A Heritage Tourism and Tourist Flow Pattern: A Perspective on Traditional versus Modern Technologies in Tracking the Tourists

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ABSTRACT

Historic city offers tourists a mixture of cultural heritage and leisure activities in a unique setting. However, there are limited research addressing the movement and behavior of tourists in tourism destination that leads the understanding of urban function towards "heterogeneity" and "multi functionality". In order to maintain and ensuring long-term success as an attractive destination for tourists, tourist's movement and behavior is most likely an important element to be fully understood by decision maker. Hence, the method of tracking tourist is one of the important aspects in providing better picture, especially in the context of obtaining accurate data on the tourist's movement. Hence, the studies were designed to determine the potential worth of the various tracking technologies for research on tourist movement in Melaka historic cities. The discussion in this paper focusing on 6 traditional and 5 modern methods of tracking tourists movement. Accuracy, availability, location of the study area, costs, privacy of travelling, duration of tracking and suitability in tracking daily movement are used as variables to identify which tracking method is the best to track tourists in heritage site. Existing literature indicates that application of GPS in a smart phone emerges as the best option method for tracking tourists in Melaka heritage site. By comparing methods of tracking tourists, it may assist researcher to choose the best option of method to obtain accurate and precise data about tourist movement. Thus, the study offered a systematic review of several tracking technologies in which potentially able to push the boundaries of tourism studies, as well as improving policy making, planning and management in tourism area.

1. Introduction

Historic city is one of tourism attractions that can attract many tourists. It offers lots of activities such as cultural heritage attractions, diversity of architectural periods and styles, a sense of a place and a pedestrian scale which combine to offer a distinctive character (Les et al. 2004). However, tourists need to share space and places within the urban area with local people. Local people who are doing lots of activities such as working, shopping, commuting, playing, undertaking an education and much more. Due to different activities between tourists and permanent residents, some challenges, problems and conflicts might occur. For example, the infrastructure that provided cannot handle and cater for tourists. Tourism activities tend to be superimposed on a spatial system and infrastructure network that was not designed specifically to cater for it and tourism activity can be unevenly distributed (Gladstone & Fainstein, 2001).

Thus, by understanding the tourist activities, places visited, the time they spend and the facilities and service that they used can provide valuable information in research study and also for improving tourism management. For example, the government agencies and tourism managers can use the information to inform decision makers, redirect tourist flows to avoid overcrowding, minimize adverse impacts on sensitive destination, identify potential places for leisure activities, advice transport policies and more broadly distribute expected benefits. Nowadays, the new development of technology brings opportunity to researcher to use the modern technology in order to get more accurate data on tourists movement. The traditional approach of tracking tourist seems like fail to record tourist movement accurately (Szalai, 1972). However, not all modern technologies are suitable to use for tracking the tourists, especially in the context of the historic city. Hence, this paper presents the best options of tracking tourist in a historic city.

2. Problems related to the tourist tracking method

Previous researchers that study on tourist movement have explained the weaknesses of some tracking tools. For example, in 1992, Ming & Mc Hugh studies the movement of tourist in a Yellowstone National Park. They asked subject's to sketch trip on the map as a method to know the spatial movement of tourists. This method has some limitations where the data of tourist movement will depend on tourist memory. If the tourists remember their trip, then it's good, but if

tourists forgot about their movement and their activities, it will give uncompleted information to the researcher.

Then, an interview also is one of tracking methods that were used to track itineraries of tourist (Opperman, 1995). The researcher interview the visitor at the airport before the visitor goes travelling. The weakness of this method is the researcher were only getting data of intended activities of tourist without knowing whether the tourist will exactly go visit the destination or not. Thus, the tracking information is questionable. Observation technique was used for shaping the itineraries of heritage tourist in Girona, Spain (Gali & Donaire, 2008). The researcher follows the tourists from a prudent distance and gathering all the information about their visit. However, the researcher takes too long, time to finish their study because need to follow lots of tourists. Thus, observation method is a time consuming. Other than that, trip diary was used to track spatial movement of tourists. Lau & McKercher, 2008 used this method in Kowloon, Hong Kong. The visitor was asked by researcher to complete their trip diary during their visitation in a destination. Unfortunately, most of the respondents fail to record their full trip diary. This is because, the visitor is too busy to enjoy the environment of tourism area until forgot about their trip diary. There are some visitor that record their activities, but the data shows a lack of information.

In addition, mapping spatial movement of individual may seem stochastic. It becomes extremely complicated task of documenting and attempting to make sense of hundreds or thousands of individual travel routes, some going directly from A to B, some using different routes to make the trip and others stopping at C, D or E (Shoval et al. 2011). Emerging technologies of tracking tools such as GPS may solve the problems of previous traditional tracking approach. GPS device offers a precise means of determining how tourists move around a historic city, including a route they select, the places they spend time in and the modes of transport they choose. It represents a potential tool for collecting data which urban destination managers can use to examine and evaluate aspects of a tourist's experience in a city and thereby ways to improve that experience.

Nevertheless, comparing the tracking approach need to be done. Appropriate technique needed to compare the tracking approach. In this paper, the tracking technique will be compared based on 7 factors which are accuracy, availability, study area, usage costs, privacy of travelling, time frame and suitability in tracking daily movement.

3. Methodology

Many researches were conducted a study about the spatial movement of tourists (Ming, 1992, Opperman 1995, Lue et al. 1993, Lau & McKercher, 2008, Gali & Donaire 2008, and Shoval et al. 2011). Several techniques were used in order to collect data about tourist movement, such as a sketch trip on map, observation, trip diary, recall diaries and GPS (Global Positioning System). A comprehensive data collection method is needed in order to get important and valuable information. Thus, data collection method for this research have been divided into 3 stages which are arrival interview, completion of tracking tourists and post departure survey. Firstly, arrival interview will conducted at vicinity of accommodation area before tourist goes visiting tourism attraction. There will be a form of questionnaire about demographic profile and trip profile that will be answered by tourist. Secondly stage, which is completion of tracking tourists. In this stage, tourists will track by the researcher using the best options of tracking tools. It is an important stage, where there are lots of methods of

tracking tourists, but the previous traditional tracking method show some weakness. Improvement of tracking tools is needed in this research.

Finally, a post departure survey will be conducted when tourist goes back to the accommodation. An interview session will be conducted to get detail information about tourist movement, activities and their opinion about the Melaka Heritage site. Therefore, by combining data that's collected from 3 stages will allow research to get valuable information about tourist movement and their behavior. However, the second stages are a vital stage where the researcher need to compare all possible tracking technique. Thus, this paper will compare possible tracking tools either traditional or modern tracking tools based on the literature, to be the best options to be used to track visitors at the Melaka Heritage site, so it can provide more accurate data about tourist movement.

4. Tourist tracking methods

Previous study about tracking tourist that was conducted can be divided into two which are traditional approach and modern approach. Each tracking method has their advantages and disadvantages.

4.1 Traditional tracking technique

Traditional approaches can be divided into two which are direct observation technique and non observation technique. The direct observation technique can be summed up using the words "identify, follow, observe and map" (Thornton et al.1997, 1851). The direct observation technique can be divided into four which are participant observer method, non participant observation, remote observation and aggregate video tracking.

4.1.1 The participant-observer method

Participant observer method is useful to researchers in a variety of ways. They provide researchers with ways to check for nonverbal expression of feelings, determine who interacts with whom, grasp how participants communicate with each other and check for how much time is spent on various activities (Schmuck, 1997). The researcher can get lots of information about tourist's movement and behavior because they totally follow the tourists. This method can increase the validity of the study as observations may help the researcher has a better understanding of the context and the phenomenon under study. Validity is stronger with the use of additional strategies used with observation, such as interviewing, surveys, questionnaires or other more quantitative methods. However, the participant observer method also has several disadvantages, for example the quality of the participant observation depends upon the skill of the researcher to observe, document and interpret what has been observed (Schensul et al. 1999). Hence, if the research assistant does not know what to observe it will give useless data. Then, another potential limitation is that researcher bias, where researchers fail to report the negative aspects of cultural members (Kawulich, 2005). From the beginning researcher must explain and help their research assistant to understand the biases he/she that they may interfere with correct interpretation of what is observed. Other than that, participant observer methods also need a long time to collect data because the researchers need to observe daily activities of the respondent. However, this method is widely used in anthropological research when the researcher aims at achieving an intimate familiarity with the target population.

4.1.2 The non-participatory observation method

Non participatory observation also can be used as a method to track tourists. This method will use an observer to follow the visitors, recording visitor activities during their visitation in a destination. The advantage of the method is the researcher can see all activities that involve by the respondents and track the tourist by documented it. Either the activities are positive or negative the observer might record and document it. However, these methods also come with disadvantages. This method can be classified as expensive because the observer had to be present for the entire of the tourist's exploration of a destination. This problem will become worse when the destination visited is not a historic city, but instead a location characterized by relatively long stays such as a seaside resort, skiing area or multifunction city, where tourist might spend as long as entire week. Hence, this method is not only expensive, but it is time consuming, labor-intensive and not comprehensive and does not gather all necessary data about the visitors. Keul and kuheberger (1997) use this technique to study the movement and behavior of tourist in Salzburg, Austria. But, the researcher only applied for very short periods of time due to costing problems. Observations were reduces to 15 minutes out of what were, on average, four hour long walks. While Murphy (1992), who conducted a similar research only kept his visitors under surveillance for an average of 23 minutes. Another limitation of this method is it failed to unveil the purpose and meaning underlying the subjects' decision and activities because the subject do not know that they are being tracked.

4.1.3 The remote observation method

Remote observation is used to record and analyze aggregate tourist flow. It is a low cost technique that can be applied in tracking tourists. Hartmann (1988) used this technique to watch the Glockenspiel in the Old City's main square. He located a camera on the top of city hall to snap a photo of crowds. Then, he calculates the percentage of tourists among the total number of people watching the ten minute display. Actually, this is a traditional method that was used long time ago to track the routes selected by the pedestrians. Although this method is an old method of tracking hence this method have several disadvantages or limitations. Firstly, it only can snap a picture to see the tourist and we need lots of camera if we want to see the tourists movement pattern. A camera is expensive, thus the cost of the study will be high because it needs lots of cameras. Secondly, it's difficult to identify tourist by only looking at their appearance.

4.1.4 Aggregative video tracking

Aggregative video tracking or "eyes in the sky" technique can be used to track tourist's movement. Video camera or closed circuit televisions (CCTV) are being used to analyze behavioral patterns of users. Usually local authorities locate CCTV that can cover large areas within their territory. Hence, the method will use the CCTV that locates by local authorities to watch subject movements. Yan and Forsyth (2005) used this method to study human behavior in public spaces. Actually, this method can only provide data on tourist movement and difficult to understand the behavior of subjects just by looking at the movement. Then, this method is difficult to being used to track tourists. This is because, the surveillance tapes are belonging to local authority or police. They might not give the information for research purposes because it is a private data.

4.1.5 Time-space budgets

Non observation techniques only have one method of tracking tourist which is Time space budgets. Time space budgets method is a common method that is usually used in social science especially in tourism studies. It is a systematic record of a person's use of time over a given period. It records the sequence, timing and duration of the person's activities typically for a short period of time. This method is non observational and relies on the subject's report of his or her behavior. The subjects require to actively recording his or her action in time and space during their visitation. Szalai (1972) used this method in their study, but there is difficulty in finding people who willing to participate in research using this methodology and most of the people who do often fail to record their activities. Tourists who purposely come to visit a destination will spent most of their time to enjoy their vacation rather than documented their trip diary. Other than that, many previous research such as Zilinger's (2007) study on time, space activities of German car tourist in Sweden, Dievsort's (1994) research on the time, space activities of tourists in the small historic city in Holland, Pearce (1988) who study on spatial behavior of tourists in the island of Vanuatu on South Pacific Ocean that used trip diary have difficulty to keeping the accurate results. Next, time spaces budget procedure utilizes one of several techniques which are recall diaries. Recall diaries is a technique where the subject will use their memory ability to gather the information. Face to face interview will conduct at the end of the journey of the subject to know about their visitation. This method will have some limitation where the data collected will depend on the memories of subjects. However a self administration diary was introduced to overcome the problem of limitation of subject memories. Thus, self administration is a new method that can track tourist with more accurate data. The subject will be given a diary and they need to document their trip into the diary during their visitation. Previous research that study on spatial and temporal behavior of tourists used self administration diaries to collect data (Thornton et al. 1997). However, this method also will come with problems. For example, subject who required to record their diaries while busy enjoying themselves touring the destinations will make them to not document seriously. Other than that, this method has low resolution in terms of timing and space, since the subject only records his or her location and activity just several times per day. Hence, this method cannot even show exact durations of activities, but identification of main pattern in time and space. Although there are volunteer to join the study, but the longer the project the less keen and cooperative most subjects will become (Pearce, 1988). Because of this, the quality of the data collected is questionable (Anderson, 1971).

4.2 Modern tracking technique

Modern approaches of tracking tourist in a destination can be divided into 3 which are GPS Tracking Technologies, Land Based Tracking Technologies and Cellular Phone.

4.2.1 Global positioning system

Global Positioning Systems consist of a series of satellites that orbit the earth broadcasting signals, which are in turn picked up by a system of a receiver. Nowadays, GPS was widely used in various fields. For example, military use GPS to track their soldier, surveyors use GPS to make high accuracy measurements, public people use GPS to give direction when move, athlete use GPS to give information about the distance a person walk or ran as well as the speed and the parameter of

workout and as a tracking tool to track vehicle of people. These technologies can assist in navigation, supply researcher about tourist information that is derived from his or her spatial context (Schiling et al. 2005). Recent years, the size and weight of GPS device that uses to track people become small and light. Thus, it gives advantages to the research to use the GPS device because it will easier tourist to bring the GPS. However, GPS tracking technologies also have a disadvantage which is expensive. Although, a GPS device can provide more accurate and precise information about tourist movement, but the price of GPS logger is expensive. Other than that, GPS device needs high power consumption, which means it cannot track a subject for long periods of time without changing batteries. Then, coverage of GPS also has a limitation. GPS devices will have difficulty to locate the subject if there are structural blocking the sky, or the subject is inside a building.

4.2.2 Land-based tracking technologies

Land Based Tracking Technologies are local tracking systems. It's known as radio frequency (RF) detectors. Land based tracking system are predicated on the principle that electromagnetic signals travel at a known speed along a known path (Zhao, 1997). The land based antenna station will receive the signal that sent from the end unit and detect the location by using a various technique. Time of arrival (TOA) Technology is based on the radio electric signals at a known speed. The position and the distance of the signals can be calculated by knowing the exact time the signal was emitted and the exact time it was received. By recording time accurately requires atomic clock which is expensive and non cost effective. TOA technology can track tourist by using Time Difference of Arrival (TDOA). TDOA is a system based on a series of three or more land based antenna stations that pick up transmissions from end units. The antenna station will actively transmit signals rather than passively waiting to receive signals from the end units. Hence, the end unit will receive the signals from several stationary antennas and then location is calculated. Next, the advantages of land based tracking technologies are they do not need to be directly exposed to the source of the electromagnetic signal or antennas of a system in order to function. Then, the small size of end unit will easier tourist to bring it. However the disadvantages of land based tracking technologies are expensive. Secondly, it's been local systems that must be erected in a specific location. Study area, which does not have the antenna cannot detect location of the end unit

4.2.3 Cellular phone

Cellular Phone also can be used to track tourist in a destination. There are many methods that can be used to track tourists using a cellular phone. Calling, send text messages, roaming and application of GPS can be used to track tourist movement in a destination. Firstly, by giving a cell phone to tourists researcher can detect the tourist's position by calling a tourist. Other than that, subjects also can send a message to researcher to justify their location. Next, cellular communication providers have agreements with providers in other countries in which the foreign providers are obligated (usually for an inflated fee) to give service to "roaming" end units from other networks. These agreements mean that many tourists carry their cell phones with them and use them during their trips. For example, a phone that is usually registered in Vodafone Germany may register for a week on the network of an Estonian provider. In addition, the location of the phone can easily be identified on a more specific geographic scale in some cases. However, these methods have a disadvantage which the privately owned companies do not always have incentives to cooperate with the researcher. Then,

application of GPS in cellular phone also can be used to track tourist movement. The concept of GPS application is same with GPS tracking technologies, but it used cellular phone as a device. The advantage of this method is non expensive compare to the GPS tracking device because the price of a smart phone is affordable. Second, the coverage of cellular phone is good in urban areas.

5. Comparing methods of tracking tourist movement

Wrong selection of tracking methods for tracking tourist in historic site might lead to inaccuracy information or lack of data information on tourist movement. Thus, by choosing the right tools and technique, it will provide accurate and precise data. Hence a high accuracy, availability, appropriate technique, efficient time frame, suitable to be used in a historic site, privacy of travelling and affordable price are the main criteria for selecting the instrument to run the study.

Firstly is accuracy of tracking tools. GPS is only tracking tools that can provide high and rich information on tourist movement. This is because, GPS tracking methods allow precise and continuous tracking of individual and provides spatially rich data, including velocity and timing information (Edwards et al. 2013). Then, tracking tourist using remote observation and aggregate video tracking is considered as low accuracy of data. The reasons are both techniques only can track tourist in a specific place only where there is a camera or CCTV (Shoval & Isaacson, 2010). Both methods cannot track fully spatial movement of tourist. While the rest of the technique shows medium in term of accuracy. Secondly, is availability. Availability of tools are needed in a study area so the tracking process can be done. Remote observation, aggregative video tracking and land based tracking technology are technique that have a weakness in term of availability. This is because, not all places in this world have the tools. For example, most CCTV and Camera only located at the hot spot area in a tourism destination. Thus, it cannot track tourist if tourist goes to the area where there are no tracking tools. While, call & sent text message technique and application of GPS in cellular phone only can be used in a destination that have cellular coverage. No coverage signal in the study area may lead no unused of this both technique. Then, the rest of the methods are worldwide, where it can be used to track tourists in all places in this world.

Next criteria is location of the study area. Because of Melaka heritage site locate in the urban area, only certain methods can be used for the research. Land based tracking technology cannot be used because there is no infrastructure for this tool in Melaka heritage sites. In Melaka heritage site, camera and CCTV only surveillance at the hot spot attraction. Hence, remote observation and aggregative video tracking cannot be used for tracking tourist in Melaka Heritage sites. The other approach of tracking tourists can be used in order to track tourists in Melaka Heritage site. Cost is one of the important aspect in choosing tracking tools for the study. The researcher trying to minimize the study by minimizing the cost of tracking tools and avoid expensive tracking methods. There are 5 methods that are highly cost which are participant observer methods, non participant observation, GPS tracking technologies, Land Based tracking technology and roaming by cellular phone. Both observer methods and non participant observation are expensive because researcher needs to follow and document the spatial movement of tourist. Cost of transportation and service need to bear by a researcher. Then, the satellite signal are free, but GPS devices are expensive. Roaming service and Land Based Tracking Technology cost are varies from place to place according to the supplier. While, the other technique of tracking is affordable for researchers to use it.

Table 4: Comparing Methods of Tracking Tourists

		Accuracy	Availability	Urban areas (Melaka)	Usage costs	Privacy of Travelling	Time Frame to track 1 tourists	Suitability in tracking daily tourist movement
Participant observer method		Medium	Worldwide	Can be done	High; because need to follow the tourist travelling	Privacy is **not an issue** because subject's need to do nothing to pinpoint their location	Long	Yes
Non participant Observation		Medium	Worldwide	Can be done	High; because need to follow the tourist travelling	Privacy is **not an issue**, because subject's do not know that they are being followed	Long	Yes
Remote observation		Low	Only in a specific area that have a camera	Work well in surveillance of camera	Cheap; because the data are given by authorities	Privacy is **not an issue**, because subject's do not know that they are being watched	Short	No
Aggregative video tracking		Low	Only in a specific area that have video cameras	Work well in surveillance of video camera	Cheap; because the data are given by authorities	Privacy is **not an issue**, because subject's do not know that they are being watched	Short	No
Time space budgets	**Trip diary**	Medium (*Depend on subject attitude*)	Worldwide	Can be done	Cheap	Privacy is **questionable** because tourist need document their trip diary	Long	Yes
	Recall diary	Medium (*Depend on subject attitude*)	Worldwide	Can be done	Cheap	Privacy is **not an issue**; the data of movement will be collected after the visitation.	Short	Yes
GPS Tracking Technology		High	Worldwide	Work well in urban with an open terrain and where the sky is unobstructed	The satellite signal is free, but the GPS device is expensive	Privacy is **not an issue**, the system can locate a user at any time without user knowledge	Long	Yes
Land Based Tracking Technology		Medium	Only in areas with the appropriate infrastructure of TDOA	High infrastructure costs mean that it is economically viable only in urban environments	The cost of the service varies from place to place	Privacy is **not an issue**, the system can locate a user at any time without user knowledge	Long	Yes
Cellular Phone	**Call & Sent text message**	Medium (*Depend on subject attitude*)	Only in areas with cellular coverage	More accurate in urban areas due to high coverage	Affordable	Privacy is **questionable** because tourist need to respond to researcher to explain their location during visitation	Medium	Yes
	Roaming	Medium	Worldwide	More accurate in urban areas where the density of transceivers is higher	Service cost varies from place to place according to the supplier	Privacy is **not an issue**, the system can locate a user at any time without user knowledge	Long	Yes
	Application of GPS	Medium	Only in areas with cellular coverage	More accurate in urban areas due to high coverage	Affordable	Privacy is **not an issue**, the system can locate a user at any time without user knowledge	Medium	Yes

*Red shade shows disadvantages or problem of using the tracking tools
*Blue shade shows advantages of using the tracking tools

Table 4: *Comparing Methods of Tracking Tourists (continued)*

		Accuracy	Availability	Urban areas (Melaka)	Usage costs	Privacy of Travelling	Time Frame to track 1 tourists	Suitability in tracking daily tourist movement
GPS Tracking Technology		High	Worldwide	Work well in urban with an open terrain and where the sky is unobstructed	The satellite signal is free, but the GPS device is expensive	Privacy is **not an issue**, the system can locate a user at any time without user knowledge	Long	Yes
Land Based Tracking Technology		Medium	Only in areas with the appropriate infrastructure of TDOA	High infrastructure costs mean that it is economically viable only in urban environ-	The cost of the service varies from place to place	Privacy is **not an issue**, the system can locate a user at any time without user knowledge	Long	Yes
Cellular Phone	Call & Sent text message	Medium (*Depend on subject attitude*)	Only in areas with cellular coverage	More accurate in urban areas due to high coverage	Affordable	Privacy is **questionable** because tourist need to respond to researcher to explain their location	Medium	Yes
	Roaming	Medium	Worldwide	More accurate in urban areas where the density of trans-	Service cost varies from place to place according to the supplier	Privacy is **not an issue**, the system can locate a user at any time without user knowledge	Long	Yes
	Application of GPS	Medium	Only in areas with cellular coverage	More accurate in urban areas due to high coverage	Affordable	Privacy is **not an issue**, the system can locate a user at any time without user knowledge	Medium	Yes

*Red shade shows disadvantages or problem of using the tracking tools
*Blue shade shows advantages of using the tracking tools

Tourist need a privacy during their visitation to a destination. Trip diary and call & sent message are a method that does not give the privacy of travelling to tourist. Privacy is questionable because tourists need to respond each of their activities to the researcher. For example, for the trip diary visitor need to document their activities during their travelling while for call & sent message, tourist need to respond to researcher to explain their location during visitation. Although tourists are willing to participate in the research, but the method of tracking really disturbing tourists activities in tourism attraction. Yet, the rest of the tracking technique gives a privacy to the visitor, but only non participant observation is the best technique for privacy aspect. This is because, the researcher will follow visitor's and they do not know that they are being followed. It can give a real tourist movement because they do not know that they are being tracked. Although the other methods give the privacy of travelling to visitor but it will not give a real movement of tourist because the subject know that they are being followed.

The tracking method must be time consuming. There are 6 methods of tracking tourist that needs a longer time to finish which are participant observer method, non participant observation, trip diary, GPS tracking technology, land based tracking technology and roaming using cellular phone. While the other approach are only need a short period of time to track a tourist. The last aspect of comparing method of tracking tourists is suitability to track daily movement. Both remote observation and aggregative video tracking are not suitable to be used to track daily tourist movement because it cannot follow the tourist in a destination attraction. While the other method can be used to track daily tourist movement. It is important to track daily tourist movement because the researcher wants to collect data on overall location from beginning until the end of their visit.

Thus, based on literature about 11 tracking approach only two tracking approach that are suitable to be used to track tourist movement in the Melaka historic city which are using the application of GPS in cellular phone and using recall diaries (refer to table 4). Using GPS application in cellular phone and using recall diaries do not have much problem compare to other tracking technique. In terms of accuracy, GPS application in cellular phone and recall diaries is at a medium level. Although both approaches are not having high accuracy in tracking tourists such as GPS tracking technologies, but it's still can track tourists movement within a destination.

Secondly, the availability of the tracking technique in the context of Melaka. Recall diaries are available to be used because the researcher

only needs to do interview session at the end of the tourist's trip to know about their movement pattern. Then, because of the coverage of cellular phone is good in Melaka so the method can be used to track tourists. Next is usage costs, the costs of using recall diaries are cheap, but the cost of cellular phone is affordable. Then privacy of travelling is not an issue for both tracking approaches because both techniques are not disturbing the subject during their trip within a destination. Time frame for a researcher to conduct this study is important because the researcher do not have much time to conduct this research. Hence the duration of time to track one tourist within the World Heritage of Melaka is important. For example, recall diaries only need a short period of time to know about the tourist movement pattern where a researcher will interview the tourist about their daily trip. However, using a GPS application in cellular phone to track tourist movement need a more time compare to using recall diaries. This is because, the cell phone need to give to the tourist before they go traveling and take it back when they finish their visitation. So, basically one tourist will need a day to finish identify about their movement pattern in the Melaka historic city.

Lastly, the best way to track the movement pattern of tourists within destination is by analysis daily movement (Lau and McKercher, 2008). Usually, daily movement represents discrete journey beginning and ending at the accommodation. Hence, both techniques of tracking approach can be used to track daily movements of tourist. However, remote observation and aggregative video tracking are not suitable to track daily movement of tourist because the technique of tracking is static. As a conclusion, both methods can be used to track tourist in the world heritage of Melaka, but the research will use the GPS application in cellular phone as a technique to track tourists because in term of accuracy of data, this technique can provide more accurate data compare to recall diaries.

6. Conclusion

This paper compares the methods of tracking tourists in order to get the best tracking tourists methods for the research that will conduct in Melaka Heritage sites. The comparison is important because a suitable tool and appropriate technique are needed in order to get valuable information about the spatial movement of tourists. Of the 11 tracking technique in this paper, all technique can be used to track individual tourists' movement. However, GPS application in cellular phone is the best tools to be used to track the movement of tourist in Melaka Heritage site. In terms of 7 criteria that have been explained which are accuracy, availability, appropriate technique, time frame, suitable to be used in historic site, privacy of travelling and cost the GPS application in cellular phone have no problems to be used for the research. This method can record in detail tourist movement while tourists busy enjoying themselves visiting the heritage sites. It will not disturb the activities of tourists because it can work independently without being checked by tourists. In addition, the small size of smart phone also gives advantages to this method because it will not burden the respondents to bring it.

The spatial movement data that obtained from application of GPS in smart phone will be analyzed using sieve map technique and categorical technique. Further, the result will show the model of tourist movement pattern in heritage sites. Other than that, by mapping the tourists movement data also can show the 'hot spot', 'cold spot' and 'transition area' of destination attraction. Hence, accurate and precise data about tourist movement that gathered from modern tracking approach plus arrival interview and interview session at the end of the visitation of tourists can give a better picture about tourist behavior either local or international tourists. Thus, it will help tourism planner, local authority, decision makers and other related field understand more about tourists and improve the destination management and create a comprehensive policy for tourism destination especially for heritage sites.

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