

## Cultural destinations decision of solo-traveler: A network analysis at Dalat City

Hoang Thi Phuong Thao<sup>1</sup>, Phan Thi Bich Hang<sup>1</sup>, Do Thi Thuy Trang<sup>1\*</sup>

<sup>1</sup>Dalat Yersin University, Dalat, Vietnam

\*Corresponding author: msthuytrang2202@gmail.com

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### ABSTRACT

Studying the network about the ability or the trend of cultural destination selection will help to better view the reality and needs of tourists regarding cultural tourism products and services, the routes the most popular tour, or the “forgotten” destinations. This paper investigates survey results from two hundred solo-traveler, and Gephi 9.2 software to figure out the values of nodes, edges, and level of connectivity between cultural destinations of Dalat. Among the eight tourist attractions with the characteristic of being the most prominent heritage destination of Dalat, only four of the most popular tourist attractions include Space of gong culture, Bao Dai Summer Palace 3, The Lycée Yersin, and Lam Dong Museum. Heritage tourism routes that formed through the choice of visitors are the linking of the following hot spots, namely, Space of gong culture, Bao Dai Summer Palace 3, The Lycée Yersin, Lam Dong Museum, and Cathedral of Dalat Diocese. The combination of destination information promotion in the media and cultural events is seen as the solution for attracting the attention of solo tourists. Furthermore, the development of special tourism promotion programs aimed at these customers must consider package product packages, and promotional opportunities to spread the opportunity to reach the destination more effectively. These can be seen as key recommendations for increasing tourist attraction to Dalat’s cultural tourism in the near future.

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### 1. Introduction

Vietnam’s tourist industry has recently risen firmly to make swift and steady leaps, both in terms of scale and quality, underlining its vital role and place in the economy, along with the country’s innovation (Le, 2020). Currently, the tourism industry is considered a key economic sector, directly contributing at a fairly high level of 9.2% of the GDP. Vietnam’s tourism also brought in revenue of up to 32.8 billion USD, 2.5 million jobs in 2019 before the outbreak of Covid-19, and the indirect contribution of the industry through the spillover coefficient was about 1.6 times of many other industries (Fforde, 2016).

Dalat City is one of the famous tourist destinations in Vietnam attracting both domestic and foreign tourists (Truong, Lenglet, & Mothe, 2018). In addition to the favorable climate and landscape, this location also has a comprehensive system of cultural heritage tourism resources, including historical and cultural relics, which are Unesco-recognized as World Heritage Sites. That

is, Dalat is not only a captain traveler of the natural and poetic beauty of the landscapes but also has a special attraction for tourists because of the unique cultural heritage being preserved and saved in the heart of the city. An interesting thing is, Dalat City has a favorable geographical position, a well-invested transport system, and easy connections with other regions of the country. This leads to the number of solo-traveler accounting for 70% of the total number of visitors.

Nonetheless, cultural tourism in Dalat has not yet developed to its inherent potential. With favorable conditions most cultural destinations are located in the city center with a radius of 3km, but many cultural tourist attractions are less attractive. The number of tourists for cultural tourism only accounts for one-third of the total number of visitors to Dalat. Many cultural tourist attractions have a reception capacity of only 15 - 25% (Statistical Office of Lam Dong, 2021).

The tourism industry is asserted as a key economic sector, and the quality of tourism services is improving with heavy investment, but in-depth studies on tourist behavior are not prevalent (Corbisiero & Monaco, 2021; Onetiu & Predonu, 2013). Some previous studies for Dalat's tourism development only focused on analyzing destination images, and solutions to improve service quality (Mai & Hoang, 2021; Nguyen, Nguyen, Ho, Trinh, & Nguyen, 2021). So far, there are no studies on solo tourists for the most common type of tourism in this city - cultural tourism. Furthermore, in tourism research, social network analysis is also a novel approach. No studies using this approach are found in this city so far. The application of new methods expands the possibility of approaching new directions and completing the solution system (Baggio, 2017; Shih, 2006). For the reasons stated above, studying the network about the ability or the trend of cultural destination selection will help to better view the reality and needs of tourists regarding cultural tourism products and services, the routes the most popular tour or the "forgotten" destinations. Especially, this study will fill in the gap in the behavior of solo travelers in Dalat.

Based on the outcomes from network analyses, policymakers will have better appropriate adjustments, orientations, and strategies that lead cultural tourism into effective development. In addition, this is the cornerstone for planning development strategies for cultural tourism, by using heritage sites in order to diversify local tourism products, promote tours, and contribute to strengthening the conservation of cultural heritage in Dalat. The next part of the research paper will introduce the general theory related to cultural tourism, which is in section 2. The research methods and data are shown in section 3. This empirical study ends with the evaluation of the results and conclusions.

## **2. Literature review**

### **Cultural tourism**

Cultural tourism is the interest of tourists a tourist with the culture of a country or region, notably the lifestyle of the residents, the histories of those places, art, architecture, and other factors that shaped their way of life (Richards, 2018). Cultural tourism includes tourism activities in urban areas, especially historic cities and their cultural facilities such as museums and theatres (Liang, Pan, Gu, Guan, & Tsai, 2021).

Within the research limit of this article, the target cultural tourism products are heritage works recognized by Unesco and the Vietnamese state. It can be more specifically called heritage tourism. Tourist heritage is a collection of existing and potential tangible and intangible assets that can be modified to meet the needs of tourists. Tourism heritage is a raw material that is transformed by tourism development agents into a resource that meets human needs (McCormick, 2016). Activities that link tourists to the local communities, natural surroundings, and cultural aspects of heritage sites are referred to as heritage tourism. UNESCO and other governments across the world

have long supported heritage tourism as a kind of travel that respects nature and has a strong cultural component. This is a form of tourism that combines responsible tourism, ecotourism, responsible travel, spiritual tourism, and cultural tourism with the goal of safeguarding and preserving the integrity of the world's essential values heritage (McCormick, 2016; Št' Astná et al., 2020).

### **Cultural destinations decision**

Correia, Kozak, and Ferradeira (2011) revealed that culture influences tourist decisions. In other words, the primary goal of this paper is to investigate the relationship between tourism decisions and the cultural backgrounds of tourists. This decision to visit a cultural attraction is influenced by visitors' willingness to accept social differentiation (power distance), which is moderated by their sense of individualism as well as their long-term orientation. According to a number of studies, the factors influencing cultural tourists' decision to decide a destination include (1) individual factors, namely, age, education level, hobby, and occupation; (2) behavioral factors of tourists including the province's destination, frequency of travel, reason for travel, and accompanying friend. The most important factors in shaping the choice are education level and hobby (Correia et al., 2011; Dahiya & Batra, 2016; Lai, Zhang, Zhang, Tseng, & Shiau, 2021; Simasathiansophon, Jotikasthira, Onputtha, & Tiwasing, 2020).

### **Network approach in Tourism studies**

Tourism studies using a network analysis approach are not yet prevalent recently. Network analysis is considered an effective tool combined with econometric models to expand research results. Preliminary research revealed that some studies are presented in the form of social network analysis due to the data gathered from social networks such as Google Trends, Facebook, Twitter, travel blogs, and travel agency websites (Aguilar-Becerra et al., 2019; Kádár & Gede, 2021; Shih, 2006). Overall, network analysis remains the primary tool (Baggio, 2017). Table 1 contains the most relevant studies with outstanding results from the network analysis.

Several studies have confirmed the novelty and utility of network analysis (Aguilar-Becerra et al., 2019; Baggio, 2017; Monarca, Cassetta, Re, & Meleo, 2019; Pyka, 2002). In addition to econometric models, network analysis visualizes the connections and significance of the subjects studied. Basic network analysis in tourism activities assist administrators in determining the role of destinations in a tourist route, the popularity of a tourist destination or route, and the connectivity between those points (Baggio, 2017). A combination of network analysis with quantitative analysis produces detailed results from multiple perspectives (Shih, 2006). Policymakers rely on this information to develop more effective strategies.

**Table 1**

Previous studies and outstanding outcomes

<b>Article and authors</b>	<b>Method and data</b>	<b>Main outcomes</b>
Network characteristics of driving tourism destinations: An application of network analysis in tourism (Shih, 2006)	<i>Method:</i> Network analysis with software UCINET 6.03 <i>Data:</i> Calling survey from 16 destinations in Nantou, Taiwan	This study determines the structural configuration of each destination within a specific area by measuring network analysis indicators such as degree centrality, closeness centrality, betweenness centrality, and structural holes. Based on the network analysis results, recommendations are made

Article and authors	Method and data	Main outcomes
		regarding the location and type of tourist facilities to be offered and promoted
Social network analysis in tourism services distribution channels (Tran, Jeeva, & Pourabedin, 2016)	<i>Method:</i> Network analysis with Organizational Risk Analysis software <i>Data:</i> Social network (Tour operators)	The application of network analysis in tourism research is relatively new, especially in the study of tourism services distribution channels. Network analysis reveals the cooperation and cohesion of the network as well as the network dynamics between the case study tour operator and its travel agencies over a period of time
Social network analysis in tourism (Casanueva & García-Sánchez, 2016)	<i>Method:</i> Systematic literature review in Network analysis <i>Data:</i> Scopus, ProQuest, and Web of Knowledge	Tourists, service-oriented organizations, tourism resources, destinations, and government agencies all play important roles in tourism activity. The connections between these elements must be investigated in order to better understand the mechanism of the tourism industry. These problems can be solved using network analysis. Social network analysis in tourism-related contexts is uncommon and relatively new
Social network analysis: organizational implications in tourism management (Valeri & Baggio, 2021)	<i>Method:</i> A literature review in Network analysis <i>Data:</i> Web of science	To analyze the formation and configuration of communities of practice within the destination and to identify potential barriers to effective interaction, social network analysis is required. Together with the legacy of traditional procedures, network science methods can be extremely useful and effective for deepening understanding of complex systems and their dynamics
A social network analysis of international tourism flow (Seok, Barnett, & Nam, 2021)	<i>Method:</i> Network analysis by UCINET 6.624 <i>Data:</i> Social network (UNWTO database)	This study looked at how the structure of international tourism has changed over time. Outbound and inbound international tourism networks have gradually decentralized. The study also explored the correlations between analytic indicators of the international tourism network and social/economic indicators, taking into account the previously mentioned relationship between international tourism and social/economic factors
Measuring institutional thickness in tourism: An empirical application based on social network	<i>Method:</i> Network analysis <i>Data:</i> Interview and questionnaires with institutions regarding	By using network analysis to measure institutional thickness in a regional tourism destination in Colombia through the data analysis of 107 institutions. The main

Article and authors	Method and data	Main outcomes
analysis (Restrepo, Lozano, & Clavé, 2021)	tourism planning and management	findings include (1) identifying the role of institutional presence, levels of interaction, structures of domination, and common agendas in tourism, and (2) better planning and managing their dynamics and effects
The spatial network structure of the tourism economy in urban agglomeration: A social network analysis (Gan, Alutercu, Wang, Chen, & Ye, 2021)	<i>Method:</i> Network analysis <i>Data:</i> Social network (data of 28 cities in UAMRYR)	There is a scarcity of literature on the spatial network structure of the tourism economy in urban agglomeration. The tourism economy's spatial network structure in UAMRYR was loose, with few adequate tourism economic connections and collaboration among various plates. This study identifies the position and role of various cities within the tourism economy's spatial network structure, as deduced from new urban economic geography, and then supplements the literature on the tourism spatial network, while also responding to the call for more empirical studies on the flow of space in tourist destinations
Tourism flows in large-scale destination systems (Kádár & Gede, 2021)	<i>Method:</i> Network analysis <i>Data:</i> Social network (database of Danube river)	To map short-time-interval visitor flows along with the linear system of the river Danube. The central integrating effect of the large capital cities and the boundary-shielding effect impeding the total integration of this large-scale system were made measurable

Source: Author's own synthesis

### 3. Methodology and data collection

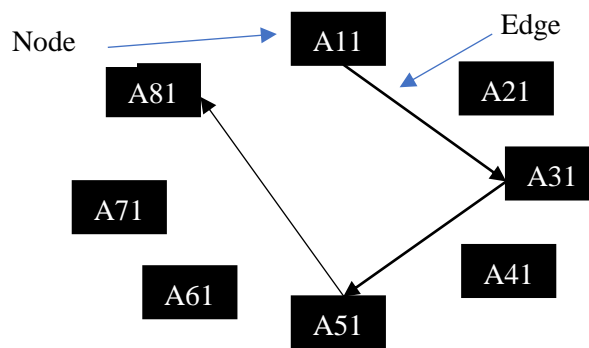
#### *Network analysis*

Network analysis is a set of techniques for visualizing and understanding inter-actor relationships and the social structures that emerge as a result of their occurrence (Marsden, 2005). Gathering relational data in a matrix style is how this technology works. Observed objects are represented as nodes in network analysis, and their interactions are shown as lines connecting pairs of nodes. Then, using the mathematical languages of graph theory, matrix, and relational algebra, the social network concept transforms from a metaphor to a practical analytical tool (Chiesi, 2015).

A network is a structure that represents a group of objects/people and their relationships. In mathematics, it is also known as a graph. Nodes and edges make up a network structure. Nodes indicate the things that are being studied, while edges represent the connections between them (Chiesi, 2015).

The structural properties of various cultural attractions are investigated using network analysis, in which the destinations are considered as nodes and the tourist routes between

destinations are considered as edges. This study explores the connection between the 08 most prominent cultural destinations of Dalat. Each attraction calls “Node”, and the link between the two attractions calls “Edge”. For example, in a traveler’s route, they go from A1 to A3 to A5 then A8, skipping the rest of the points A2, A4, and A6. Thus, there will be a Graph as shown in Figure 1. From this graph, the network matrix can be built in Table 2. In Table 2, it will be written: “1” if there is a directed link from this attraction to that attraction, and “0” in the cell otherwise. This form of the matrix represents what network analysis refers to as sociometric options, which simply show the presence or absence of a specific type of relationship (Degenne & Forsé, 1999). The result is a valued matrix, in which the (i, j) th cell has a number expressing the number of times the tourist routes occur from destination A1 to destination An. Weightings are indicated by the numbers in the adjacency matrix.



**Figure 1.** Network graph

**Table 2**

Network matrix

	A1	A2	A3	A4	A5	A6	A7	A8
A1	0	0	1	0	0	0	0	0
A2	0	0	0	0	0	0	0	0
A3	0	0	0	0	1	0	0	0
A4	0	0	0	0	0	0	0	0
A5	0	0	0	0	0	0	0	1
A6	0	0	0	0	0	0	0	0
A7	0	0	0	0	0	0	0	0
A8	0	0	0	0	0	0	0	0

The simplest measure of a network is its size, the number of nodes. The most important characteristic of nodes is how many links/partners do they have, this is called a degree.  $d_i = \sum_{j=1}^J a_{ij}$

Average degree describes the whole network:  $\bar{d} = \frac{\sum_{i=1}^J d_i}{J} = \frac{\sum \sum_{j=1}^J a_{ij}}{J}$

Density is normalized average degree:  $\Delta = \frac{\sum_{i=1}^J \sum_{j=1}^J a_{ij}}{J(J-1)} = \frac{\bar{d}}{J-1}$

In this study, the Gephi software will clarify which nodes are the most powerful by these signals. Firstly, degree centrality will describe how many links nodes have (Golbeck, 2015). Secondly, closeness centrality will show how close nodes are to others on average (Hansen, Shneiderman, Smith, & Himelboim, 2020). Thirdly, betweenness centrality illustrates to what extent do nodes control information flows in the network (Golbeck, 2015). The next is, eigenvector centrality will present the centrality of nodes depending on the centrality of their partners (Hansen et al., 2020). The average path length, which describes the “average distance between any couples of nodes may also highlight interesting properties of a given graph” (Perez & Germon, 2016, p. 116). Lastly, the clustering coefficient is the degree to which nodes in a graph prefer to cluster together is quantified by a clustering coefficient (Hansen et al., 2020). This network analysis technique will support more specific perspectives on heritage tours in Dalat City such as key tourist attractions, the degree of linkage between destinations, and clusters that can form between spots.

### ***Empirical analysis: A study in Dalat City - Vietnam***

Dalat was established in 1893, the time when Doctor Alexandre Yersin first set foot on Lâm Viên plateau (Lamdong province data, lamdong.gov.vn). General Paul Doumer decided to find a place to build a holiday station for French civil servants and soldiers in Indochina. Due to the climate being similar to temperate Europe, Dalat was designed to become a high-class resort center. Those were the initial foundations to create the city containing much cultural and architectural heritage as it is today.

Dalat was once known as “a miniature Paris”. There are many public and civil structures built in different historical periods. Currently, the city is still preserving more than 1,500 ancient villas, in which French architecture is still dominant and most prominent. The architectural styles of these villas are very diverse with high artistic value, modeled on prototypes from different regions of France. Therefore, they are full of images and identities of each locality in France. Famous beautiful architectural buildings, and outstanding cultural and historical heritages currently on the cultural tourism itinerary in Dalat are churches, ancient schools, stations, mansions, museums, and prisons.

This study explores the linkage network of the 08 most prominent cultural heritage sites being exploited for heritage journey tours (Table 3). The formation of the network will show the choice of destination and the link between the destinations. Combined with the assessment of cultural values, utilities, and favorable conditions, managers will develop a more effective exploitation plan in the future.

### ***The data collection***

The data are partially extracted from a study on measuring satisfaction with the heritage destination of Dalat City in 2020. The study collected 960 surveys from visitors to Dalat with the purpose of the trip being cultural tourism. The main focus questions on measuring destination satisfaction include safety, destination cultural value, emotional value, infrastructure, destination amenities, and service capacity.

Focus on the purpose of this study, the former is to collect information about destination choice, degree of connectivity between destinations, order of destination selection, or in other words, “path of attractions”. The latter is to find out the network and level of connectivity between destinations, tourists who are solo-traveler and stay for more than 03 days and have more than 03 attractions are selected for analysis. Therefore, only 200 answer sheets were used for network

analysis. Solo travelers select destinations purely based on their interests and goals, so they can completely focus on an area of their interest. They decide the experience time at each location as well as the order of destinations flexibly. Meanwhile, tours organized by travel agencies are often designed according to a general trend, towards a balance between cultural, natural, and culinary values.

The data of 200 respondents will be processed in two steps. In the first step, the data presented is the selection of heritage attractions during the trip. Specifically, if the visitor reaches point A1 will be recorded as 1, otherwise 0. This data is used to run the network about the route of the attractions in Figure 2. Second, the author notes the order of visits to heritage destinations, counts the total number of visits to each attraction, then makes a matrix in Table 2. This matrix is then used to analyze with Gephi software for the results of Figure 3, Table 5, and Table 6.

Tourist information is summarized in Table 4. Vietnam is basically divided into 03 regions: north, central, and south. The number of tourists participating in cultural tours surveyed was 45% from the north, 30% from the central region, and 25% from the south. Female customers account for more than 57%, and respondents over 30 years old account for more than 70%.

The frequency of heritage tourism destinations will show the level of interest and attraction of visitors, outline the tours that are of interest to tourists, and preferences about the destination, etc. These preliminary results can be made as assessments of trends and needs of visitors. In addition, the results also evoke challenges for destinations that are less attractive to tourists. The analysis to find out the causes and solutions is necessary to promote equal development opportunities for destinations, as well as to expand and diversify tourism products for the city.

**Table 3**

Characteristics of cultural destinations in Dalat, Vietnam

	<b>Destination</b>	<b>Network characteristic</b>	<b>Facilities and activities</b>
A1	Space of gong culture	A periphery, 15 kilometers from the city center	A part of a biosphere reservation, convenient traffic, a local food center, cultural ethnic performances a large souvenir shop, Camping areas, unique viewpoints, Accommodation with “Ethnic minority style”, Heritage recognized by Unesco
A2	Dalat Railway Station	2 kilometers from the city center and connect with A11	A cultural, historical, and architectural monument, sightseeing tour around the city by train, coffee shop, and small sightseeing space, Heritage recognized by Unesco
A3	Palace 3	3 kilometers from the city center and connect with A3, A4	The residence of the last king of Vietnam, Preserving historical evidence, The nice viewing area and great, Large local souvenir outlets, Camping areas, Heritage recognized by the Government of Vietnam
A4	Cathedral of Dalat Diocese	City center	The on-road attraction with no entrance ticket. Architectural monuments from the French colony, the biggest cathedral of this city, Dalat’s biggest Christmas festival center, and Heritage recognized by the Government of Vietnam
A5	The Lycée Yersin	City centre	Lycée Yersin was founded in Dalat in 1927, with unique architecture, to educate the children of French colonial officials. This building was preserved and became the Dalat Pedagogical College as it is today. Beautiful natural scenery, Usually the outdoor stage of famous concerts, Heritage recognized by Unesco

	<b>Destination</b>	<b>Network characteristic</b>	<b>Facilities and activities</b>
A6	National Archives Center	2 kilometers from the city center	The villa area was used as the Central Highlands Ethnic Museum and the National Archives Center IV, where the woodblocks of the Nguyen Dynasty are kept. No souvenir shops or other extra services. Heritage is recognized by the Government of Vietnam
A7	Dalat Youth Prison Museum	5 kilometers from the city center	This is the area where prisoners from 12 to 17 years old of the whole southern region were held during the war of 1968-1970. This place is a testament to the heroic and indomitable revolutionary tradition of Vietnamese youth. It is now open to visitors as a museum, a historical relic in Dalat City. No souvenir shops or other extra services. Heritage recognized by the Government of Vietnam
A8	Lam Dong Museum	3 kilometers from the city center	Lam Dong Museum is a place to display traditional and historical artifacts of the locality, especially those showing the cultural traditions of Lam Dong land. The museum is keeping over 15,000 artifacts, many of which are rare and unique, and valuable in Southeast Asia. Camping areas. A large souvenir shop. Many highly educational presentation programs, and rich sports games. Heritage recognized by Unesco

Source: Author’s own synthesis

**Table 4**

Sample distributions

	<b>Number</b>	<b>% of tourist</b>
Region of tourist		
North	90	45
Central	60	30
Southern	50	25
Sex		
Male	115	57.5
Female	85	42.5
Age		
< 18	20	10
18 - 30	40	20
31 - 45	50	25
46 - 60	65	32.5
> 60	25	12.5

Source: Author The author synthesizes from 200 respondents

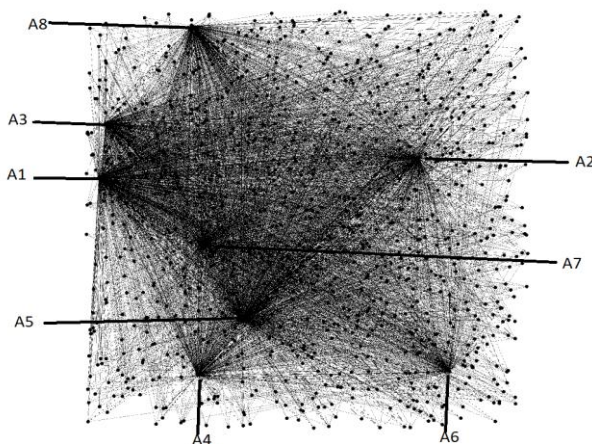
#### 4. Result and discussion

Figure 2 is the result of using the destination statistical data of 960 visitors during their 02-03 day trip in Dalat, the network shows the different density of destination choices and initially realized the status of heritage destination exploitation in Dalat. Preliminarily, the attractive destinations in descending order are A1, A5, A3, A2, A7, A4, and A6. There are 03 destinations with the lowest attraction: The young prison (A7), the National Archives Center (A6), and the Cathedral of Dalat Diocese (A4). These three sites, on the whole, have heritage resources and lovely landscapes, but they lack diversity in tourism offerings.

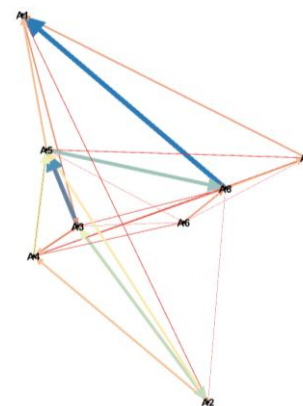
Figure 3 shows the degree of cohesion between the nodes and the thickness of the edges. Through the figure, each “edge” has a greater thickness, which shows that the degree of sightseeing choice between 02 destinations (02 nodes) is at a high level. Edges connecting between pairs of nodes with high thickness can be seen from points A8 to A1, A3 to A5, A3 to A2, A5 to A8, and A3 to A1. From these data, initially identify central destinations such as A1, A5, and A8.

Table 5 provides important network information. This network’s graph has 08 nodes and 34 edges, the density is 0.821, which refers to the ratio of the maximum value of achieved edges to the value of realized edges. It can fluctuate between 0 and 1, the value of 0.821 is near the maximum value and thus relevant in this scenario. The value of the average degree of all the nodes is 4.25 indicating that attractions have a moderate degree of cohesion. Network diameter is equal to 2, it is the shortest distance between the two most distant nodes in the network.

“Average path length is a concept in the network topology that is defined as the average number of steps along the shortest paths for all possible pairs of network nodes. It is a measure of the efficiency of information or mass transport on a network. The average path length is one of the three most robust measures of network topology, along with its clustering coefficient and its degree distribution” (Perez & Germon, 2016, p. 116).



**Figure 2.** Network of the visitor trips  
(of 960 tourists on their optional destination choice)



**Figure 3.** Network of the graph of cultural destinations in Dalat (200 respondents)

In this case, the average path length is 1.179, and the average length of tourists who will go from “this attraction” to another is 1.179. An indicator of how closely nodes in a graph tend to cluster together is called a clustering coefficient (Hansen et al., 2020). This network has Avg. a clustering coeff is 0.815, which confirms that the possibility of destinations connecting into clusters is very high.

The degree to which a vertex is located on connections between other vertices is measured by betweenness centrality. High betweenness vertices may exert significant influence on other vertices within a network by controlling the flow of information between them (Golbeck, 2013). Avg. betweenness centrality between cultural tourist attractions ranges from 0.2 to 1.15.

The average shortest path between one vertex and the other vertex serves as a measure of closeness centrality (Hansen et al., 2020). Avg. closeness centrality is around 0.77 to 1, which illustrates the average shortest distance from each attraction to other attraction is from 0.77 to 1 (Table 5). This data confirms the high degree of linkage between the destination and the central destination, and the highest is 02 destinations A5 and A8 (1.00) (Table 6).

**Table 5**

Network parameters computed for describing the network

Metrics	Detail
Number of nodes	8
Number of edges	34
Avg. degree	4.25
Range in-degree	3 - 6
Range out-degree	1 - 6
Avg. weighted degree	81.25
Network diameter	2
Graph density	0.821
Avg. path length	1.179
Avg. clustering coeff	0.815
Avg. betweenness centrality	0.2 - 1.15
Avg. closeness centrality	0.77 - 1

Source: Gephi’s analysis outcomes

**Table 6**

Network indicators of cultural destinations in Dalat, Vietnam

	In-degree	Out-degree	Degree	Clustering coef	Number of triangle	Closeness centrality	Betweenness centrality	Weighted degree	Modularity
A1	5	4	9	0.80	8	0.78	0.45	180	0
A2	3	4	7	0.90	9	0.78	0.2	150	1
A3	5	6	11	0.80	12	0.88	0.7	245	1
A4	3	5	8	0.80	12	0.88	0.7	140	1
A5	4	6	10	0.76	16	1.00	1.15	225	0
A6	4	1	5	0.90	9	0.78	0.2	45	0
A7	4	4	8	0.80	8	0.78	0.45	95	0
A8	6	4	10	0.76	16	1.00	1.15	220	0

Source: Gephi’s analysis outcomes

From the results of Table 6, it is possible to determine which destination is the center and the degree of connection with other tourist destinations. The destinations with the highest density that can be identified as key destinations are A3 (11), A5 (10), A8 (10), and A1 (9). In other words, A3, A5, A8, and A1 are the most appealing tourist attractions. Two places that can be considered as “departure points” of travel itineraries are A3 and A5. A5, A8, A3, and A4 are the spots that are most likely to form clusters. In terms of central characteristics, points A5 and A8 have a Cloness centrality of 1, which means they can be considered the two most typical tourist attractions, the center of cultural tours. The value betweenness centrality of A5 and A8 shows that these two points play a very important intermediary role in the network, followed by points A3, A4, A1, and A7. Furthermore, Table 6 shows the ranks of attractions in the network based on weighted degrees. The attractions that have the highest degree of connection are A3, A5, A8, and A1.

Among the 08 most typical heritage attractions of Dalat, the choice of tourists mostly focuses on A1, A3, A5, and A8. Although A1 is located far from the center, it has unique cultural values representing the area with many ethnic minorities. This area is well invested in infrastructure, many tourist services, and large space, which can simultaneously welcome a large number of tourists. Three 03 points are belonging to architectural heritage and are located right in heart of the city but are less attractive to tourists: A2, A4, and A6. In terms of cultural qualities, these areas can be described as cultural riches of historical value. However, aside from the cultural and historical importance, the other amenities and services are not particularly extensive. Furthermore, the pieces of information about this destination are still limited and not accessible to many tourists.

Some of the most selected travel programs that can be confirmed through network analysis are A3-A5-A8-A1, A3-A5-A4-A8, A3-A4-A5-A8. Thus, policymakers can see that tourists’ demand for tourism products and services is directed to places with many amenities, accommodation, dining, and camping areas. The remaining destinations can increase investment and renewal to attract more visitors.

## 5. Conclusions

This present study, using data from 200 solo-traveler on cultural tours in Dalat City with a novelty approach, becomes a concrete illustration that indicates the effectiveness of network analysis methods in supporting tourism research. An important contribution of network analysis is that it provides many techniques, by measuring the links of nodes to show the degree of connectivity between destinations, finding the central destination, and the influence of the nodes on others.

In addition, the attributes of each node (tourist destination) can be presented to provide necessary information related to the research objective (visitor’s trend to choose a destination). The difference between nodes is used to evaluate the attractiveness of each destination, the degree of constraints, and the chance of creating clusters. The network analysis approach is highly applicable in the study of destination tourism from a multi-destination point of view, as each destination has development opportunities and limitations in comparison with other destinations in the region.

To depict travel pathways between locations, network analysis employs graphs and matrices. This network analysis approach will aid policymakers in assessing the location and type of tourist facilities and activities carried out by tourism, hence supporting policymakers in planning regional development.

When compared to other locations in the region, each destination has its own set of development potential and constraints. By assessing the structure, the configuration of each

destination depends on the degree of proximity - the linkability between the destinations, the degree of centrality, the discrete points (less likely to be associated with other destinations), and the structural characteristics of the network destination can be investigated.

Similar to the studies of Shih (2006) and Kádár and Gede (2021), this study outlines the destinations and cultural tourism routes that are mostly chosen by solo tourists at the time of the study while no previous studies have illustrated this with empirical evidence. Along with the research on service quality, destination image, development planning, and network analysis supplementing the specific behavior of tourists through their choices. Furthermore, the possibility of linking tourist attractions is also seen through the network. Simultaneously, destinations that are less attractive and low likely to be linked with the rest of the destinations are also revealed. Therefore, travel agencies can use this network as a reference to improve current tourism programs.

The experimental result demonstrates that among the 08 tourist attractions with the characteristic of being the most prominent heritage destination of Dalat, only 04 of the most popular tourist attractions are A1, A3, A5, and A8. In which, A3 and A8 can be considered as the center and have high connectivity with the rest. In terms of geographical location, A1 and A8 are farthest from the center; A3 and A5 are located in the heart of the city. The heritage values of these four destinations are all recognized by Unesco. However, compared with the rest of the destinations, the competitive advantages that can be mentioned are the variety of tourist facilities, large space, convenient transportation, unique accommodation, and dining areas with boldly local and not imitated by other places. During the in-depth analysis of the survey, many tourists returned to these destinations more than 05 times within 02 years. In addition, the managers of these destinations pay great attention to marketing, organizing many local events and festivals. This creates a great attraction and impression for visitors. On another side, with the network results, it can be seen that the solo traveler has programmed cultural tours full of unique values in Dalat City. A3, A5, and A8 can be considered as three travel centers with a variety of tourism services on the basis of cultural tourism. With diverse sources of travel information, and customers' smart approach to information, customers' decisions in their trip also become professional. This is also one of the issues that travel agencies also need to consider to further promote the quality of their business operations.

Tourist attractions with favorable locations, and impressive cultural and historical values, but less attractive to tourists are A4 and A7. Some of the reasons drawn from the comparison with the rest are the diversity and richness of tourism services. In the visitor's comments, one of the less attractive points is the way to show the heritage value through interpretation, presentation, decoration, and historical story. The second point is the fewer additional services: no souvenir shop, no visitor support center. The third point is that many tourists do not have much information about the destination.

Heritage tourism routes that can be formed through the choice of visitors are A3-A5-A8-A1, A3-A5-A4-A8, A3-A4-A5-A8. Not only ensure the infrastructure to continuously improve the quality of services at these tours but the management agency and policymakers also need to study to reduce the capacity for spots like A3 and A8 to ensure preservation and preservation of traditional values. Formulate a strategy to restore the attractiveness of the remaining destinations such as A4, A6, and A7 to create equal development opportunities for tourist destinations as well as expand opportunities for tourists to discover other heritage values locally.

Some solutions to improve the efficiency of exploiting destinations in the heritage tourism journey should be laid out. The first is to conduct surveys of visitors about the satisfaction, needs, and desires of customers about the destination. In addition, it is necessary to

strengthen field trips to survey the potential and current status of cultural heritage sites in Dalat. The parallel implementation is the discussion and listening to the contributions of stakeholders to come up with policies and plans to develop Dalat tourism in the direction of diversity and sustainability. Especially, increasing the use of network analysis tools to have a multi-dimensional and diverse view in analyzing trends and cluster destination selection also opens up many innovations in policy formulation.

The second is, in addition to showing the unique values of a culture - architecture - history, it is necessary to focus on products and services to serve tourists, creating infrastructure for package tours (accommodation, entertainment, discovery, research, etc.)

The third is, that updating the necessary knowledge and skills for stakeholders to be able to participate in the local tourism development process through courses, training classes, etc. should be the priority, especially for those who interact directly with tourists.

The fourth is, that it is necessary to develop a regulation on coordination and cooperation in harmony and fairness among the parties involved. where the local government will be the coordinator. Heritage tourism directs communities and visitors to the preservation of unique values of historical and cultural significance. However, the issue of benefits needs to be considered. Authorities need to consider expanding facilities around destinations, attracting community participation, and creating jobs and income. This helps the community to be more active in promoting the attractiveness of the destination. This solution focuses on destinations number 04 and number 07 in the study.

Lastly, it is promoting tourism marketing programs, promoting communication to provide useful tourist information to visitors. For example, organizing tourism fairs in destinations that have not yet attracted many visitors is a way to promote and support the communication activities of this place. This solution comes from the network results of destinations 04 and 07 in the study.

Considered the first study to approach the network analysis method, it leads to some limitations. Firstly, due to the topic focusing on cultural tourism, the survey subjects are solo tourists, therefore the small study sample leads to low inclusivity. Second, there is no previous study in Dalat to compare and strengthen the arguments. If the quantity of surveys and overseas visitors is increased, this study will provide more useful information. Heritage travel is one of the tactics for diversifying tourism offerings, and it is a precious asset held by only a few places. More in-depth research and use of network analytic approaches are required to effectively exploit historic destinations, boost educational and conservation relevance, and effectively exploit heritage destinations. The outcomes will be more specific in terms of which locations are prioritized in short and long-term journeys, as well as the option to select destinations for each consumer. These are some potential future directions for this research.

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