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A DSM-Based Route Planning Method for Touring Historic Street

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----------ABSTRACT----------

Nantun Historic Street which is located at Nantun district of Taichung City in Taiwan is a famous tourist attraction. This area can be defined as around Wanghe Road and Nantung Road intersection. This place was pioneered by immigrants during the Qing Dynasty. Because of the pioneer policy, the farm tool industry became prosper. This place soon became an important path for trading between Changhua and Taichung in Taiwan. After the modernization of transportation system, the old trading path was no longer important. Although the lifestyle changed, this place preserves its own unique culture. This place also still is the worship center of the areas nearby. The people live with the old scenes here. This research is trying to build a route planning model for touring Nantun Historic Street based on design structural matrix (DSM). By the way, we expect more visitors will come to here. The questionnaires was designed by exploring reference about "tour" and "historic street" to figure out what are the attractions of this area. On the other hand, we design and plan the tour route by DSM and then present two tour routes for the visitors. The routes begin from the Nantun Historic Street and stretch out to tour spots nearby. We hope the proposed routes can provide visitors wonderful experiences and help this area to promote its local culture.

Keywords: route planning, historic street, tourist attraction, design structural matrix (DSM), local culture

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I. INTRODUCTION

Nantun Historic Street is a famous scenic spot. It is located at Nantung district of Taichung City in Taiwan. The target area can be defined as around Wanghe Road and Nantung Road intersection, including the intersection block, Wanghe Temple and Nantung market. Nantun was called "Babuza" in the past time since there was an aboriginal tribe. During the Qin Dynasty of China, the empire gathered farmers to reclaim this area. Because of the policy, more and more people are gathering into this area, and the requirement of farm tool had increased. Farm tool business of this area had reached their golden age, and this area had got another name called "Plow Store Street". This area also became a transportation hub, and also named as "The Primary Street of Taichung City".

In ancient time, where the people gathering, where the religion center arise. This makes the Wanghe Temple so well known. Along this long street, most of the old time architectures and traditional stores had been conserved. The historic scene had already blended with the general life of local residents. After the modernization of the transportation construction, the transportation hub had shifted to other place. Though the transport function and industrial had declined, this place retained its own culture and appearance. The modern life has blended with the local culture and space. Since the local culture of this area has been noticed, people began to realize the tourism potential of this place. The culture here can be valuable teaching material to promote this place, and can also carry the local industry.

Touring industry can improve local economy, and also meet the requirement of tourists- tourists tend to visit historical places. The historic street has become a popular tour spot, since it has local industries, local culture and special building scene. Meanwhile, the consumers no longer only purchasing products, the consumers' behavior become a sense of style. The traditional marketing strategy aimed to emphasize the function and profit. In the future, the strategy will emphasize the experiences of five senses. Thus, it can provide consumers values in diverse perspects.

The exploit of local resources has a lot to do with the development of historic street. The authorities, venders, designers and promoters should work together and figure out how to continuously attract tourists. Nantun historic street has been declining, but the community is not that old to renew. This makes an issue that how to manage the old buildings and create new value of this place. This place has strong local culture, and the building are well conserved, so it has good potential to prmote the tourism with local culture. Through user experience, this study trying to build a fine model of tourist, in order to raise the attraction of this area. The proposal of planned route can make people tour in a more efficient way. Take Nantun Historic Street as center, connects the

surrounding tourist spots. We can promote the local culture by improve the tourist experience. This study aims to provide a method for promote the value of local area, and also wants to contribute some effort to sustainable environment development.

II. RELATED WORKS

Lee(2008) has claimed that, like technology industry, touring industry is also one of the future industries. Tourist activities can provide employment opportunities and earn foreign exchange. Wu (2006) has claim that, the local industry is the activator of local economy, and the local cultural industry will become a new development priority. Shen (2010) has claimed that, the attraction of touring destination can raise the competitive strength of touring industry, and be able to help the tourist activitie.Syu (2009) has claimed that, the definition of tourism is, finding, selecting activities to participate, and finally get both physiological and psychological satisfied. Chang (2010) has claimed that, touring attraction is the pull of tourist industry, and can appeal tourists to stay and experience.Yujuan-Kao(1995) has claimed that, attraction is the things with unique features in the area, and can appeal tourists to come. Zeithamal(1988) has claimed that, price is not the only cost that tourists concern, some other concept also included in costs, like 'time' and 'physical condition'. Shu (2004) has claimed that, attraction of tour including the characteristic, motivation and expectation of the tourist. Wang (2012) has claimed that, the most attractive part of religion activities to tourists, is the culture experiencing part. Thus, the main purpose in this type of activities is spiritual experience. Huang (2013) has claimed that, promoting local culture can unite the local residents, and motivate local economy. The main reason of lack of tourists is that, the traffic not convenient enough.

To sum up all the references, attraction of a place can be the target of local tourist development. We have to define the attractions very carefully to make it fits the research condition. We also concern about the concept of costs here, trying to realize how well the cost effective in tourists mind. Spiritual experience can bring tourists different view of life, so it has been regard as the most valuable part. Differentiation of culture has become the key factor of local development, so the culture should be well conserved. Promoting local culture can unite the local residents, and motivate local economy.

2.1 User Experience

User Experience (UX) involves a person's behaviors, attitudes, and emotions about using a particular product, system or service. User experience includes the practical, experiential, affective, meaningful and valuable aspects of human–computer interaction and product ownership. Additionally, it includes a person's perceptions of system aspects such as utility, ease of use and efficiency. User experience may be considered subjective in nature to the degree that it is about individual perception and thought with respect to the system. User experience is dynamic as it is constantly modified over time due to changing usage circumstances and changes to individual systems as well as the wider usage context in which they can be found.

2.2 Tour Spots

The tour spots surrounding Nantun Historic Street including famous ancient temple (Figure 1), old time architectures (Figure 1), national art museum(Figure 2), sculpture park (Figure 2), cultural ruins (Figure 3) and exotic art street (Figure 3). They canrepresent the local culture, activities and features.

Figure 1. Famous ancient temple and old time architectures.

Figure 2. National Art Museum and Sculpture Park.

Figure 3. Cultural uins and exotic art street.

III. METHODOLOGY

3.1 Questionnaire survey

A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. Although they are often designed for statistical analysis of the responses, this is not always the case. The questionnaire was invented by Sir Francis Galton. Questionnaires have advantages over some other types of surveys in that they are cheap, do not require as much effort from the questioner as verbal or telephone surveys, and often have standardized answers that make it simple to compile data. However, such standardized answers may frustrate users. Questionnaires are also sharply limited by the fact that respondents must be able to read the questions and respond to them. Thus, for some demographic groups conducting a survey by questionnaire may not be concrete.As a type of survey, questionnaires also have many of the same problems relating to question construction and wording that exist in other types of opinion polls. In the psychometrics, reliability is the overall consistency of a measure. A measure is said to have a high reliability if it produces similar results under consistent conditions. For example, measurements of people's height and weight are often extremely reliable.

3.2 Descriptive statistics

Descriptive statistics is the discipline of quantitatively describing the main features of a collection of information, or the quantitative description itself. Descriptive statistics are distinguished from inferential statistics (or inductive statistics), in that descriptive statistics aim to summarize a sample, rather than use the data to learn about the population that the sample of data is thought to represent. This generally means that descriptive statistics, unlike inferential statistics, are not developed on the basis of probability theory. Even when a data analysis draws its main conclusions using inferential statistics, descriptive statistics are generally also presented. For example in a paper reporting on a study involving human subjects, there typically appears a table giving the overall sample size, sample sizes in important subgroups (e.g., for each treatment or exposure group), and demographic or clinical characteristics such as the average age, the proportion of subjects of each sex, and the proportion of subjects with related comorbidities.

3.3 Factor Analysis

Factor analysis is a statistical method used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors. For example, it is possible that variations in four observed variables mainly reflect the variations in two unobserved variables. Factor analysis searches for such joint variations in response to unobserved latent variables. The observed variables are modelled as linear combinations of the potential factors, plus "error" terms. The information gained about the interdependencies between observed variables can be used later to reduce the set of variables in a dataset. Computationally this technique is equivalent to low-rank approximation of the matrix of observed variables. Factor analysis originated in psychometrics and is used in behavioral sciences, social sciences, marketing, product management, operations research, and other applied sciences that deal with large quantities of data.

3.4 Design structural matrix (DSM)

The Design Structure Matrix (DSM) (also referred to as dependency structure matrix, dependency structure method, dependency source matrix, problem solving matrix (PSM), incidence matrix, N2 matrix, interaction matrix, dependency map or design precedence matrix) is a simple, compact and visual representation of a system or project in the form of a square matrix. It is the equivalent of an adjacency matrix in graph theory, and is used in systems engineering and project management to model the structure of complex systems or processes, in order to perform system analysis, project planning and organization design. Don Steward coined the term "design structure matrix" in 1981, using the matrices to solve mathematical systems of equations. Yet, equivalent methods have been in use since the 1960s.

To identify the independent (uncoupled), dependent (decoupled), and interdependent (coupled) information flows inherent in complex processes, design structure matrix (DSM) proposed by Steward (1981a,b) is a useful tool. Much research has demonstrated its effectiveness in the past (Eppinger et al., 1990; Eppinger et al., 1994; Gebala & Eppinger, 1991; Dixit et al., 2014; Gálvez, et al.2012; Gálvez et al., 2015; Tang et al., 2000). DSM divides the design project into n individual tasks in an nxn matrix. Similar to adjacency matrix, DSM is a square matrix with n rows and columns, and m non-zero elements, where n is the number of nodes and m is the number of edges. If there exist an edge from node i to node j, the value of element ij is a unity or a marked sign in the matrix, otherwise the value of the element is zero or empty. Information links among individual tasks are clearly shown by the systematic mapping, regardless of number of tasks. The advantages of using DSM are: (1) DSM overcomes the size and complexity limitations of digraphs; (2) DSM is easy to understand and able to handle the processes in their entirety; and (3) the matrix format is suitable to program and calculate using computers. Figure 4 (Chen & Lin, 2003) shows a binary DSM. However, other than the input or output relationship between tasks, no structure can be seen in this matrix. According to Steward's (1981b) partitioning algorithm, the original binary DSM is reordered and then shown in Figure 5. After the partitioning process, not only the sequence among project tasks is identified, but also the entire structure of the project is revealed.

DSM has been used as a management aid as well as engineering tool to guide the organizational structure of design projects (Browning, 2001; Eppinger et al., 1994; Iooss & Lemaître, 2015; Shi & Blomquist, 2012; Tang, 2010). Rogers (1996) developed an expert system called DeMAID (design manager's aide for intelligent decomposition) that can perform DSM analysis. Sobieszczanski-Sobieski (1993) combine DSM with a mathematical model of the physical problem to form a hierarchical, constrained non-linear optimization problem. Eppinger et al. (1990, 1994) analyzed task interactions to create design task groupings using DSM in order to find alternative sequence and structure of a project. Kusiak and Wang (1993) decomposed tasks in design using DSM and group technology to identify how tasks should be divided into groups. Guo et al. (1995) developed an algorithm for DSM to carry out the planning tasks. Smith and Eppinger (1997a,b) used DSM to represent each task with deterministic duration and probabilistic repetition in order to identify controlling features of engineering design iterations. A comprehensive review for DSM research directions and new applications has been recently provided by Browning (2001). This paper is attempting to use DSM to optimizing tour route planning for historic street.

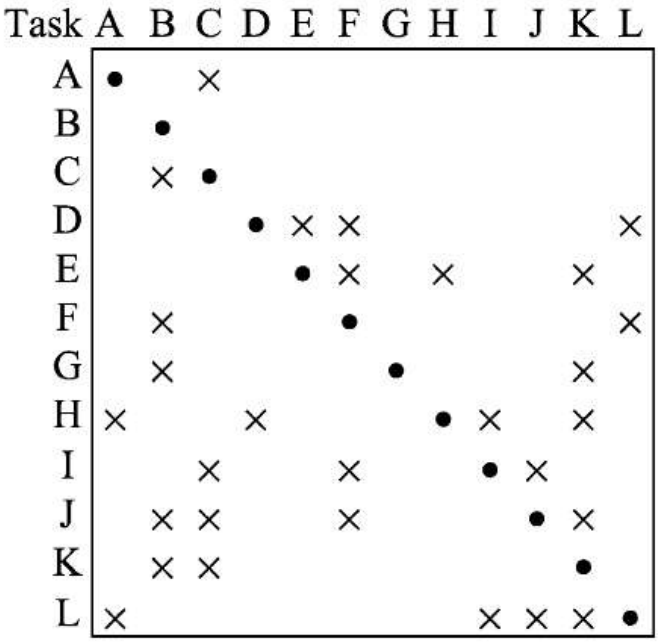

Figure 4. Original binary matrix (unpartitoned). (Chen, 2003)

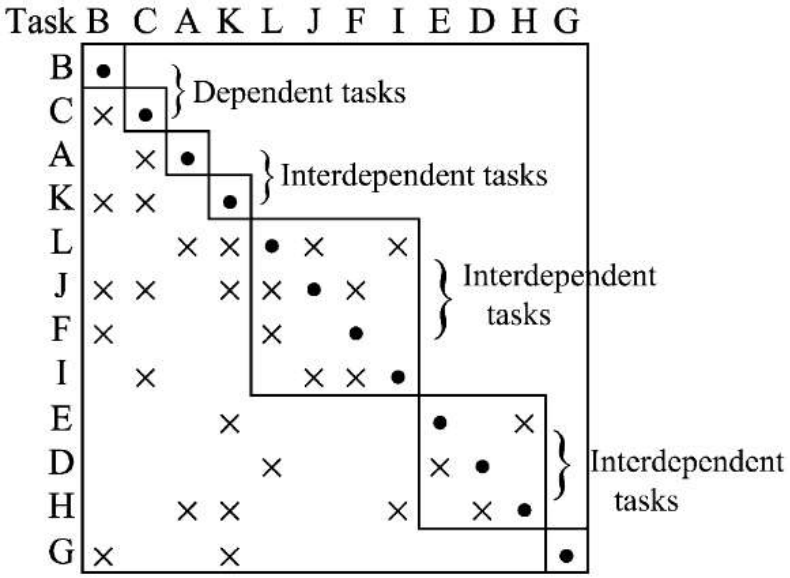

Figure 5. Reordered binary matrix (partitoned). (Chen, 2003)

3.5 Investigation

Refer the questionnaire from related works including Wang (2012), Yeh (2010), Lee (2008), Lin (2012), Su (2013), Chang (2009), Shen (2006). Modify the questions from their questionnaires, put some new questions that fit this area, and make it a new questionnaire. We do both realistic questionnaire and internet questionnaire. We define Nantun Historic Street as the investigation area, so that the respondents are all users of this area. We had sent out 100 sets of questionnaires, and the results that 81 sets are valid questionnaires. In order to put elements into the matrix, we have to set up the data base first. Among this research, the elements are tourist spots. We collected the tour spots by visiting the area with firsthand experience, and also browsed resources on the internet.

IV. RESULTS AND DISCUSSION

The value of Cronbach's Alpha has reached 0.874, shows that it has high internal consistency. Only few elements affect the Cronbach's Alpha value, furthermore, it do not affect significantly, so we did not delete any element.

4.1 Descriptive statistics

The first part of questionnaire is background information of respondents. We have more female than male respondents here. The average age is 19-34 years old. Occupation of them shows no significant meaning. The education level is average over 'Undergraduate'. Most of the tourists take 'Family' and 'Friends' as companion. People visit this place at average 2-4 times. The average stay time is 1-4 hours. Tourists are willing to spend 0.5-1 day to stay around this area. The main transportation way is 'Scooters' and 'Automobiles'. The second part of questionnaire is the Likert scale of tour attractions. The higher score means the higher acceptance.

The elements performs high scores are "Attractive architectures", "Feel comfortable", Feel like walking in ancient street", "Feel the education value of this place", "The view makes me want to take photos", "It can improve the relationship between companions", "It reminds me the history", "I can afford the total cost". The strongly disagree elements are "The cost of physical condition is too high", "The cost of time is too high", "The cost of money is too high".

4.2 Frequency distribution table

Table 1 Background information of respondents.

Gender	Female	Male		
	60%	40%		
Age	19-24 yr	25-34 yr		
	53.10%	29.60%		
Occupation	Student	Manufacturing	Services	
	48.10%	17.30%	14.80%	
Education level	Undergraduate	Graduate school		
	67.90%	21.00%		
Companion	Family	Alone	Friends	Couple
	37.00%	23.50%	21.00%	18.50%
Frequency of visiting	First time	Over 5 times	Twice	3-4 times
	34.60%	27.20%	24.70%	13.60%
Stay period	1-2hrs	3-4 hrs	5-6 hrs	
	67.90%	28.40%	3.70%	
How long I willing to stay	In half day	In a day	2 Days	
	50.60%	44.40%	4.90%	
Transportation	Scooter	Automobile	Walk	Public transportation
	54.30%	28.40%	12.30%	4.90%

Table 1 shows that, if there are other spots nearby, the tourists are more willing to spend more time to stay. The amount of scooter is two times of the automobile, and is also the leading place to other transportation method. This statistic shows that most of the people are able to transport independently. This also shows the condition of the area, the roads usually are narrow alleys, so the scooter is more comfort in this area. The frequency of visiting shows that, a lots of people are first time coming to this area, means that tourists willing to come to this place. The second high amount of respondents shows those who visit this place over 5 times, means that some of the respondents are the local residents.

Respondents all agree with the local characteristics, shows that this place has high degree of recognition. However, they feel "Neither agree nor disagree" on the vender's part. This may tell that, there are only few venders since crowds only show up during special festival events. Tourists think it is "Neither agree nor disagree" on the special foods part. The main reason of this answer could be the lack of index of food venders. Likewise, tourists think it is "Neither agree nor disagree" on the "Clear index" part, telling the truth that it is the thing needed to be improved. Also, they do not think propaganda will make them feel confident with the tour. Tourists do not think the costs are high, no matter it is money, time or physical condition.

4.3 Correlation analysis

Table 2. Correlation coefficient.

Item A	Item B	Correlation coefficient
Average stay period	How long I willing to stay	0.352
Special life experience	Feel different from other historic street	0.773
Feel like walk in the ancient time	Attractive architectures	0.726
Attractive voice	Feel like walk in the ancient time	0.504
I can watch exhibitions here	Feel like walk in the ancient time	0.635
Feel like walk in the ancient time	Make me concern about the history	0.618
Feel the education value here	I can watch exhibitions here	0.713

In order to understand how the different elements related to each other, we extract some elements to do correlation analysis. Table 2 shows that the longer period tourists have stayed, the more likely they will spend more time to stay. The local experience provides a unique experience to tourists. The appearance of building is an important factor to make tourists feel like walking in an ancient street. The voices of local activities also have something to do with the feeling of feel like walking in an ancient street, but the visual factors still take the upper hand. The conservation of cultural relic can do positive effect to the vibe. A historical environment can recall the affections of tourists. The conservation of cultural relic also has educational value.

4.4 Factor analysis

Table 3 Ingredient matrix of rotated axis.

Ingredient matrix of rotated axis					
	Items				
	1	2	3	4	5
Attractive architecture	0.641	0.235	0.189	0.524	-0.133
Attractive voice	0.402	0.312	0.084	0.746	-0.174
Attractive odor	0.23	0.217	0.13	0.797	-0.168
Attractive venders	0.233	0.027	0.782	0.142	-0.206
Feel comfortable	0.6	0.257	0.359	0.264	-0.153
Feel like walk in ancient street	0.772	0.121	0.204	0.248	-0.02
Special foods	0.261	0.28	0.709	0.088	-0.022
I can watch exhibition here	0.836	0.195	0.107	0.015	-0.058
Can enrich my mind	0.824	0.239	-0.018	0.226	-0.08
This place has educational value	0.778	0.219	0.04	0.302	-0.048
Navigation service can let me understand	0.622	0.494	-0.019	-0.016	0.03
Makes me want to take photos	0.75	0.173	0.302	0.194	0.191
Clear index	0.429	0.649	0.179	0.166	-0.018
Convenient transportation	0.131	0.671	0.236	0.427	-0.085
Friendly walking space	0.33	0.767	0.126	0.215	-0.06
Propaganda makes me feel confident with the tour	0.507	0.633	0.057	0.177	-0.167
Reminds me of history	0.604	0.406	-0.087	0.474	-0.008
Beautiful scene	0.566	0.619	0.282	0.091	0.132
Delicious food	0.071	0.128	0.843	0.014	0.115
Special interior decoration	0.698	0.346	0.282	0.01	-0.084
Improve the relationship between companions	0.78	0.284	0.192	0.152	0.041
Different from other historic street	0.588	0.437	0.189	0.238	-0.125
Special experience	0.659	0.316	0.224	0.243	-0.139
The cost of money is too high	-0.046	-0.001	-0.177	-0.171	0.84
The cost of time is too high	0.139	0.022	-0.045	-0.068	0.846
The cost of physical condition is too high	-0.158	-0.188	0.218	-0.011	0.789
The total cost is too high	0.491	-0.026	0.279	0.283	-0.441

The Kaiser-Meyer-Olkin measure of sampling adequacy of this questionnaire is 0.892, indicating that the result is suitable for Factor Analysis. Significance of the result is 0.000, showing a good significance. In the total explanation of variance, adopting the five items which have an eigenvalue over 1, the cumulative explain ingredients have reached 72.676%. Then we began to name the five items. Since the elements in item 2 mostly have features about hardware facilities and the environment conditions, and those elements should be basic demands of tour spots, we didn't consider item 2 an influential factor. The elements in item 5 are mostly about costs, and are also basic demands of a tour, we didn't put item 5 an influential factor neither. The elements of item 3 and item 4 have the familiar content, so we combine these two item, in order to give it a more powerful representativeness and strengthen its ability of explanatory.

Now we have item 1 as one factor, item 3 and item 4 as another factor, item 2 and item 5 as basic demands. The elements of item 1 mostly are activities about knowledge, so we named it as "Intellectual Visits". While the item 3 and item 4 are showing contents about sensory experience, we named it as "Emotional Experience".

4.5 Design structural matrix analysis

Set the tour spots data base into 2 groups and take them as elements of matrix. The tour spots include Nantun historic street and the surrounding area of historic street. We have 14 tour spots inside the Nantun historic street area, and 16 tour spots surrounding Nantun historic street area. During the analyzing process, put 1 into the matrix if there is any relationship between 2 elements, otherwise, put 0 into the matrix. Figure 6 shows the Route of "Sensibility Tour". The input elements are Plow Store, Rice Bran Store, Nantun Market, Matsu Alley, Traditional Noodle, Duck Rice, Calligraphy Greenway, Wenshin Night Market, Exotic Art Street, Lakeshore Art Neighbor, Sculpture Park, Tuku Valley, Longfu Night Market and Fulfillment Amphitheater. Figure 7, 8 and 9 shows the route after analyzed.

Tour Spots Name		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1-Plow Store	1		1												
2-Rice Bran Store	2	1				1	1								
3-Nantun Market	3				1										
4-Matsu Alley	4			1											
5-Traditional Noodle	5		1				1								
6-Duck Rice	6		1			1									
7-Calligraphy Greenway	7				1					1					
8-Wenshin Night Marketr	8		1	1		1	1				1			1	
9-Exotic Art Street	9				1						1	1	1		1
10-Lakeshore Art Neighbor	10			1						1		1			1
11-Sculpture Park	11				1					1	1				1
12-Tuku Valley	12			1											
13-Longfu Night Market	13		1	1		1	1		1						
14-Fulfillment Amphitheater	14									1		1			

Figure 6. Input of sensibility tour.

Tour Spots Name	Level		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1-Plow Store	1	1		1					Block1							
2-Rice Bran Store	1	2	1		1	1										
5-Traditional Noodle	1	3		1		1										
6-Duck Rice	1	4		1	1											
3-Nantun Market	1	5						1			Block2					
4-Matsu Alley	1	6					1									
12-Tuku Valley	2	7					1									
9-Exotic Art Street	3	8						1	1		1	1	1			Block3
10-Lakeshore Art Neighbor	3	9					1			1		1	1			
11-Sculpture Park	3	10						1		1	1		1			
14-Fulfillment Amphitheater	3	11								1		1				
8-Wenshin Night Marketr	4	12		1	1	1	1				1				1	Block4
13-Longfu Night Market	4	13		1	1	1	1							1		
7-Calligraphy Greenway	4	14						1		1						

Figure 7. Output of sensibility tour.

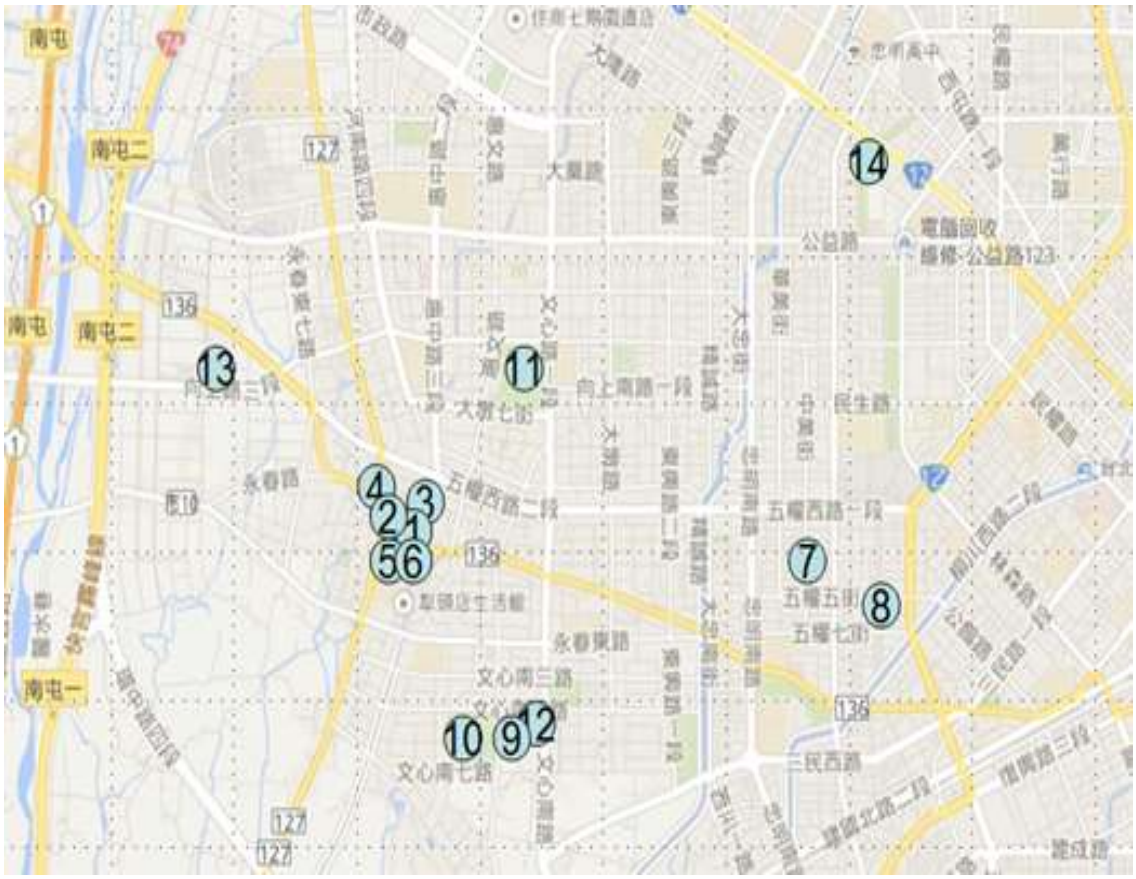

Figure 8. Map of sensibility tour.

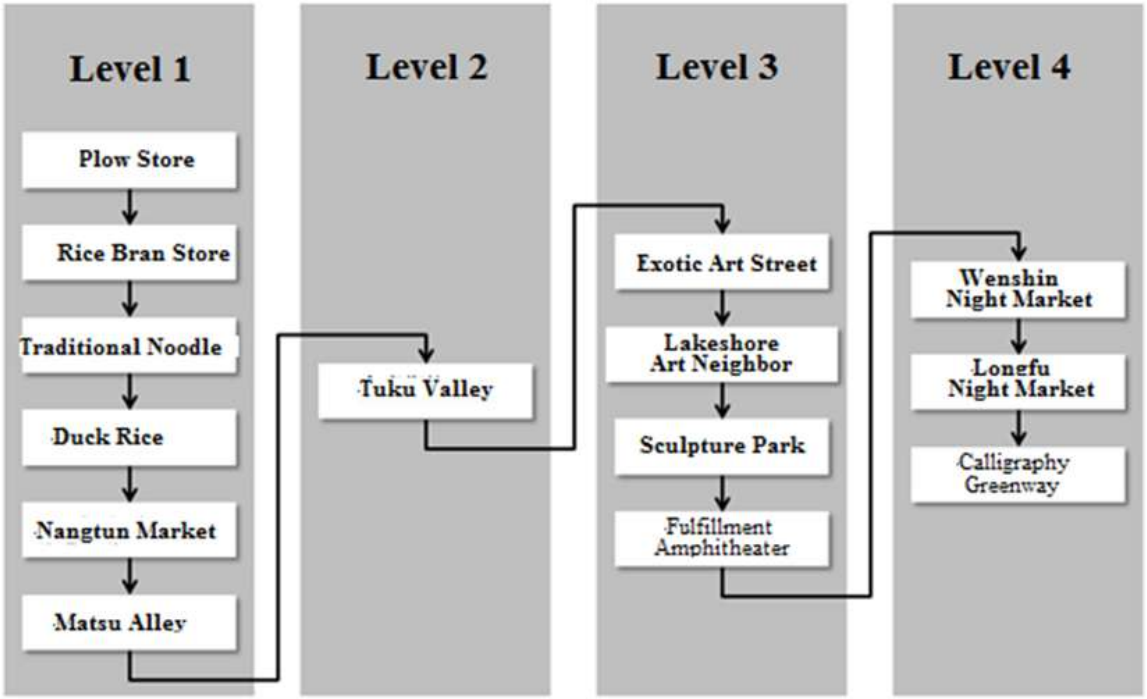

Figure 9. Hierarchy of sensibility tour.

Figure 10 Shows the route of "Knowledge Tour". The input elements are Wanghe Temple, Nantun Triangle Corner, Plow Store Museum, Historic House, Historic Cake Store, Wenchang Temple, Station Ruins, Local Plants Museum, Science Museum, Tzingshin Market, Chin Art Museum, Wuri Police Station, Rainbow Valley, Old Community, National Art Museum. Figure 11, 12 and 13 shows the route after analyzed.

Tour Spots Name		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1-Wanghe Temple	1			1			1									
2-Nantun Triangle Corner	2			1					1							
3-Plow Store Museum	3															
4-Historic House	4							1								
5-Historic Cake Store	5	1					1		1							
6-Wenchang Temple	6	1		1												
7-Ruin of the Station	7				1											
8-Local Plants Museum	8	1	1			1										
9-Science Museum	9			1					1			1				1
10-Tzongshin Market	10					1			1	1		1			1	1
11-Chin Art Museum	11								1	1	1			1		1
12-Wurih Police Station	12		1		1			1						1	1	
13-Rainbow Valley	13	1					1						1		1	
14-Old community	14	1					1						1	1		
15-National Art Museum	15								1	1	1	1		1		

Figure 10. Input of knowledge tour.

Tour Spots Name	Level		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
4-Historic House	1	1		1			Block1										
7-Ruin of the Station	1	2	1														
3-Plow Store Museum	1	3															
1-Wanghe Temple	2	4			1		1			Block2							
6-Wenchang Temple	2	5			1	1											
2-Nantun Triangle Corner	3	6			1					1			Block3				
5-Historic Cake Store	3	7				1	1			1							
8-Local Plants Museum	3	8				1		1	1								
12-Wurih Police Station	4	9	1	1				1				1	1			Block4	
13-Rainbow Valley	4	10				1	1				1		1				
14-Old community	4	11				1	1				1	1					
9-Science Museum	5	12			1					1						1	1
10-Tzongshin Market	5	13							1	1			1	1		1	1
11-Chin Art Museum	5	14								1		1		1	1		1
15-National Art Museum	5	15								1		1		1	1	1	

Block5

Figure 11. Output of knowledge tour.

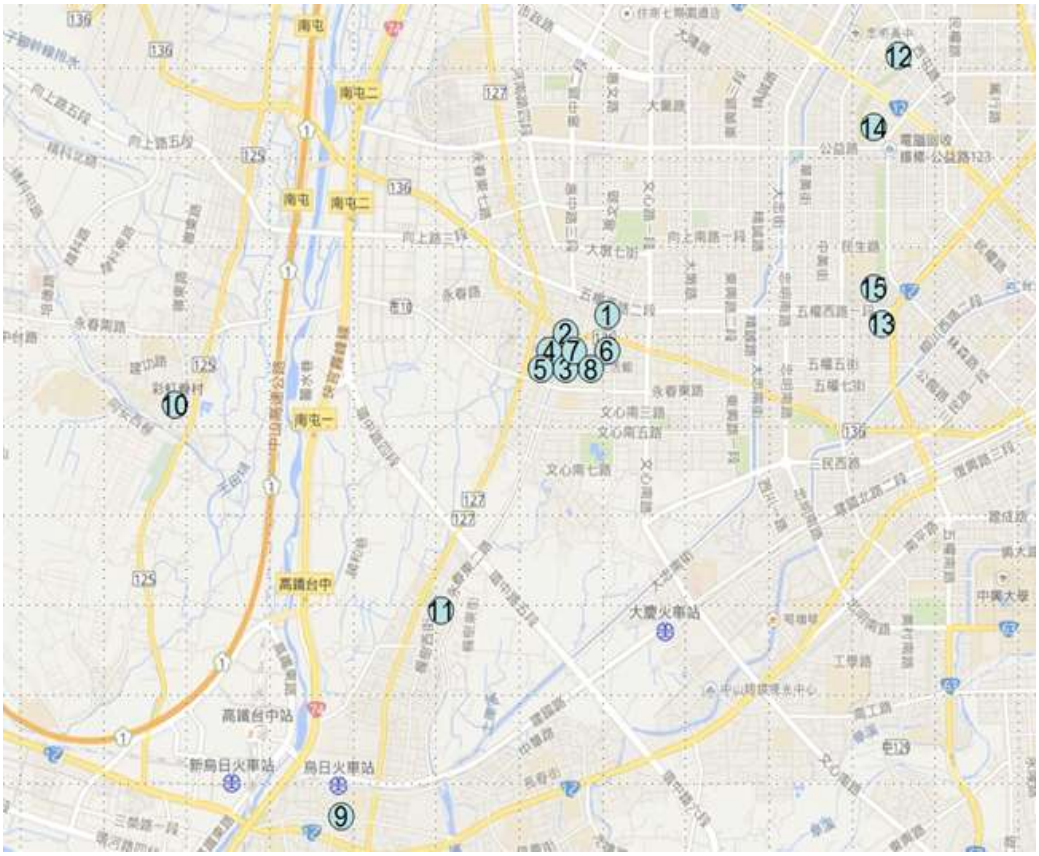

Figure 12. Map of knowledge tour.

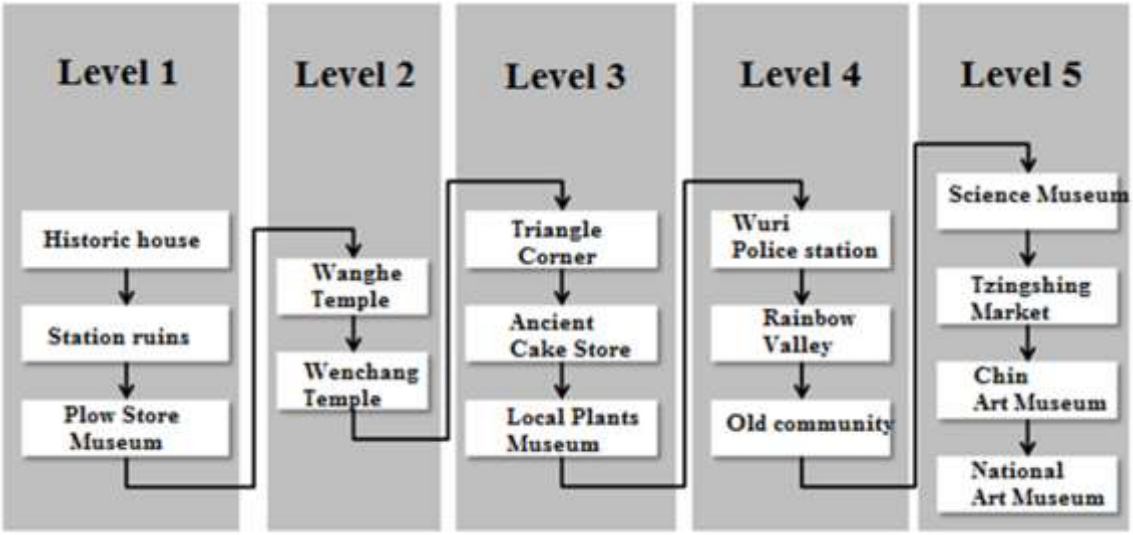

Figure 13. Hierarchy of knowledge tour.

Follow the efficient routes that have been analyzed, the information between touring spot will be logically reasonable, and also prevents from unnecessary losing of time.

V. CONCLUSIONS

Most of the users among Nantun Historic Street stay over 1 hour and no longer than 4 hours. If they being informed that there has other tour spots around, they are willing to take half more day to stay. Since the physical condition might affect the willing of tourists, and also has influence on touring experience, the time limitation should be taken as a key factor of route planning. In above mentioned, it shows that tourists would like to take a few hours to half day in the historic street area, and willing to spend half to one more day on the surrounding area of historic street, so the two proposal of route both set the time expectation as one day long. These two routes both take Nantun Historic Street as starting point. The priority of tour spots can be changed because of the tendency of different tourists. Thus, tourists can visit the places they like the most in a limited time period, and plan the route to surrounding area depending on the left time. By this systemic method, tourists can tour in an efficient way, and do not have to worry about the time limitation. Both routes are departed from the attractions of the Nantun Historic Street. We expect the research could bring tourists new experience of tour, and propose a new way to plan route.

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