

Variables associated with the tourists’ activity chain: definition, grouping, and measurement approaches

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Abstract: This study investigates the variables associated with the activity chains of tourists. Activity chains of tourists is a complex issue because it is related to several decisions due to the variety of alternatives. Despite the vast studies conducted in the tourism market, the literature review found less attention towards the variables of the tourists' activity chains. Tourists choose the activities depending on many variables. This study presents three main groups that affect the choice of activity, such as variables related to the tourists, the parameters of the location, and the circumstances of the trip. The results show the most important variables that affect the choice of the activity, the categories of each variable, and the different approaches to gather the data. This study can assist other researchers in developing a realistic model that help tourists choosing the optimal set of activities.

1. INTRODUCTION

Tourism involves various activities that tourists perform, such as sightseeing, shopping, transport, food, and other enjoyment activities (Sylejmani, 2013). When planning the activities to visit, tours are being created by making a lot of decisions. However, the tour planning might not be conducted effectively, as several variables need to be taken into account related to their preference, local knowledge, as well as, other conditions such as time, cost, and weather constraints (Ricci, Shapira, & Rokach, 2015). The basis of any decision-making process is the analysis of alternatives in order to select one choice among a set of other options (Vermeir, Van Kenhove, & Hendrickx, 2002). In tourism, the decision-making process is a complex problem since it is associated with multiple decisions about different alternatives (Hyde & Lawson, 2003). Furthermore, the psychological (internal) and non-psychological (external) factors add an extra complexity to the tourist's decision making (Carroll & Johnson, 1990).

An important method to explore the decision-making process of tourists is the investigation of their behaviour. In order to recognize the characteristics of tourist behaviour, firstly the motivation should be considered (Kozak & Kozak, 2016). (Mehmetoglu, 2011) claimed that the motivation is based on push and pull factors, and it leads the behaviour of tourists. The internal force that motivates tourists to travel represents the push parameter, while the external force that attracts them to select their destination refers to the pull force (Kozak & Decrop, 2009) Another study explained similarly that the push parameter refers to the personal parameters, while the pull parameter represents destination attributes and constrains (Kim & Prideaux, 2005).

2. THE ACTIVITY CHAIN

The visiting of specific points of interest at a specific time is known as the activity chain. There are several numbers of characteristics that affect the choice of a specific destination.(Arentze, Kemperman, & Aksenov, 2018) mentioned several aspects that affect the selection of POIs such as; the degree of attraction towards the destination, for example, many travellers depend on the rating system in order to find the most attracted target. Also, the total cost and time are a crucial factor that affects activities selection. Another study argued the factors that influence the activity chain. (Esztergár-Kiss, Munkácsy, & Velázquez, 2017) adopted in his research three main factors which are; related to the travellers themselves, related to the circumstance of the trip, and the last on associated with the destination. Moreover, fixe and flexible activities have been handled in their study. (CHENG & Hui, 2012) explained in their study that the activity chain belongs to the activity-based model. This model is totally different from the trip based model. The activity-based model analyzes the journey as an obtained demand from the necessity to continue activity distributed in the area. Also, they mentioned that the demand for activities results from travelling to a specific location at a specific time of day by a specific transportation mode. Their study summarize some features that can be found in the activity-based model;

- The assistance of activities lead to creating journey.
- This model focus on the chains of activities.

- There are some constraints related to the time, location, and to the travellers themselves.
- The activities continuously covered through a day.

3. DEFINITION, GROUPING, AND MEASUREMENT APPROACHES

In order to simplify the complex requirements of creating an activity chain for tourists, the relevant variables have to be identified. It is obvious from the literature review that tourist's decision making is affected by various variables and constraints. This study is based on three main types of aspects:

- Tourist attributes (TA): These attributes involve gender (GE), age (AG), income (IN), education level (EL), marital status (MS), degree of attraction (DA), and the type of the attraction (AT).
- Location characteristics (LC): These characteristics contain security (SE), safety (SA), accessibility (AC), rating (RA), price range (RP), time interval (TI), opening time (OT), closing time (CT), and the type of the location (TL).
- Trip parameters (TP): These parameters cover transportation mode (TM), travel time (TT), acceptable travel delay (AT), travel distance (TD), walking distance (WD), travel cost (TC), environmental effects (EE), health effects (HE), privacy (PR), weather (WT).

Further categorization is conducted on all aspects into two main types: directly measurable and indirectly measurable variables. Directly measurable variables represent all variables that can be measure in a direct way, while indirectly measurable variables cannot be observed directly. All tourist attributes belong to the directly measurable variables, whereas the location characteristics and trip parameters are shared between the two types.

Another way of categorizing the variables is the data source. All values of the tourist parameters can be set directly by the tourist, while for location characteristics and trip parameters, the input values can be produced from external sources (i.e. social media, maps, Points of Interest (POI) database).

An additional grouping is conducted on the variables. Some of them may remain fixed with time, such as gender, type of location, and the accessibility variable belongs to the fixed group because it represents the access from fixed (origin) to fixed (park or mobility services) locations. The second group is changeable with time. It can be divided into regular altering (which might be daily, weekly, monthly, or yearly), and irregular altering. Walking distance characteristics can be included to the regular daily altering group because many of people are taken the walking as their daily routine. Concerning the weekly altering group, a lot of the

destinations have a constant schedule, such as opening and closing time, while other parameters are available every month based on general statistics, such as safety and security. Furthermore, income may also have a regular monthly change due to some causes such as overtime or bonuses. This study assumed that the health effect is considerably related to the age of tourist that identifies the transportation modes, consequently, this variable can be included to the regular yearly collection. The rest of the characteristics and attributes have an irregular change due to several causes. For instance, the degree of attraction and the attraction types are affected by perception and attitude. On the other hand, the marital status is influenced by several factors, such as quality of life, income, and emotion. Also, many other parameters are subject to external constraints, such as transportation mode that has a direct influence on environmental effects, health effects, privacy and travel time, see Fig 1 for more illustration.

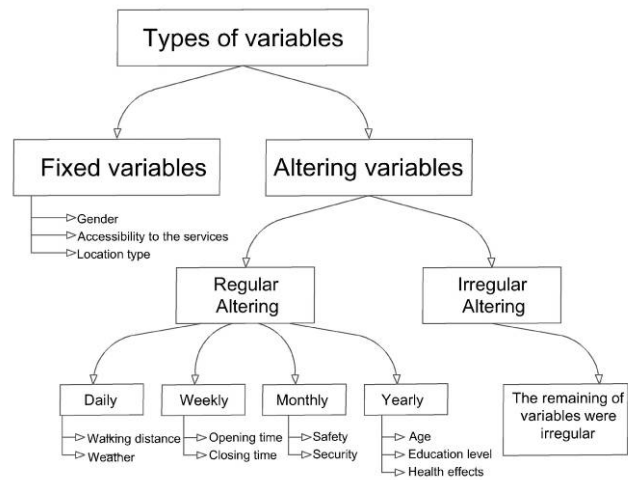


Fig. 1. Categorization of the variables that influence the activity chain of tourist according to the changeability over time.

3.1 Tourist attributes

Gender (GE) plays an important role in the optimization of the activity chain (for example, shopping activities are preferred more by women than men).

Age (AG) has a significant effect on the identification of the activities (for example, older people prefer to visit historical and cultural places, rather than active and sports destinations). The study also found that the destinations, such as entertainment, sports, and recreation had low importance by older group compared with younger tourists, who tended for relaxation, business, or adventure destinations. Data can be defined from the tourist profile. Its options are 18-30, 31-50, 51-65, and More than 65.

Income (IN) is one of the most relevant characteristics, which has a major effect on tourism, which is the gross monthly income of the tourists. Data can be obtained from the tourist profile. The options are Less than 500 Euro/month, 500-1000 Euro/month, 1000-2000 Euro/month, 2000-3000 Euro/month, and More than 3000 Euro/month.

Education (EL) can be also categorized. Tourists with high education level might be more conscious toward the environmental impact and sustainability of their travel. Many studies stated that environmental behaviour is highly associated with the level of education. The options are High school, Bachelor degree, Master degree, and Doctoral degree. Marital status (MS) it is obvious that this characteristic has a significant impact on the activity chain (i.e. there is a significant difference between the tourism of family and individual). Data can be obtained from the tourist profile. The options are Single, Married, and Married with children.

Tourist attraction types (AT) support the creation of activity chains by filtering the most relevant types of activities. Tourists visit destination according to their preference, some of the attraction types match their preference, and some are not. Data can be obtained from the tourist profile. There are many options concerning to the attraction types, such as Main sights, Culture & history, Nature & recreation, Active & sport, Medical & health, Night life & shopping, and visiting friends & relatives.

Degree of attraction (DA) it is an important attribute that represents tourist preferences of the POIs (e.g. tourist with a high degree of attraction to the POI is willing to pay more to visit). Data can be obtained from the tourist profile. The options are High, Medium, and Low.

3.2 Location characteristics

Safety (SA) refers to the level of safety in the specific area, where the attraction is located. Data can be obtained from statistical offices based on police reports. It is calculated by the number of accidents per year, and its options are defined based on the maximum number of accidents in the city, which are High (less than 1/3 of the max. accidents/year), Medium (between 1/3 and 2/3 of the max. accidents/year), Low (more than 2/3 of the max. accidents /year).

Security (SE) refers to the level of crime in the specific area, where the attraction is located. Data can be obtained from statistical offices based on police reports. It is calculated by the number of the crimes per year, and its options are defined based on the maximum number of crimes in the city, which are High (less than 1/3 of the max. crimes/year), Medium (between 1/3 and 2/3 of the max. crimes/year), Low (more than 2/3 of the max. crimes /year).

Accessibility (AC) refers to the level of access of mobility services reachable by walking distance. Data can be obtained from online maps, and can be processed by GIS software.

The options are High (less than 300 m walking distance), Medium (between 300 and 500 m walking distance), and Low (more than 500 m walking distance).

Rating (RA) means the evaluation of the attraction by the users. Data can be obtained from social media platforms or POI (Points of Interest) databases. The options are Poor (1 Stars), Satisfactory (2 Stars), Average (3 Stars), Good (4 Stars), Excellent (5 Stars).

Price range (RP) is the level of costs of the attraction. Data can be obtained from social media platforms or POI (Points of Interest) databases. It is calculated by the average cost, which has to be spent to visit the attraction (e.g. basic entrance fee at a museum, normal meal at a restaurant). The options are High (more than 15 Euro), Medium (between 5 and 15 Euro), Low (less than 5 Euro).

Time interval (TI) refers to the period planned to be spent at the attraction. Data can be obtained from the user, but default values are provided based on general statistics. The average time that tourists tend to spend to visit an attraction is 20 minutes. The options are Long (more than 30 minutes), Medium (between 10 and 30 minutes), Short (less than 10 minutes).

Weather (WT) refers to the degree of temperature and humidity, which can have an impact on the mode choice. Data are obtained from meteorological databases. The options are Suitable (15-25 C, 0-20%), Average (5-15 C or 25-30 C, 20-50%), and Unsuitable (lower than 10 C or more than 30 C, more than 50%).

Opening time (OT) refers to the opening time of attraction. Data can be obtained from POI (Points of Interest) databases. The option is a time during the day in minutes (0-1440 minutes).

Closing time (CT) refers to the closing time of attraction. Data can be obtained from POI (Points of Interest) databases. The option is a time during the day in minutes (0-1440 minutes).

Type of location (TL) is to the type of attraction (e.g. landmark, restaurant, and mall). Data can be obtained from POI (Points of Interest) databases.

OT, CT and TL are constraints, which cannot be weighted by the user, but user preferences can be taken into account, when planning the activity chains.

3.3 Trip parameters

Travel time (TT) represents the time from the origin to reach the destination. Data can be obtained from routing algorithms or route planning applications. The options are Long (more than 80 minutes), Medium (between 10 and 80 minutes), and Short (less than 10 minutes).

Acceptable travel delay (AT) can be used as an indicator related to the congestion. Traffic data is the source of this parameter, which can be obtained from online maps. The average acceptable travel delay can be defined as is 10

minutes. Its options are High (more than 15 minutes), Medium (between 5 and 15 minutes), Low (less than 5 minutes).

Travel distance (TD) represents the distance from the origin to the destination. Data can be obtained from routing algorithms or route planning applications. The average distance, which is being travelled by tourists to visit attractions is set 5 km. The options are Long (more than 7 km), Medium (between 3 and 7 km), Short (less than 3 km).

Walking distance (WD) refers to the amount of walking based on the willingness of the tourists. Data can be obtained from routing algorithms or route planning applications. The average distance, which is being walked by tourists to visit attractions is set 2 km. The options are Long (more than 3 km), Medium (between 1 and 3 km), Short (less than 1 km).

Travel cost (TC) represents the cost of the trip when visiting an attraction. Data can be obtained from online maps or transport operators. The value for private car is calculated from the distance (fuel consumption), and it is the calculated fare for other transportation modes (e.g. single ticket). Its options are High (more than 2 Euro), Medium (between 1 and 2 Euro), and Low (less than 1 Euro).

Environmental effects (EN) is the level of emission, which is produced during a trip. Data can be calculated based on the travel distance using emission calculation formulas, and these values depend on the used transportation mode. In my study, the options are High (Car, Taxi, Car-sharing), Medium (Public Transport), Low (Bicycle, Walking, Bike-sharing, Kick-scooter).

Health effects (HE) is the degree of healthiness factor, which is arises during a trip. Data are based on the used transportation mode. The options are Highly affected (Bicycle, Bike-sharing, Walking), Partially affected (Kick-scooter, Public Transport), and Not affected (Car, Taxi, Car-sharing).

Privacy (PR) is the degree of separation when using a transportation mode. It has discrete values, and these values depend on the used transportation mode. Its options are High (Car, Bicycle, Kick-scooter), Medium (Walking, Taxi, Car-sharing, Bike-sharing), and Low (Public Transport).

Weather (WT) refers to the degree of temperature and humidity, which can have an impact on the mode choice. Data are obtained from meteorological databases. The options are Highly affected (Walking, Bicycle, and Kick-scooter), Partially affected (Public Transport, Car-sharing), and not Affected (Car, Taxi).

Table 1 shows the final result, including all the variables.

Table 1. Tourist attributes, location characteristics, and trip parameters

Var	Data source	Measur-ability	Change-ability
Tourist attributes			
GE	Tourist	Direct	Fixed
AG	Tourist	Direct	Yearly regular
IN	Tourist	Direct	Irregular
EL	Tourist	Direct	Irregular
MS	Tourist	Direct	Irregular
AT	Tourist	Direct	Irregular
DA	Tourist	Direct	Irregular
Location characteristics			
SE	Statistical offices based on police reports	Indirect	Monthly regular
SA	Statistical offices based on police reports	Indirect	Monthly regular
AC	Online maps, processed by GIS software	Direct	Fixed
RA	Social media platforms or POI databases	Direct	Irregular
PR	Social media platforms or POI databases	Direct	Irregular
TI	Tourist	Direct	Irregular
OT	POI databases	Direct	Weekly
CT	POI databases	Direct	Weekly regular
TL	POI databases	Direct	Fixed
Trip parameters			
TM	Tourist	Direct	Irregular
TT	Route planning applications	Direct	Irregular
TD	Route planning applications	Direct	Irregular
WD	Route planning applications	Direct	Daily regular
TC	Travel distance based cost calculation formulas	Indirect	Irregular
PR	Tourist	Direct	Irregular

AT	Tourist	Indirect	Irregular
WE	Meteorological databases	Direct	Daily regular
EE	Travel distance based emission calculation formulas	Indirect	Irregular
HE	Travel distance based health calculation formulas	Indirect	Yearly regular

4. DISCUSSION

All variables of the tourists' attribute group can be inserted directly by the user. Gender and age were fixed and regular yearly altering respectively, while the other variables were irregular altering. For the location attributes, all variables can be gathered from external sources except for the travel interval. Travel interval is referred to the time spent at the desired activity according to his/her preference. Besides, the majority of variables can be measured directly except the safety and security factors that change every month according to the statistical records. It is obvious that location type and accessibility were fixed on the time and the opening and closing time were weekly changeable, whereas the rest of variables within the group have irregular changing. The irregular altering was the common aspect that shows the variables of the last group. Weather and walking distance certainly have a regular daily change. However, tourists have restrictions on some parameters such as privacy, acceptable travel delay and transportation mode. However, tourists have restrictions on some parameters, such as transportation mode, travel distance, or privacy. Meanwhile, the weather and other parameters are uncontrollable. Finally, it is evident that the majority of variables that can be set by tourists are directly measurable.

5. CONCLUSIONS

The main purpose of this study was to present a roadmap for the definition, classification, and measurement of variables related to the tourists' activity chains. This study will assist in developing a realistic model for choosing the optimal set of tourists' activities. The main groups adopted in this study were tourist attributes, location characteristics, and trip parameters. The variables of the main groups were defined, classified, and measured in a connected way. In addition, an approach have been provided to facilitate the data gathering process.

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