rightarrow { the slider, water bicycle }	0.53	0.89
Activities	{ water bicycle } \rightarrow { rafting }	0.61	0.91
	{ archery } \rightarrow { paintball }	0.90	0.81
	{ non-smoking room, comfortable parking lots } \rightarrow { free internet connection }	0.41	0.94
Amenities	{ swimming pools } \rightarrow { fitness room }	0.54	0.88
	{ swimming pools, fitness room } \rightarrow { spa }	0.66	0.80
	{ spa } \rightarrow { laundry }	0.25	0.96
	{ public transportation } \rightarrow { near the train station }	0.61	0.95
	{ public transportation } \rightarrow { pickup services }	0.27	0.93
Accessibilities	{ by car } \rightarrow { pickup service }	0.92	0.83

Control variables: min-sup = 0.2, min-conf = 0.8

Accommodations: the factors that the tourist agreed to consider are; if accommodation can provide tourist cleanliness and safety, they will look for a good decoration. Moreover, if the accommodation is well decorated and safe, another factor that will be considered is cleanliness. Furthermore, tourist usually pays attention to not just a safety, but also cleanliness as well as good decoration.

Attraction: the factors that customers agreed to consider are; if they planned to be around *Khao Yai National Park*, *Ban Tha Chang Spring*, they would consider the accommodation which is *Khao Yai Panorama Farm*. If they planned to be around *the Primo Piazza*, they would consider accommodation which is near *Palio Khao Yai* and *Chok Chai Farm*. If customers preferred photographing and wanted to be around *the Bloom by TV Pool* and *Palio Khao Yai*, they would consider the accommodation which is near *Khao Yai Art Museum*. In the other hand, if accommodation in the area of *Farm Chok Chai* were all booked, they would consider accommodation in the area of *Primo Piazza* and *Sheep Land Farm* instead. Moreover, customers wanted to be around the *PB Valley Khao Yai Winery* and *National Research Center of Millet and Corn*, they would consider the accommodation which is near *Khaoyai Floating Market*.

Activities: the factors that customers agreed to consider are; if customers preferred to play water park, the slider and water bicycle would be the factor they will consider. In case that there was water bicycle, customers would look for rafting. According to the study, customers who want to do the archery, they will also be interested in paintball.

Amenities: the factors that customers agreed to consider are; the good accommodation is the place that can provide customers free internet connection, non-smoking room and comfortable parking lots. Moreover, customers who preferred swimming pools, they usually looked for fitness room as well. In case that there were already both, the customer would prefer spa. If there were already spa, they would consider laundry as a factor. The nightclub was not a factor that can influence the decision.

Accessibilities: the factors that customers agreed to consider are; if customers traveled by public transportation, they would consider accommodation which is near the train station as much as possible or the accommodation where can provide them the pickup services. If customers traveled by car, they would consider accommodation where can provide the pickup service between hotel and attraction.

Regarding five aspects from association rules, there were nine factors which effect to customers' choices, which were cleanliness and safety, locating nearby *Farm Chok Chai* and *Primo Piazza*, activities such as water bicycle, free internet connection, parking lots, swimming pools and pickup services.

Discussions and Suggestions

On the accommodation, customers usually considered the cleanliness, decoration, and safety. The customers who visited Pak Chong paid much attention to the privacy and price less than other factors.

Attraction can be divided into five groups by customer interest; group 1, the accommodation where are located near *The Bloom by TV Pool, Palio Khaoyai, and Khao Yai Art museum*. Group 2, the accommodation where are located near *Khao Yai Panorama farm, Khao Yai National Park, and Ban Tha Chang Spring*. Group 3, the accommodation where are located near *Primo Piazza, Palio Khao Yai, and Chok Chai Farm*. Group 4, the accommodation where are located near *Chok Chai Farm, Primo Piazza, and Sheep Land Farm*. Group 5, the accommodation where are located near *PB Valley Khao Yai Winery and National Research Center of Millet and Corn and Khao Yai Floating Market*. Considering all groups, the accommodation which usually got high attention from the customer was around the area of *Primo Piazza, Palio Khao Yai, and Chok Chai farm* or the accommodation which quickly access to these three attractions.

Moreover, customers also paid attention to the provided activities which are a water park, water bicycle, sightseeing, rafting, archery, and paintball. The accommodation which provided customers those activities would have more customers than others which did not. The accommodation which seems to be more advantage was the place that could provide free internet connection and parking lots, swimming pools, fitness room, spa and laundry services, accordingly.

Regarding the convenience of transportation, customers usually chose the accommodation which can provide them the pickup services between hotel, public transportation station, and attractions. From the summary of finding and discussion, the improvement opportunity that influences the accommodation business consists of 1) cleanliness, 2) safety environment in accommodation area, 3) locating near famous attractions, 4) activities, 5) free internet connection, 6) parking lots, 7) swimming pools, and 8) pickup services among hotel and attractions

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