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TOURIST INFORMATION-SEEKING BEHAVIOURS USING ASSOCIATION RULE MINING

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Abstract. *The evolution of information technology and social media today affects the behaviour and expectations of tourist knowledge and information-seeking. Proper answers can enhance the opportunity of travel decision-making. The purpose of this research is to study tourist information-seeking behaviours. Such behaviours derive from the question items that are frequently asked by association rule mining (ARM). Following previous research, the questions were clustered into four groups in what is termed the ESAN model, which is the input data to ARM with default parameters in Weka. It was found that the question patterns generated by the ARM, consisting of clusters E, S, A, and N, had a value of conf. > 98%, and the value of supp. was 0.980-0.987, 1, 0.988-0.994, and 0.983-0.996, respectively. The utilization of this result includes 1) the representation of a data preparation model to access information quickly and to meet the needs of tourists and 2) the provision of guidelines for the Chatbot design by the rules-based Chatbot.*
Keywords: Association rule mining, Information-seeking, Rules-based Chatbot, APRIORI algorithm, Community-based tourism

1. **Introduction.** The tourism industry has been a crucial industry for the country for decades. It creates jobs for people, builds incomes and earns foreign currency. According to global tourism statistics, the number of tourists has increased by 6%, which is around 1.4 billion. Similar tourism statistics apply in the Asian and Pacific areas, which saw an increase of 6%, or 343 million tourists, in 2018. This indicates that the global average growth rate of tourist numbers is similar in the Asian and Pacific regions. Furthermore, such a statistic is higher than the expectation of the World Tourism Organisation (UNWTO). Additionally, in 2017, Thailand was a leader in earning tourism-based income in the region (57.5 billion dollars). Currently, there are policies for promoting tourism from numerous government organizations [1].

Community-based tourism (CBT) is an alternative form of tourism that is managed creatively and at a high standard by a community, leading to sustainability of the environment, local culture, and good quality of life in the community, and bringing about income distribution [2,3]. Nonetheless, many countries, Thailand included, are still encountering various problems and obstacles such as political issues, natural disasters, environmental changes, and, most importantly in 2020 and the current near-future, the COVID-19 pandemic. Tourist behaviour and expectations due to the adjustment and change brought about by information technology, social media evolution, rapid access to the required information, and receipt of the required information are also problems to be solved [3].

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Today, users' information-seeking in this digital era usually is satisfied by the questioning-answering system (Q&As) or the recommendation system. These systems include artificial intelligence (AI), such as the finding out of association rule mining (ARM) that occurs together with the finding of frequent item sets, or the forecast of phenomena generated in the huge data sets in the form of if-then statements [4], with APRIORI, an algorithm usually used with the structural data [5,6], well-known for identifying relationships that occur repeatedly in the dataset. For a small dataset, association-seeking can be done quickly, whereas large datasets require more processing time and are more complicated [7-9]. It is one of the algorithms that works fast and is the most effective [10,11] when testing with the datasets of Accidents and Pumsb to compare time and memory usage for data processing [7,8,10,12]. Meanwhile, the APRIORI algorithm is used with the tourism industry and services in various dimensions, for example, finding the frequent item sets of the tourists travelling to Bali Island to allow the stakeholders to prepare everything from the infrastructure, human resources, accommodation, and so forth, and finding the best 20 rules with a value of conf. between 86%-100% [12]. This is concordant with the association-seeking of the behaviours' form and possibility for the product's order prediction in online bookstores for the two groups of customers, consisting of innovative and traditional customers. The analysis of log data recorded in the longer period makes it possible to incorporate seasonality factors and a history of a customer's previous visits and purchases. The association rules for both groups have very high confidence, exceeding 88% for innovative customers and 90% for traditional ones. The support level exceeds 1% [5]. Accordingly, improvements were made to the quality of recommendation and the design of a new and more powerful hybrid architecture to provide strong recommendations to the users, by comparing two approaches: content-based filtering (CBF) and recommendation based on collaborative filtering association (RCFA), which had a value of conf. between 60%-96%, and 54%-88% [6], respectively.

According to the mentioned literature review, there has been research that found the ARM occurring together with the finding out of frequent item sets or that predicted the occurring phenomena in the huge dataset with structural data [5,6]. This research data was collected from the tourists interested in community-based tourism in the northeast of Thailand. The research emphasizes how the ARM reflects the model of information-seeking behaviours of the tourists.

These impact tourist knowledge-seeking behaviour and information-seeking in regard to products and services management that offer convenience and speedy service, infrastructures, and other factors that help promote tourism such as safety, convenience, cleanliness, and up-to-date standards [4,13]. These factors affect tourists while they are personally deciding on their travel plans and destinations. Potential tourists, both domestic and international, have to inform themselves about such situations to enable them to make better decisions on their own [14]. Readily available information on these various factors can help create jobs and income for the community, maintain their cultures, and provide funds for environmental protection. Moreover, such information availability can help influence travel decisions, such as travel destinations that provide new and broader experiences to tourists that also benefit the community [2,3,12].

The benefit of this paper is threefold. First, the question patterns that express the tourist information-seeking behaviours can help tourist find informative answers that impact their knowledge-seeking behaviours or information-seeking and help their decision-making regarding their potential tourism activities. Second, the ARM indicates the association between the form and stage of the knowledge-seeking behaviours caused by the tourists' questions. The questions lead to improving the strategies of the services model [15], increasing the efficiency of accessing the customers, and generating the responses

between the buyers and service providers. Finally, the questions acquire the correct answers, meet the needs, create an impression, respond to the needs of information-seeking, as well as allow further decision-making for travel.

2. **Literature Review.** This section introduces related research consisting of 2.1) tourism concepts, 2.2) information-seeking, and 2.3) association rule mining.

2.1. **Tourism concepts.** The UNWTO [1] determined three forms of cultural-based tourism: 1) historical tourism, which includes traveling to experience the places, artifacts, and activities that authentically represent the stories and people of the past, 2) cultural and traditional tourism that is an activity in which the visitor's essential motivation is to learn, discover, experience, and consume the tangible and intangible cultural attractions/products in a tourism destination, and 3) rural tourism, which is a type of tourism activity in which the visitor's experience is related to a wide range of products generally linked to nature-based activities, agriculture, rural lifestyle/culture, angling, and sightseeing. Today, the situation of tourism in Thailand shows that tourists also choose to travel the first class destinations that were popular place. In order to distribute income to other area the Thai government has issued the policy for stimulation tourism in second-class destinations. The example of second-class destinations in northeast of Thailand with potential and the outstanding concepts such as Buriram – the sports city, Surin – organic agricultural city, and Sisaket – ancient Khmer city. However, these locations were not commercial promotion seriously [16]. Then, it affects the economic distribution at the root base system, difference, perception, information access, information preparation for receiving quick information technology, and meeting the needs. When considering such problems mentioned above, it leads to the problem solution and potentials development, including improving the value and worth to the tourism by communities using Chatbot-based system or recommendation system, which are called AI (artificial intelligence). The benefits of all forms include the focus on the cultural capital to develop the tourist attractions that have local uniqueness and to maintain the society, culture, way of life, livelihood, and income distribution to the community, including the maintenance of cultural heritage.

Three theories affecting tourism decision-making are as follows. 1) The five-stage theory on motivation is applied to rural tourism. The theory consists of physiological needs, safety needs, social needs of love, belonging, and esteem, cognitive needs, and aesthetic needs (the latter two apply the most to rural tourism) [7]. On the other hand, Mill and Morrison [8] applied Maslow's hierarchy of needs to describing two types of behaviours responding to the tourist needs, namely, the physical and psychological needs. 2) Whether for business or leisure travel, tourism experts agree that there are fundamental expectations a destination must meet in order for visitors to recommend their experience to others and return with friends or family. These key elements are known as the five A's: attraction, activities, access, amenities, and accommodation [17]. Sharron expressed the same opinion as Middleton of attraction being the most important factor to attract the tourists to visit [15,17]. 3) Furthermore, the consumer behaviour model consists of the consumer's behaviours originating from the stimulus, need, and buyer's black box, which influences the cause of the buyer's response or purchase decision. Hence, the consumer behaviour model consists of the stimulus, both internal and external parts, emphasizing the construction of the marketing stimulus that cannot be controlled, and the buyers' feelings, which the manufacturers or sellers could never know. It has to use the effort to discover the answers behind the buyers' behaviours, decision process, final decision [17,18].

2.2. **Information-seeking.** This is the consistent and frequent seeking of interesting information by information seekers that enhances their skill in terms of critical thinking,

determination of resources, rapid access to the required information, and receipt of the required information. The skills of critical thinking for determining resources and accessing the required information are consistently developed to the point of being able to generate appropriate and useful information. Ellis [19] developed an information-seeking behaviour prototype covering six information gathering activities: 1) starting, which is the beginning process of information-seeking on the required issues, 2) chaining, 3) browsing, 4) differentiating, 5) monitoring, and 6) extracting.

2.3. **ARM.** ARM consists of an unsupervised algorithm that is a crucial technique in data mining for authentic use. The principle of operation lies in seeking the relationships inherent in the data, from a large database, and applying [7,11] those relationships to the analysis or prediction of various phenomena.

The important benefit of ARM is that it helps find the association of question items by using the APRIORI algorithm to discover the association, which happens so frequently that it reaches the question patterns that express the tourist information-seeking behaviours with their change of questions. It is concordant with the consumer behaviours model [14,20] in that the received results are reliable, correct, prompt, and responsive to the needs. It can build an opportunity for the tourist decision-making [14,17,20,21].

The application of Q&As: This is the expression of concise and precise answers to match the user's questions. Primarily, the automatic Q&A process helps the user receive concise answers to the questions that meet their needs. Generally, the form of "answer" proposed will depend on the question types [9,22]. The Q&A process can be categorized into three types:

1) Q&A process under the domain: closed-domain and opened-domain,
2) Q&A process under the technique: analysis using the language principles, statistical analysis, and comparison with prepared forms, and
3) Q&A process under the answer: factoid and non-factoid. Q&A to get the ratio of correct answers and meet the questions better [23].

Since the questioning structures can predict more, they are known to be applied to the Q&A process [14].

3. Methodology.

3.1. **Conceptual framework.** This research is experimental, with three processes to analyze the tourist information-seeking behaviour. We applied the aforementioned concepts and theories to designing the question lists. The input process included 1) the five A's of tourism, 2) tourist behaviours, and 3) consumer behaviours. Then, the received question lists were clustered as groups of questions. The results were stated as the ESAN model, which became the input data to ARM by the APRIORI algorithm. The output process included 1) question patterns for all of the four groups and 2) tourist information-seeking behaviours, as shown in Figure 1.

3.2. **Data collection.** An online questionnaire comprising 50 questions was made available to tourists interested in community-based tourism in the northeast of Thailand in the provinces of Nakhon Ratchasima, Buriram, Surin, and Sisaket. In all, 702 tourists responded to the online questionnaire between January 2019 and October 2020. The dataset uses Weka. The ESAN model [24] indicates the groups and question lists to identify tourist interest in tourism attractions and the frequently asked questions regarding the tourist attractions. The method used is exploratory factor analysis (EFA) with the principal component analysis (PCA) technique. The data reduce process, which is association-seeking for variable structures, was applied to gathering the groups of question lists that were relevant to each other. The datasets with the highest factor loading were gathered as the same factor and a new name was determined in the four clusters. All the

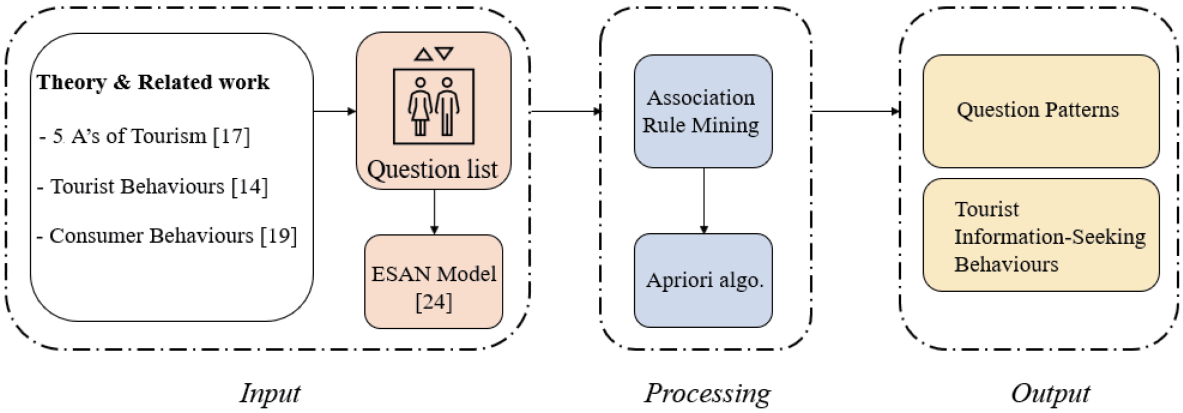

FIGURE 1. Conceptual framework of tourist information-seeking behaviours

E: Excellent Service		S: Standard Facilities		A: Accuracy of Information		N: Noble Culture	
Item	Question	Item	Question	Item	Question	Item	Question
Q23	time of activity	Q6	travelling	Q43	information centre	Q1	tourist attractions
Q26	service area	Q7	transportation	Q44	rules & regulations	Q2	identity
Q27	services mind	Q8	traffic sign	Q45	suggestions & service mind	Q3	uniqueness
Q28	primary facilities	Q9	time to attraction	Q46	websites	Q4	attractions/historical tourist
Q29	phone and Internet	Q10	vehicle is varied	Q47	channels to communicate	Q5	conserves the local cultures
Q30	health centre	Q11	local vehicles	Q48	social media		
Q31	safe parking	Q12	residences sufficiency	Q49	tourist guide		
Q32	suitable traffic	Q13	facilities in the residence	Q50	guides/local guides		
Q33	clean & standardized toilets	Q14	residence is hygienic				
Q34	hygiene standards restaurants	Q15	convenience				
Q35	local food	Q16	residence is safe				
Q36	local & souvenir shops	Q17	ready to help				
Q37	prices of products	Q18	residence price				
Q38	various products & services	Q19	residence is varied				
Q39	standardized products & services	Q20	activities are interesting				
Q40	products & services sufficiency	Q21	activities are varied				
Q41	security guards	Q22	participation in activities				
Q42	guides & local guides	Q24	local activities				
		Q25	activities that create perceptions				

FIGURE 2. The number and question list of ESAN model

four groups consist of 50 question lists as follows: 1) E: Excellent Service (0.529-0.769), 18 attributes 2) S: Standard Facilities (0.547-0.733), 19 attributes, 3) A: Accuracy of Information (0.592-0.739), 8 attributes, and 4) N: Noble Culture (0.735-0.801), 5 attributes. These were found by analysis of the dataset by their eigenvalues of more than 1 and cumulative variance at 81.116. The question lists that the tourists were interested in and exhibited the most frequent inquiry behaviours were used as the imported information to create the ARM, as shown in Figure 2.

3.3. **Experiment.** The question items were used in the ARM, using the APRIORI technique by determining the default parameter value (MinSupport = 0.1, and minMetric = 0.9) in Weka. The investigation on the effectiveness indicators of the ARM was derived from the acceptable confidence value and support, as shown in Section 5.

4. Discussion.

4.1. **Analysis method of the information-seeking behaviours.** The purpose of this research was to use an ARM to study tourist information-seeking behaviours using the

APRIORI technique. It is similar to the research of Kusakci [25], which used the APRIORI technique to find the association rules to plan and manage the harbour for policy security by determining the default parameter from 8,089 records of the inspection data. Their results were divided into two datasets. They found a value of conf. $> 87\%$ and supp. value between 0.124-0.205. The research results reported in Ait-Mlouk et al. [26] indicate that the association rule of street accidents, with parallel FP-growth, can be used for big data by selecting the significant rule from a value of conf. $> 80\%$ and supp. between 0.290-0.540 to make decisions and manage street traffic security quickly and efficiently. Furthermore, it is concordant with the research contribution of Soni et al. [27], which set the method of developing the software to meet the needs and rearranged the significance of the users using the APRIORI technique satisfactorily. It has outstanding qualifications to deal with big data to achieve minimal errors. Their results found a value of conf. $> 67\%$, and supp. between 0.200-0.603.

4.2. **Tourist information-seeking behaviours.** The results of this research expressed four tourist question patterns that include 1) Excellent service (Figure 3(a)), 2) Standard facilities (Figure 3(b)), 3) Accuracy of information (Figure 3(c)), and 4) Noble culture (Figure 3(d)), as shown in Figure 3.

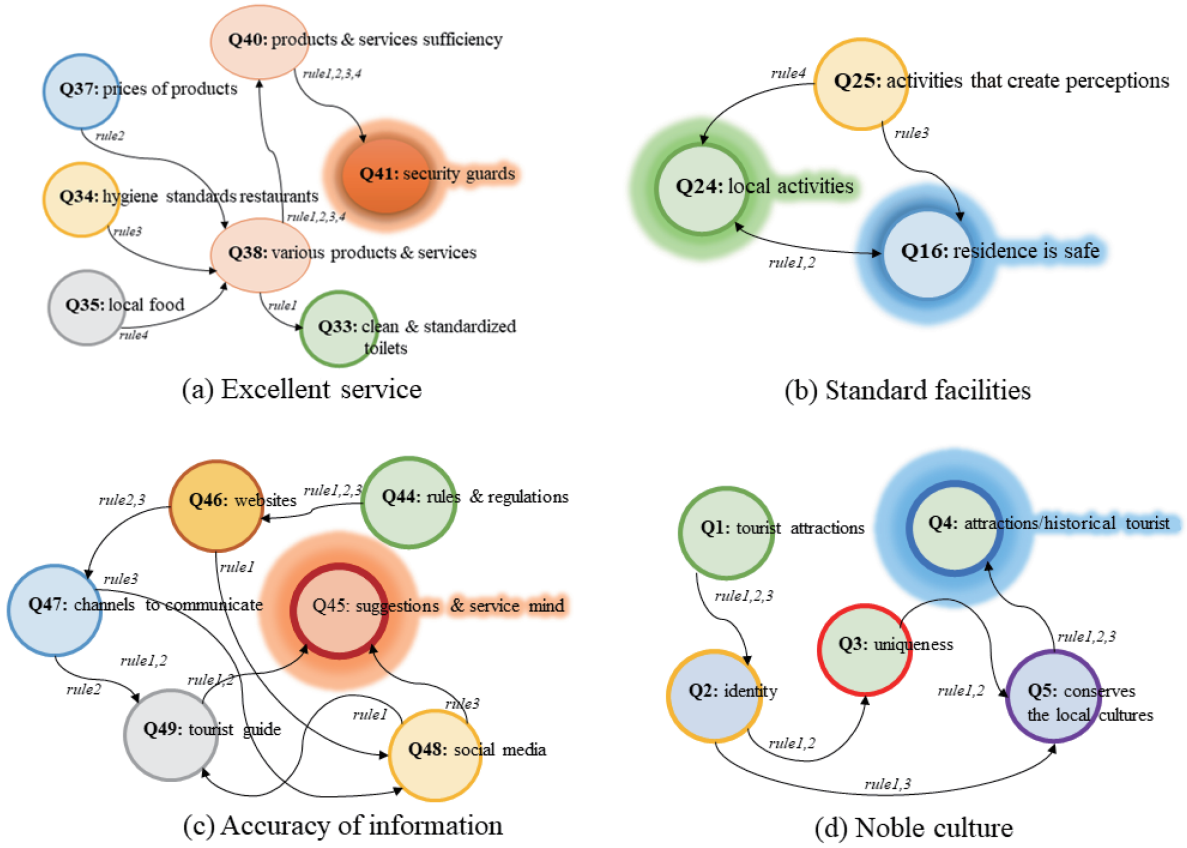

FIGURE 3. Tourists' question pattern

Tourist information-seeking behaviour about the excellent service started with food, products, price, and hygiene. The last question dealt with security which was also part of the standard facilities. This is consistent with the research results of Höpken et al. [28], who discussed tourism behaviour toward famous tourist attractions. They indicated the tourists' characteristics or specific information to extract the data to utilize the management, service, and marketing activities for reaching sustainable tourism. This method helps describe the behaviours that achieve the safety needs of tourists under Maslow's

hierarchy [8]. Moreover, it conforms to the tourism behaviours model from the traditionalists who prefer tourism that emphasizes safety, as seen in Swarbrooke and Horner [29]. It is also applicable to the plan of rules on the policy safety system towards the community regarding every dimension such as public health and hygiene, traffic, and the safety of life and properties for building the confidence of tourists.

The accuracy of information starts with the website and channels to communicate, before moving on to the guidelines of tourism and social media, as asked for by the information-seekers. The last question was about service mind. It is in line with the research of Ellis [19] and Li et al. [30], who identified that tourists need information that is accurate and meets their needs. Furthermore, it has suggestions about tourism that lead to the decision making and tourism plan. It is useful for the preparation of the locality's information and resources to communicate the community's images until it reaches all channels of the target groups, such as their social media and website. Overall, it prepares knowledgeable personnel to give information comprehensively to meet tourists' needs.

For the questions about the noble culture, tourists usually asked for identity, uniqueness, and attractions of local cultures and history. It is similar to the report of UNWTO [1,2], which determined a form of tourism by focusing on the cultural capitals to develop the tourist attractions that have the uniqueness of locality, maintain the pride of society, culture, livelihood, and community economy, and preserve the cultural inheritance together. It can design the local activities expressing the local wisdom, culture, and livelihood of the community. It helps reach mutual cultural conservation and construct awareness of the real roots of communities. The suggestions derived from this tourist information-seeking behaviour, especially for community-based tourism, indicate that tour promotion agencies should prepare information about food, products, price, hygiene, activities, residence channels of communication, identity, uniqueness, and attractions of local cultures and history in various formats, including their website, call centre, and digital media.

5. **Conclusion.** The purpose of this research is to study tourist information-seeking behaviours. Such behaviours derive from the question items that are frequently asked from ARM, we identified four models divided under the clusters of E, S, A, and N, which had a value of conf. $> 98\%$, and the value of supp. were 0.980-0.987, 1, 0.988-0.994, and 0.983-0.996, respectively. The rules of question clusters E, S, A, and N that significantly affected the information-seeking behaviour of tourists are shown in Figure 4.

In the excellent service aspect (Cluster E), seven question items were found that referenced clean & standardized toilets (Q33), various products & services (Q38), products & services sufficiency (Q40), prices of products (Q37), hygiene standards restaurants (Q34), local food (Q35), and security guards (Q41). Under the aspect of the standard facilities aspect (Cluster S), as shown in Figure 3(b), three question items were frequently asked: those concerning local activities (Q24), activities that create perceptions (Q25), and residence is safe (Q16).

The accuracy of information aspect (Cluster A), as shown in Figure 3(c), found six question items that included rules & regulations (Q44), websites (Q46), channels to communicate (Q47), social media (Q48), tourist guide (Q49), and suggestions & service mind (Q45).

The noble culture aspect (Cluster N), as shown in Figure 3(d), found five question items, consisting of tourist attractions (Q1), identity (Q2), uniqueness (Q3), conserves the local cultures (Q5), and attractions/historical tourist (Q4). In future work, the above question pattern can be the base and guideline for designing Q&A structure in a Chatbot.

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rule 1	Q33=1 Q38=1 Q40=1 391 ==> Q41=1 386	<conf:(0.99)> lift:(1.5) lev:(0.18) [128] conv:(22.28) supp:(0.987)
rule 2	Q37=1 Q38=1 Q40=1 397 ==> Q41=1 391	<conf:(0.98)> lift:(1.5) lev:(0.18) [129] conv:(19.39) supp:(0.984)
rule 3	Q34=1 Q38=1 Q40=1 396 ==> Q41=1 390	<conf:(0.98)> lift:(1.5) lev:(0.18) [129] conv:(19.34) supp:(0.984)
rule 4	Q35=1 Q38=1 Q40=1 396 ==> Q41=1 390	<conf:(0.98)> lift:(1.5) lev:(0.18) [129] conv:(19.34) supp:(0.984)

(a) Cluster E

rule 1	Q24=1 702 ==> Q16=1 702	<conf:(1)> lift:(1) lev:(0) [0] conv:(0) supp:(1)
rule 2	Q16=1 702 ==> Q24=1 702	<conf:(1)> lift:(1) lev:(0) [0] conv:(0) supp:(1)
rule 3	Q25=1 476 ==> Q16=1 476	<conf:(1)> lift:(1) lev:(0) [0] conv:(0) supp:(1)
rule 4	Q25=1 476 ==> Q24=1 476	<conf:(1)> lift:(1) lev:(0) [0] conv:(0) supp:(1)

(b) Cluster S

rule 1	Q44=1 Q46=1 Q48=1 Q49=1 354 ==> Q45=1 352 <conf:(0.99)> lift:(1.58) lev:(0.18) [129] conv:(43.7) supp:(0.994)
rule 2	Q44=1 Q46=1 Q47=1 Q49=1 353 ==> Q45=1 351 <conf:(0.99)> lift:(1.58) lev:(0.18) [128] conv:(43.58) supp:(0.994)
rule 3	Q44=1 Q46=1 Q47=1 Q48=1 363 ==> Q45=1 360 <conf:(0.99)> lift:(1.58) lev:(0.19) [131] conv:(33.61) supp:(0.991)

(c) Cluster A

rule 1	Q1=1 Q2=1 Q3=1 Q5=1 293 ==> Q4=1 292	<conf:(1)> lift:(1.7) lev:(0.17) [120] conv:(60.52) supp:(0.996)
rule 2	Q2=1 Q3=1 Q5=1 323 ==> Q4=1 321	<conf:(0.99)> lift:(1.69) lev:(0.19) [131] conv:(44.48) supp:(0.993)
rule 3	Q1=1 Q2=1 Q5=1 299 ==> Q4=1 297	<conf:(0.99)> lift:(1.69) lev:(0.17) [121] conv:(41.17) supp:(0.993)

(d) Cluster N

FIGURE 4. The best rules in ESAN cluster

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REFERENCES

[1] World Tourism Organization (UNWTO), *Recommendations on Sustainable Development of Indigenous Tourism*, 2019.
[2] P. Buppatanakorn, *Community-Base Tourism*, 2nd Edition, Cocoon and Co. Limited, Bangkok, 2017.
[3] N. Phopi, *The Problem and Obstacle of Market Expansion in Less Visited Area for Russian Tourist: A Case Study of Phitsanulok Province*, Master Thesis, Faculty of Liberal Arts, Thammasat University, 2018.
[4] K. Pitchayadejanant and P. Nakpathom, Data mining approach for arranging and clustering the agro-tourism activities in orchard, *Kasetsart J. Soc. Sci.*, vol.39, no.3, pp.407-413, 2018.
[5] G. Suchacka and G. Chodak, Using association rules to assess purchase probability in online stores, *Information Systems and e-Business Management*, vol.15, pp.751-780, DOI: 10.1007/s10257-016-0329-4, 2016.
[6] M. Gandhi, S. Gandhi and S. Collage, An enhanced approach for tourism recommendation system using hybrid filtering and association rule mining, *Asian J. Converg. Technol.*, vol.V, no.I, pp.1-4, 2019.
[7] I.-G. Czibula, G. Czibula and D.-L. Miholca, Enhancing relational association rules with gradualness, *International Journal of Innovative Computing, Information and Control*, vol.13, no.1, pp.289-305, 2017.
[8] R. C. Mill and A. M. Morrison, *The Tourism System: An Introductory Text*, Prentice-Hall, Inc., 1998.
[9] T. Khongtuk, A comparison of frequent itemsets mining algorithms, *J. Innov. Technol. Manag. Rajabhat Maha Sarakham Univ.*, vol.1, no.4, 2017.
[10] J. Han, M. Kamber and J. Pei, *Data Mining Concepts and Techniques*, 2nd Edition, Morgan Kaufmann Publishers, Cambridge, 2006.
[11] E. Šimková and J. Holzner, Science direct motivation of tourism participants, *Procedia – Social Behav. Sci.*, vol.159, pp.660-664, 2014.
[12] D. A. K. Arimbawa, Implementation of Apriori algorithm in determining tourism visit patterns to bali, *International Journal of Emerging Technology*, 2019.
[13] A. Prutzkow, Algorithms and data structures for association rule mining and its complexity analysis, *International Conference on Psychology and Education*, pp.558-568, 2018.
[14] N. Jongrak, *Studying the Use of Travel Agencies by Thai Residents of the Bangkok Metropolitan Area*, Master Thesis, Thammasat University, 2017.

[15] B. R. Ranoliya, N. Raghuwanshi and S. Singh, Chatbot for university related FAQs, *2017 International Conference on Advances in Computing, Communications and Informatics (ICACCI)*, pp.1525-1530, DOI: 10.1109/ICACCI.2017.8126057, 2017.
[16] S. Sregongsang, The development of tourism routes linked to tourism identities for the ways of lower Northeastern part of Thailand, *J. Lib. Arts, Ubon Ratchathani Univ.*, vol.14, no.1, pp.198-231, 2018.
[17] D. Sharron, *Tourism: An Introductory Text*, Hodder Education, 1996.
[18] Economics Tourism and Sports Division, *National Tourism Development Plan 2016-2022*, 2016.
[19] D. Ellis, A behavioural model for information retrieval system design, *J. Inf. Sci.*, vol.15, nos.4-5, pp.237-247, 1989.
[20] T. Eom, H. Han and H. J. Song, Discovering the perceived attributes of CBT destination travelers in South Korea: A mixed method approach, *Tour. Manag.*, vol.77, 2020.
[21] G. Del Chiappa, M. Atzeni and V. Ghasemi, Community-based collaborative tourism planning in islands: A cluster analysis in the context of Costa Smeralda, *J. Destin. Mark. Manag.*, vol.8, pp.41-48, 2018.
[22] Y. Ali, A. Farooq, T. M. Alam, M. S. Farooq, M. J. Awan and T. I. Baig, Detection of schistosomiasis factors using association rule mining, *IEEE Access*, vol.7, pp.186108-186114, 2019.
[23] B. D. Wijanarko, Y. Heryadi, H. Toba and W. Budiharto, Automated question generating method based on derived keyphrase structures from bloom's taxonomy, *ICIC Express Letters*, vol.14, no.11, pp.1059-1067, 2020.
[24] U. Chaisoong and S. Tirakoat, The clustering of questions affect to tourist's decision making for Chatbot design, *The 17th Int. Conf. Electr. Eng. Comput. Telecommun. Inf. Technol. (ECTI-CON2020)*, pp.784-787, 2020.
[25] A. O. Kusakci, A literature survey on association rule mining algorithms, *Southeast Europe Journal of Soft Computing*, vol.5, no.1, p.14, 2016.
[26] A. Ait-Mlouk, T. Agouti and F. Gharnati, Mining and prioritization of association rules for big data: Multi-criteria decision analysis approach, *J. Big Data*, vol.4, no.1, 2017.
[27] A. Soni, A. Saxena and P. Bajaj, A methodological approach for mining the user requirements using Apriori algorithm, *J. Cases Inf. Technol.*, vol.22, no.4, pp.1-30, 2020.
[28] W. Höpken, M. Müller, M. Fuchs and M. Lexhagen, Flickr data for analysing tourists' spatial behaviour and movement patterns: A comparison of clustering techniques, *J. Hosp. Tour. Technol.*, vol.11, no.1, pp.69-82, 2020.
[29] J. Swarbrooke and S. Horner, *Consumer Behaviour in Tourism*, Butterworth-Heinemann, 2007.
[30] J. W. Li, W. D. Chen, Y. Ma, N. Yu and J. W. Jiang, Research on behavioral motivation inference method for geographical spatiotemporal large data, *Int. Arch. Photogramm. Remote Sens. Spat. Inf. Sci. (ISPRS)*, vol.XLII-3/W10, no.3/W10, pp.725-729, 2020.