# Knowledge of tourist spatial behaviour to improve Melaka world heritage site management

Nurul Diyana Md Khairi, Hairul Nizam Ismail and Syed Muhammad Rafy Syed Jaafar

Nurul Diyana Md Khairi, Hairul Nizam Ismail and Syed Muhammad Rafy Syed Jaafar are all based at the Department of Urban and Regional Planning, Faculty of Built Environment and Surveying, Universiti Teknologi Malaysia, Skudai, Malaysia.

## Abstract

**Purpose** – *The paper aims to comprehensively use the knowledge of tourist spatial behaviour to improve World Heritage Site (WHS) management. Efficient heritage management can be achieved if critical aspects such as tourist spatial activities were better and comprehensively understood, primarily at the micro-level. Inaccurate information on these essential aspects will potentially cause problems in managing a WHS and compromises its Outstanding Universal Value. This study aims to extend the knowledge of tourist spatial behaviour by including the non-spatial and spatial characteristics of the tourists to better manage a WHS.*
**Design/methodology/approach** – *This study uses a trip diary and a GPS tracking app with 384 free independent tourists as the study respondents. Melaka WHS was chosen as the study area. The data were complemented by an aggregative analysis method to extract different discrete patterns based on individual itineraries.*
**Findings** – *This paper indicates a noticeable relationship between individuals' non-spatial and spatial characteristics. It suggests that integrating these two characteristics can provide more comprehensive knowledge of tourist behaviour.*
**Originality/value** – *This paper provides a different perspective to improving WHS management by determining the operative tools to develop an effective visitor management plan.*
**Keywords** *Tourist spatial behaviour, Heritage management, Outstanding universal value, World heritage site, Trip diary, GPS tracking*
**Paper type** *Research paper*

## 1. Introduction

Tourism in urban areas is rapidly growing due to the increasing popularity of holiday destinations and mass tourism development (Timothy, 2011). Ashworth and Page (2011) highlighted that heritage is one of the more commonly used instruments in urban tourism. Although the importance of urban areas in tourism is well-known, the rising demand for heritage tourism, particularly in urban destinations, has put growing pressure on historical cities that might not have been designed to accept such large tourist volumes. Garcia-Hernandez *et al.* (2017) also agreed, stating that a rapid touristification process could threaten a city's historic urban landscape. Too much pressure from human activities within the World Heritage Site (WHS) boundary could hypothetically destroy the physical condition of the site and hence compromise its Outstanding Universal Value (OUV) (Allan *et al.*, 2017). These circumstances fall short of the objectives set by the World Heritage Convention (UNESCO, 2016). The rising number of tourists in certain parts of a city could negatively impact its historic towns (Moscardo *et al.*, 2001). Ashworth and Page (2011) affirmed the above, that despite having some positive economic impact, tourism growth has also led to many challenges and issues relating to planning, management and sustainability.

Heritage planning was born to cater to the increased demand for heritage products and their consumption (Timothy, 2017), primarily to facilitate the management of heritage sites and attractions. In response to this demand, tourism is now inevitably linked to WHSs, offering destinations the opportunity to take advantage of economic advantages that comes with the recognition as a WHS (Alazaizeh et al., 2016), including increased international tourist arrivals (Su and Lin, 2014). However, Kim (2016) emphasised that the WHS designation is currently not operating and functioning as intended. The mismanagement of a WHS could inadvertently compromise the site's physical condition, potentially undermining its OUV (UNESCO, 2016; Allan et al., 2017). Therefore, this paper focusses on comprehensively using tourist spatial behavioural information to improve heritage management, especially within the boundaries of the WHS. Such information is important for developing operational tools to better and more comprehensively manage a WHS. These tools serve as a basic guideline for effectively managing and distributing tourists and controlling tourist flow.

This study focusses on Melaka WHS, a unique heritage tourist destination. However, most shophouses within Melaka WHS have been converted to boutique hotels and commercial premises (Conservation Management Plan, 2011). This circumstance is due to the tourism demand that has put tremendous pressure within the area, and thus negatively affecting the living community. For cities that strongly promote tourism such as Melaka, the tourist has become the target audience for tourism management and urban planning (Garcia-Hernandez et al., 2017). It is necessary to understand tourist consumption and their movement at a specific tourist destination to improve tourist behavioural knowledge (Horner and Swarbrooke, 2016; Khairi et al., 2020). By considering tourist spatial behaviour information, the authorities can construct a basic strategy to regulate tourist flow and manage spaces, particularly within Melaka WHS, a well-known living city. As stated in the Conservation Management Plan (2011), Melaka WHS has a living population. However, it has encountered a variety of developmental pressures and demands, which, if left on their own, could threaten its OUV.

## 2. Literature review

According to the UNESCO World Heritage Sustainable Tourism Toolkit, effective visitor management will be impossible without thoroughly analysing the tourism activity at the destination itself. There is a need to recognise when too many visitors at attractions or WHSs may ruin the visiting experience or become a threat. Most heritage destinations have a seasonal number of visitors (Hsiao and Chuang, 2016). Hence, an understanding of tourism, particularly from the tourist's point of view, is critical. Information about tourists is important for the ongoing management, interpretation and sustainability of WHSs (Gravari-Barbas et al., 2016). This study emphasises on understanding how tourists behave in Melaka WHS, as most of the tourism activities occur within the city's epicentre.

### 2.1 Melaka world heritage site and its outstanding universal value

UNESCO recognised Melaka as a WHS in 2008 because of its OUV. It is also a well-known historical State in Malaysia that offers a variety of tourism activities. The city also has a huge potential to elevate the number of tourists that come each year because of the rising popularity of activities involving visiting historical and cultural sites in recent years. Tourism is critical to Melaka's economic sector, contributing 46.6% of its total annual GDP (Amir et al., 2014). Today, Melaka WHS faces rapid developmental changes. Shamsuddin et al. (2012) remarked that there is an increasing amount of interference in these sites resulting from too many high-rise constructions and new developments to meet tourism needs. All this disruption has occurred within the historic urban fabric, thus threatening the existing character and OUV of the WHS. Melaka's recognition as a WHS has indeed positively impacted the State and the country.

However, negative impacts have also been observed and these pose real challenges to the authorities responsible for sustaining and managing the WHS. Significant growth in tourist arrivals to Melaka WHS was observed after the city was established as a WHS (Tourism Malaysia, 2013). However, the growing numbers of tourists have created new problems, especially within the WHS area (Abdul Ghani *et al.*, 2015). This phenomenon shows that the recognition of Melaka as a WHS has been particularly impactful and has increased its global visibility and has attracted more tourism growth (Teo *et al.*, 2014; Rasoolimanesh *et al.*, 2017). Therefore, due to the site's complexity, the management of the WHS areas will require people from a range of disciplines and agencies (Garcia and Corbett, 2018). In this context, the disciplines and agencies refer to the different departments in Melaka WHS, such as heritage, planning and architecture. Thus, it is imperative to gather and manage tourism activity information, which the respective authorities will use in managing the WHS (Md Khairi *et al.*, 2019).

It is also challenging to manage and conserve a heritage site if there is no clear information about the area. Knowledge of tourist activities can also help the management to make informed decisions when determining the right operative tools, such as wayfinding, carrying capacity and accessibility. Previous studies on Melaka WHS focussed on tourist movement flow patterns (Rahman *et al.*, 2011), cultural heritage visitor behaviour (Teo *et al.*, 2014), heritage preservation (Aziz and Siang, 2014), local community economy (Amir *et al.*, 2015), urban regeneration (Ertan and Egercioglu, 2016), sensory values (Nur *et al.*, 2019) and heritage building (Musa *et al.*, 2020). Up until now, no study has yet researched tourist spatial behaviour and how this information could help improve the management of a WHS.

### 2.2 Tourist spatial behaviour and its impact on world heritage site management

The rising population and the pursuit of local economic goals have led to increasingly challenging tourist space organisation within historic sites (Li *et al.*, 2016). Understanding tourist behavioural patterns can help the management synchronise targeted segments within a specific timeframe to align with the exact heritage product that the tourists consume at the destination (Buhalis, 2000). Vu *et al.* (2015) and Zheng *et al.* (2017) highlighted the importance of tourist behaviour, especially for decision-makers and strategic planners. In the context of tourism, Xia *et al.* (2010) emphasised that spatial behaviour refers to the sequence of movements between one attraction and another within a geographical space and within a particular time interval. It is critical to identify tourist spatial behaviour, which is key to achieving more efficient urban planning management (Bauder and Freytag, 2015), especially in areas that have been recognised as a WHS. Md Khairi *et al.* (2019) also mentioned the importance of studying tourist space and time when travelling between a destination's attractions. den Hoed and Russo (2017) further stated that many everyday domains are engaged relationally through mobility such as work, consumption, leisure and recreation.

The tourists' spatial behaviour can explain the interaction of this group with the spaces that they use. One factor that shapes tourist behaviour is the tourist's participation time (Lu *et al.*, 2016), where normally tourists would participate in many activities and visit various attractions. However, most visits are carried out within a relatively short time. Another critical factor influencing tourists' activity participation is activity duration (Buning and Gibson, 2016), which, in turn, affects the tourists' travel behaviour. Essentially, the core of tourism is people's movement through time and space (Leung *et al.*, 2016). Therefore, different tourist attractions are connected based on tourist consumption behaviours and movements (Liu *et al.*, 2017). Understanding tourist movement is important, especially for transport, attraction planning and tour product development (McKercher and Lau, 2008). Luberichs and Wachowiak (2010) pointed out the non-random distribution of tourist spatial activities, where such information could be used to foresee the type of tourist behaviour at a destination.

It is important for tourism managers to understand tourist behaviour and tourist consumption to better manage historical sites (Choibamroong, 2006; Vu et al., 2015). To clearly understand tourist behaviour, the tourists' non-spatial and spatial characteristics must first be understood. Comprehensive information or knowledge of spatial behavioural formation can be obtained through an in-depth study on the factors that influence how tourists use space and time at a destination (Dejbakhsh et al., 2011). These factors can be variously categorised and segmented, such as based on socio-demographic background and travel behavioural characteristics, depending on the availability of the information at hand (Raun et al., 2016). The country of origin, the length of stay, the number of visits and the geographical location of visits could also be considered in tracking tourists (Kuusik et al., 2011). Therefore, urban destinations must consider, promote and, to a certain degree, accurately manage the time-space activity of tourists.

## 3. Methodology

### 3.1 Melaka world heritage site

Melaka WHS was selected as the study area due to its consistently receiving high number of annual tourist arrivals. Tourism is a booming industry in Melaka, with the State recording 16.79 million tourist arrivals in 2017 and a 19.03% (more than 520,000) increase in international tourist arrivals. Despite its well-known reputation as a historic city, Melaka is also rich with valuable historical values (Ab Aziz and Siang, 2014). Melaka is one of the oldest cities located along the Straits of Melaka. It is located on both sides of the Melaka River and is close the Straits' mouth, as shown in Figure 1.

### 3.2 Sampling, data collection and analysis

The study population framework refers to the total number of tourists who visit Melaka in a year. The size of the sample was determined using the table of Krejcie and Morgan (1970).

**Figure 1** Map of Melaka World Heritage Site (WHS)
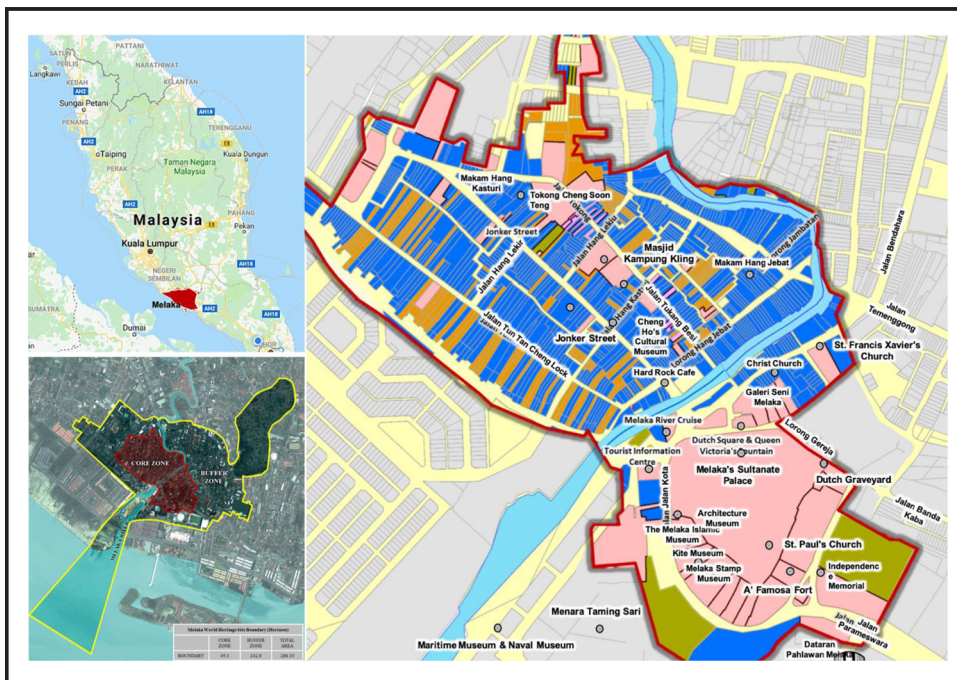
According to the authors, "as the population increases, the sample size increases at a diminishing rate and remains relatively constant at more than 380 cases". In 2018, the number of tourist arrivals increased dramatically to 17.02 million, with 33.4% of this number being international tourists. The number 384 was taken as the optimum number of samples representing only international tourists from different backgrounds, with a sampling error of ±5%. The study was carried out for eight months, from March 2018 until August 2018, within Melaka WHS boundaries. The data were gathered using a GPS application, trip diaries and questionnaires. This study used GPS to track tourist spatial activity, as recommended by Edwards and Griffin (2013) and Shoval and Ahas (2016). Once the respondents agreed to participate in the survey, they were then given the option to proceed with the survey using either a trip diary or a GPS tracking application.

Trip diary forms were given to the respondents that chose to use the trip diary over GPS tracking. Respondents who agreed to proceed with GPS tracking were given instructions to install a GPS application via smartphone. Only respondents who completed the first stage (spatial data) could proceed to the second stage, i.e. the questionnaire (non-spatial data). Disproportionate stratified sampling (DSS) was used to allocate the number of respondents for each previously selected hotel, as indicated in Table 1. Several processes were undergone to determine the preferred budget hotels as the starting point for the study. A total of 155 hotels under the purview of Majlis Bandaraya Melaka Bersejarah (MBMB) were short-listed based on different categories. From the 155 hotels registered in Melaka, only 106 hotels are considered budget hotels, according to Jabatan Pelesenan, MBMB.

This study found that only 34 budget hotels are located within the core and buffer zones of Melaka WHS. However, the starting point was subsequently revised based on a second pilot survey. The budget hotels located outside the core zone but within 800-m walking distance from the Tourist Information Centre (TIC) were also considered. The TIC was chosen as the node for the radius because it serves as the main tourist information source for a tourism destination. The presence of international tourists in the selected hotels was the main criteria in selecting the starting point for this study. Of 18 budget hotels, only 12 budget hotels were marked as having a higher percentage (≥ 50%) of international tourists. Respondents were stratified based on hotel occupancy rate. Only hotels with 50% and above international tourist occupancy were selected. These hotels must be located within the core zone area of Melaka WHS.

The data collection procedure for the study involved two stages. The first stage involved collecting spatial data, while the non-spatial data was collected in the second stage, as illustrated in Figure 2. The respondents were given instructions to install a GPS app or to use a trip diary. During the actual survey, the tracking tools (the GPS app or the trip diary)

**Table 1** Distribution of sample from starting point

| Name of hotel | No. of rooms | Rooms occupied | Distribution of respondents (%) | No. of respondents | Response rate (%) |
|---|---|---|---|---|---|
| Cheng Ho Guest House | 24 | 19 | 13.3 | 51 | 85.2, 87.5 |
| Chong Hoe Hotel | 12 | 10 | 7.0 | 27 | 90.0 |
| Courtyard at Heeren | 15 | 15 | 10.5 | 40 | 81.6 |
| Heeren House | 6 | 5 | 3.5 | 13 | 86.7 |
| Quayside Hotel and Halia Inc. | 39 | 31 | 21.7 | 83 | 83.7,78.6, 87.8 |
| Da Som Inn Hotel | 10 | 7 | 4.9 | 19 | 82.8 |
| Harmony Lodge | 18 | 5 | 3.5 | 13 | 86.7 |
| Hotel Hong Melaka | 12 | 9 | 6.3 | 24 | 82.7 |
| Riversong Residence | 13 | 10 | 7.0 | 27 | 87.1 |
| Sama-sama Bed and Breakfast | 5 | 3 | 2.1 | 9 | 81.8 |
| Jonker Boutique Hotel | 16 | 16 | 11.2 | 43 | 83.3, 85.7, 50 |
| Ginger flower Boutique | 13 | 13 | 9.1 | 35 | 94.6 |
| Total | 183 | 143 | 100 | 384 | 85.3 |

**Figure 2** Tracking methods using trip diaries and GPS application on smartphones
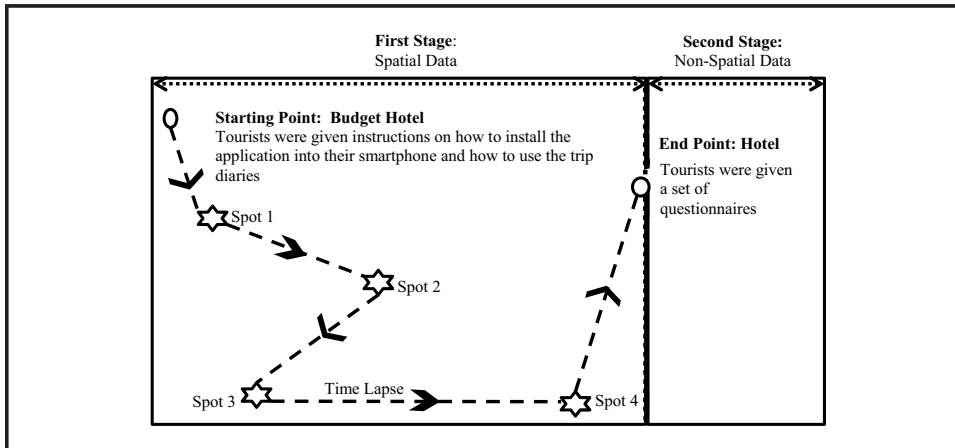
and questionnaires were distributed at the selected budget hotels where the samples could be reached. The respondents would not be counted as usable samples if they did not complete either of the stages in the survey. During the data collection, the potential respondents were approached at the hotel lobby. If they agreed to participate, the respondents were given the option of proceeding with the survey using a trip diary or a GPS tracker. The respondents were further asked to return the form to the hotel at the end of their visit.

The recording activity started at the respondents' respective hotel lobbies to track their behavioural path. The instruments were then collected at the same original location once the respondents had finished their one-day trip. The respondents were also asked to complete the questionnaire (second stage) once they had completed the first stage. This process is quite similar to that of Shoval *et al*. (2011) and Zheng *et al.* (2017), the only difference being that the respondents were instructed at a different staging point. The questionnaire contained two parts: socio-demographic information and travel characteristic, while the information on space and time was based on the GPS app and the trip diary. A collected sample would only be considered valid when he/she has completed both the tracking information and questionnaire.

Potential respondents were asked the following screening questions for qualification purposes:

■ Are you a free independent tourist (FIT)? and

■ Is this your last day in Melaka WHS? The first screening question ensures that the respondent is not on a package or guided tour and is not planning on purchasing a full- or half-day sightseeing tour.

The second screening question ensures that the respondent is not on his/her last day of stay in Melaka WHS and will not be departing Melaka on that day. Regarding any ethical issues, both tracking instruments do not breach the respondent's right to privacy because the trip pattern is only shared after the visitation is complete. Any potential privacy issues for the respondents who have agreed to use the GPS app are avoided because smartphone apps can be deleted after the pattern is shared. This process is all in line with the procedures suggested by Hallo *et al.* (2012) and Glasgow *et al.* (2016). The respondents were also asked to return the trip diary form to their respective hotels at the end of their visit.

The trip diary is used to collect the same information as the GPS app albeit via a more traditional way of collecting spatial data. This method may not be as accurate as the GPS app, but it still provides the exact data needed for the study. The data collected was further analysed via several descriptive, inferential statistics and visualisation analyses. The study also analysed tourist movement patterns through aggregative analysis; for example, using quantitative methods to aggregate behavioural patterns. This method included counting the number of trips made, the attractions visited by the tourists and grouping the tourists based on the sequence of attractions visited. Following the sequence of attractions that the tourists had visited in Melaka WHS, the researcher managed to determine the overall tourist movement pattern. This analysis was conducted using SPSS and Microsoft Excel software to provide a more accurate sequence of tourist movement patterns.

## 4. Analysis and findings

A detailed profile of the respondents is shown in Table 2.

### 4.1 Tourist space and time

Based on the survey, 29 common attractions were identified as the preferred tourist spots in Melaka WHS. As indicated in Table 3, the top-five tourist spots are Melaka River/Cruise, Jonker Street, the Dutch Square, Queen Victoria's Fountain, Dataran Pahlawan Melaka and The Stadthuys. Melaka River was the most popular tourist site, garnering 351 visits. This attraction allows the tourists to see Melaka WHS at its best via a 45-min cruise. Jonker Street is a famous and lively heritage street that is known for its great shopping, dining and nightlife experience. The Dutch Square and Queen Victoria's Fountain are also popular hotspots for photo-taking due to their colonial-influenced architecture. Dataran Pahlawan Melaka is also one of the most popular malls among the respondents and is located near Melaka WHS. It takes only 5 min to walk to Dataran Pahlawan from Jonker Street and the Dutch Square. The Stadthuys, known as Melaka's most recognised landmark, is ranked fifth after the four tourist spots mentioned above because it is located near the TIC and serves as a pick-up point for traditional trishaw tours.

### 4.2 Tourist movement pattern

Information regarding the tourists' preferred tourism attractions can help identify tourist behaviour while visiting a WHS. A total of 58 discrete patterns were extracted from 384

| Table 2 | Respondents' profile | | |
|---|---|---|---|
| *Characteristics* | *Item (s)* | *Frequency* | *(%)* |
| Gender | Male | 138 | 35.9 |
| | Female | 246 | 64.1 |
| Origin (Region) | Europe | 203 | 52.7 |
| | Asia | 146 | 38.1 |
| | Oceania | 35 | 9.1 |
| Past-visit experience | First-time Tourist (FT-tourist) | 237 | 61.7 |
| | Repeat Tourist (RP-tourist) | 147 | 38.3 |
| Number of nights | Two Nights | 79 | 20.6 |
| | Three Nights | 86 | 22.4 |
| | Four Nights | 180 | 46.9 |
| | Five Nights and above | 39 | 10.1 |
| Travel companion | Partner | 161 | 41.9 |
| | Individual | 120 | 31.3 |
| | Family | 15 | 3.9 |
| | Friends | 88 | 22.9 |

**Table 3** Total frequency of respondents' preferred attractions and time spend in Melaka WHS

| Name of attractions | Max. visit/day | Total score (N) | Time (mins) Sum | Time (mins) Ave. |
|---|---|---|---|---|
| Melaka River/Cruise | 2 | 351 | 8,805 | 25 |
| Jonker Street | 3 | 304 | 9,805 | 32 |
| Dutch Square and Queen Victoria's Fountain | 2 | 282 | 6,965 | 25 |
| Dataran Pahlawan Melaka | 2 | 263 | 8,555 | 33 |
| The Stadthuys | 2 | 254 | 6,275 | 25 |
| A'famosa Fort | 1 | 199 | 5,075 | 26 |
| Melaka Sultanate Palace | 1 | 107 | 3,145 | 29 |
| Cheng Ho's Cultural Museum | 1 | 100 | 2,075 | 21 |
| Dutch Graveyard | 1 | 91 | 910 | 10 |
| Taming Sari Tower | 1 | 90 | 3,360 | 37 |
| Galeri Seni Melaka | 1 | 90 | 1,645 | 18 |
| Architecture Museum of Malaysia | 1 | 89 | 1,605 | 18 |
| Christ Church | 1 | 86 | 1,290 | 15 |
| Proclamation of Independence Memorial | 1 | 79 | 1,413 | 18 |
| Hard Rock Cafe | 2 | 77 | 1,800 | 23 |
| Maritime Museum and Naval Museum | 1 | 70 | 1,880 | 27 |
| Baba-Nyonya Heritage Museum | 1 | 69 | 1,425 | 21 |
| Makam Hang Kasturi | 1 | 68 | 1,295 | 19 |
| Melaka Stamp Museum | 2 | 65 | 1,260 | 19 |
| St. Francis Xavier's Church | 1 | 61 | 900 | 15 |
| Tokong Cheng Soon Teng | 1 | 58 | 1,165 | 20 |
| Masjid Kampung Kling | 1 | 55 | 1,105 | 20 |
| Mahkota Parade | 1 | 48 | 2,208 | 46 |
| Kuil Sri Poyattha | 1 | 46 | 925 | 21 |
| Makam Hang Jebat | 1 | 46 | 970 | 20 |
| Hatten Square | 1 | 39 | 1,730 | 44 |
| Melaka Islamic Museum | 1 | 30 | 505 | 19 |
| Kite Museum | 1 | 30 | 580 | 17 |
| St. Paul's Church | 1 | 7 | 80 | 11 |

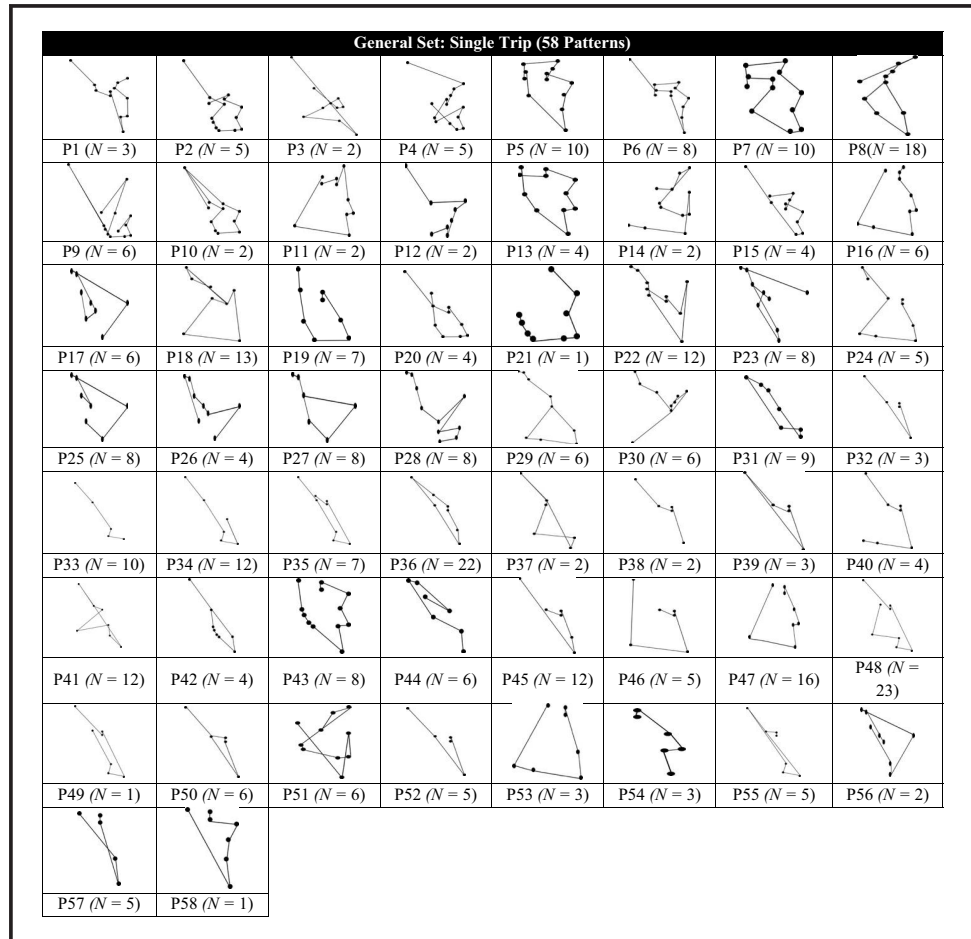Note: *Ranking is based on number of visitations at each attraction (frequency = 384)

individual itineraries using an aggregative analysis method. Each respondent produced a different pattern. The black dots in Figure 3 represent the attractions visited based on the trip diary and GPS tracking methods. The results from the analysis show that all patterns reflect a single trip. The designation of discrete patterns was mainly based on considering the number of stops (tourist spot) made by the respondents within a single-day trip. The results also suggest that common features of tourist movement patterns could be inferred or discerned from individual patterns. Items of the same pattern exhibited comparable qualities that distinguished them from other patterns. Therefore, even if different locations were visited, two distinct patterns might match with the same type of movement pattern. Using a Linear Path Model, 58 patterns were identified in this study. This number was then reduced to four movement styles, as shown in Figure 4. These discrete patterns correspond with that of Lew and McKercher (2006) and provide an insightful outline into the following analysis stage.

### 4.3 Analysis of tourist spatial behaviour in Melaka world heritage site

*4.3.1 Influence of socio-demographics on respondent spatial behaviour.* The results from the T-test for Equality of Means are outlined in Table 4. The findings indicate that the number of attractions visited and the movement patterns are not significantly different between genders. The changes in movement patterns are highly influenced by the number of attractions at a destination. However, the results suggest that female tourists spent a longer time visiting attractions than male tourists ($t$ (382) = −2.307, $\rho$ = 0.02). Figure 5

**Figure 3** Observed movement patterns



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| P1 (N = 3) | P2 (N = 5) | P3 (N = 2) | P4 (N = 5) | P5 (N = 10) | P6 (N = 8) | P7 (N = 10) | P8 (N = 18) |
| P9 (N = 6) | P10 (N = 2) | P11 (N = 2) | P12 (N = 2) | P13 (N = 4) | P14 (N = 2) | P15 (N = 4) | P16 (N = 6) |
| P17 (N = 6) | P18 (N = 13) | P19 (N = 7) | P20 (N = 4) | P21 (N = 1) | P22 (N = 12) | P23 (N = 8) | P24 (N = 5) |
| P25 (N = 8) | P26 (N = 4) | P27 (N = 8) | P28 (N = 8) | P29 (N = 6) | P30 (N = 6) | P31 (N = 9) | P32 (N = 3) |
| P33 (N = 10) | P34 (N = 12) | P35 (N = 7) | P36 (N = 22) | P37 (N = 2) | P38 (N = 2) | P39 (N = 3) | P40 (N = 4) |
| P41 (N = 12) | P42 (N = 4) | P43 (N = 8) | P44 (N = 6) | P45 (N = 12) | P46 (N = 5) | P47 (N = 16) | P48 (N = 23) |
| P49 (N = 1) | P50 (N = 6) | P51 (N = 6) | P52 (N = 5) | P53 (N = 3) | P54 (N = 3) | P55 (N = 5) | P56 (N = 2) |
| P57 (N = 5) | P58 (N = 1) | | | | | | |

**Figure 4** Movement style of respondents

| Types of Pattern/Movement Styles | | | (n = 384) | Explanation |
|---|---|---|---|---|
| P1 Point-to-Point Patterns | | P1c Touring Point-to-Point | 130 | ▪ 16 discrete patterns were found to be similar to the Point-to-Point pattern.<br>▪ The average number of respondents: 7.63. |
| Type P2 Circular Patterns | | P2a Circular Loop | 75 | ▪ 9 discrete patterns were found to be similar to the Circular Loop pattern.<br>▪ The average number of respondents: 8.69. |
| | | P2b Stem and Petal | 122 | ▪ 16 discrete patterns were found to be similar to the Stem and Petal pattern.<br>▪ The average number of respondents: 8.67. |
| P3a Random Exploratory | | P3a Random Exploratory | 57 | ▪ 10 discrete patterns were found to be similar to the Random Exploratory pattern.<br>▪ The average number of respondents: 9.37. |

clearly shows that gender does not influence movement pattern or the number of attractions visited. However, a significant difference was found in total time spent. Females spent more

| | Male (n = 138) | Female (n = 246) | | Europe (n = 203) | Asian (n = 146) | Oceania (n = 35) | |
|---|---|---|---|---|---|---|---|
| **Table 4** Influence of socio-demographic (age and gender) on the spatial behaviour of respondents | | | | | | | |
| *Spatial characteristic* | *Gender (mean)* | | *ρ-Sig.* | *Region (mean)* | | | *ρ-Sig.* |
| Attractions visited | 8.16 | 8.58 | 0.083 | 8.72 | 7.97 | 8.63 | 0.007* |
| Total time spent | 199.93 | 214.63 | 0.022* | 213.12 | 203.34 | 212.49 | 0.310 |
| Movement *(Chi-square test)* | Gender (%) | | *ρ-Sig.* | Region (%) | | | *ρ-Sig.* |
| Touring point-to-point | 39.2 | 60.8 | 0.179 | 52.3 | 40.0 | 7.7 | 0.168 |
| Circular loop | 42.7 | 57.3 | | 53.3 | 38.7 | 8.0 | |
| Stem and petal | 32.8 | 67.2 | | 59.8 | 29.5 | 10.7 | |
| Random exploratory | 26.3 | 73.7 | | 38.6 | 50.9 | 10.5 | |

Notes: *Correlation is significant if less than $\rho < 0.05$ (2-tailed); Difference at 0.05 level of significance. *Gender (T-test for equality of means); Region (cross tabulation and one-way ANOVA)

**Figure 5** Male vs female intra-movement pattern
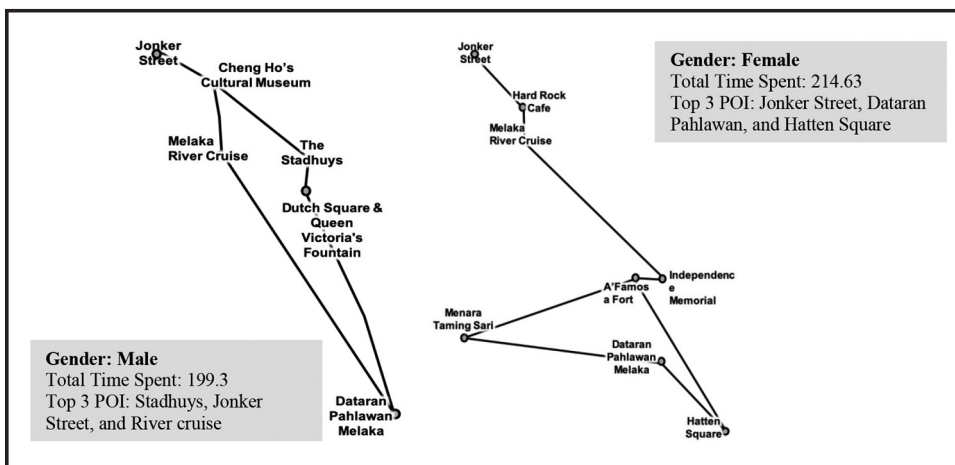


time at places that promoted more shopping and leisure activities, such as Jonker Street, Dataran Pahlawan and Hatten Square.

The findings also show that the tourist region is not significantly different in terms of total time spent and movement pattern. Concerning the number of attractions visited, the findings indicate that the tourists differed significantly across region. The results reveal that European respondents visited more attractions compared to Asian respondents. Based on Figure 6, a significant difference was found in the type of attractions chosen and the number of attractions visited. The European respondents preferred to visit heritage attractions that characterise Melaka as a WHS. In contrast, the Asian respondents preferred more sightseeing activities, especially mass tourist areas such as Dataran Pahlawan, Menara Taming Sari and Melaka River Cruise.

*4.3.2 Influence of trip characteristics on respondent spatial behaviour.* In terms of length of stay, the findings show that the respondents who stayed for two nights visited the most number of attractions and obtained the highest mean score (M = 9.24). The results show a significant difference between the number of attractions visited and the total time spent across length of stay. The results also reveal significant differences between the respondents who stayed 2–3 nights and those who stayed 4–5 nights. The respondents that stayed for two nights tended to spend more time visiting attractions than those that stayed

**Figure 6**  Asian vs Europe intra-movement pattern
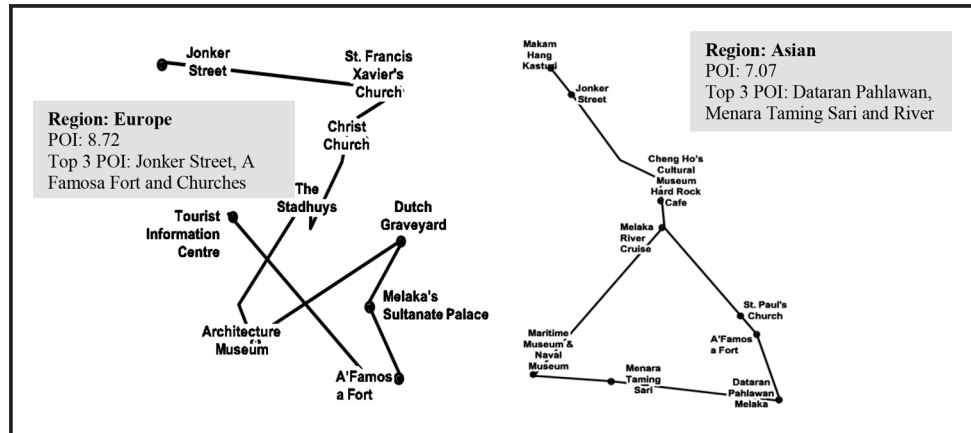


**Figure 7**  2 N vs 4 N intra-movement pattern
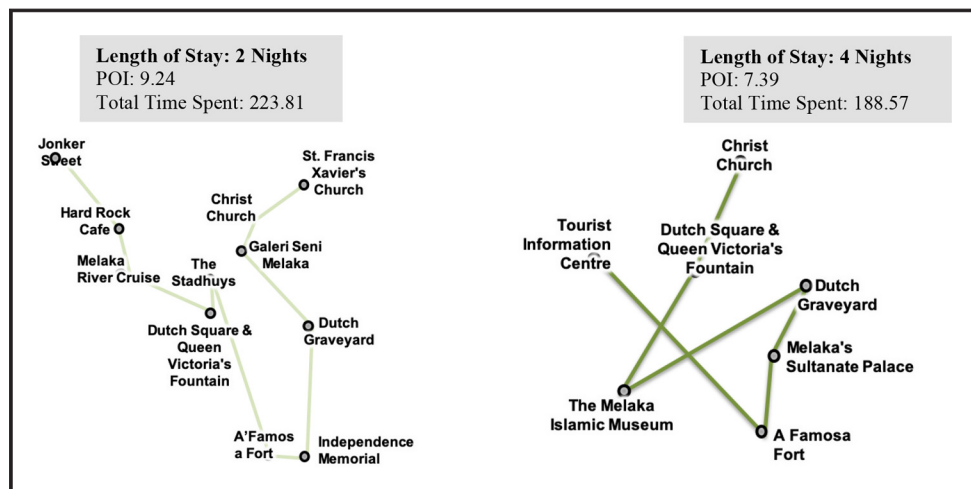


**Table 5**  Influence of travel characteristic (length of stay, past-visit experience and travel companion) on the spatial behaviour of respondents

| Spatial characteristic | 2N (n = 79) | 3N (n = 86) | 4N (n = 80) | 5N (n = 39) | ρ-Sig. | FTT (n = 237) | RT (n = 147) | ρ-Sig. | Partner (n = 161) | Individual (n = 120) | Family (n = 15) | Friends (n = 88) | ρ-Sig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Length of stay (mean) | | | | Past-visit experience (mean) | | | | Travel companion (mean) | | | |
| Attractions visited | 9.24 | 8.95 | 7.39 | 7.43 | 0.000* | 9.57 | 6.47 | 0.000* | 8.76 | 8.86 | 7.80 | 7.34 | 0.000* |
| Total time spent | 223.81 | 228.59 | 188.57 | 189.42 | 0.000* | 231.28 | 173.98 | 0.000* | 217.06 | 218.05 | 193.33 | 186.08 | 0.000* |
| Movement | | Length of | | | ρ-Sig. | Past-visit | | ρ-Sig. | | Travel Companion | | | ρ-Sig. |
| Touring point-to-point | | Stay (%) | | | | Experience (%) | | | | (%) | | | |
| | 26.9 | 23.8 | 39.2 | 10.0 | 0.067 | 46.9 | 53.1 | 0.000* | 42.3 | 32.3 | 3.8 | 21.5 | 0.117 |
| Circular loop | 14.7 | 22.7 | 56.0 | 6.7 | | 66.7 | 33.3 | | 48.0 | 20.0 | 5.3 | 26.7 | |
| Stem and petal | 18.9 | 21.3 | 44.3 | 15.6 | | 64.8 | 35.2 | | 45.9 | 32.8 | 3.3 | 18.0 | |
| Random exploratory | 17.5 | 21.1 | 57.9 | 3.5 | | 82.5 | 17.5 | | 24.6 | 31.3 | 3.9 | 22.9 | |

**Notes:** * Difference at 0.05 level of significance; FTT-First Time Tourist, RT-Repeat Tourist; Movement (Chi-square test). * Length of stay (cross tabulation and one-way ANOVA test); past visit experience (cross-tabulation and t-test for independent groups); travel companion (cross-tabulation and one-way ANOVA with Tukey HSD Post-hoc tests)
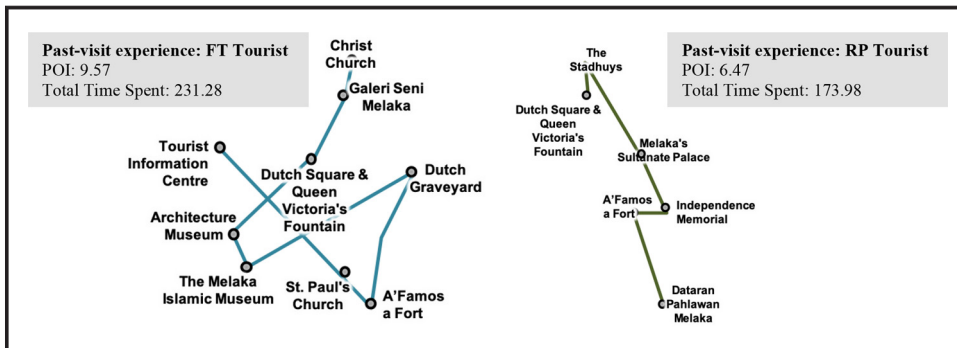
longer. This is because there is a limited time budget allocated for respondents staying for a shorter period. This limitation pushes the individuals to visit more attractions and indirectly spend more time at particular attractions within a day Figure 7.

Table 5 shows that the first-time (FT) tourists visited more attractions than the repeat (RP) tourists. Hence, it can be said that FT tourists tend to acquire a variety of information and knowledge about new destinations, so they tend to visit all the relevant attractions at a particular destination. Conversely, RP tourists are more familiar with the destination, using information and experience acquired from past visits. Figure 8 shows that the FT respondents' movement patterns were different compared to the RP respondents, who indicated a higher correlation between time spent and the number of attractions visited. This finding shows that the respondent movement pattern changes with an increase in time spent and the number of attractions visited.

Table 5 and Figure 9 indicate that the number of attractions visited and total time spent were significantly different according to the respondents' travel companion, specifically between individuals and those accompanied by friends. In summary, there is a higher correlation between time spent and the number of attractions visited. To clarify, different travel companions can indirectly influence the time spent at the destination and the attractions visited. This is because respondents might behave and experience a destination differently in groups than when travelling alone or with a companion.

## 5. Discussion

| Figure 8 | FTT vs RPT intra-movement pattern |



| Figure 9 | Individual vs friends intra-movement pattern |
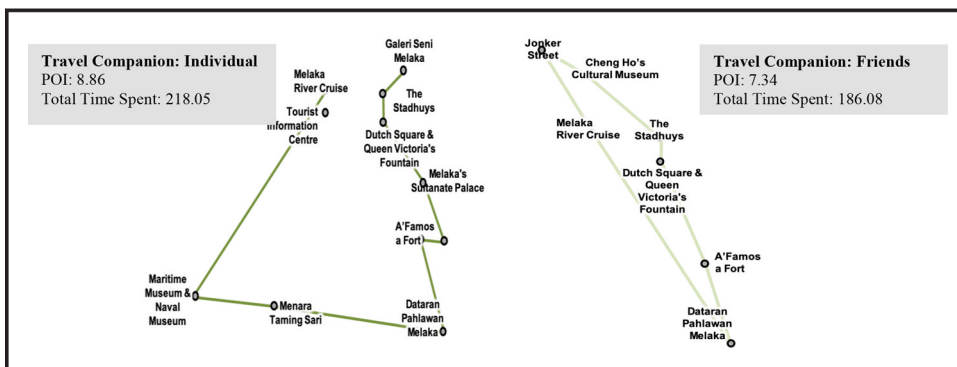
In general, the results of this study show how trip characteristics cause discernible differences in spatial behavioural patterns. It can be concluded that the tourists' trip characteristics contribute more towards the understanding of spatial behaviour compared to socio-demographic background. Although socio-demographic characteristics may not have a strong impact on spatial characteristics, it is still important to study. These traits may somehow inter-relate, although the relationship may not be strong. The findings show that female tourists spent more time at places that promoted more shopping and leisure activities compared to male tourists. Noguti *et al.* (2019) also reported the same findings, mentioning that shopping is now recognised as one of the most time-consuming activities, especially when travelling. Previously, shopping was seen as a practical activity while travelling, but it has now become an activity where individuals can enjoy and reward themselves as part of the leisure experience (Silva *et al.*, 2020). This result shows that gender has a major influence on tourist behaviour (Lehto *et al.*, 2004; Wilkins, 2011) in terms of what they spend on, where they spend their money (Swanson and Horridge, 2006), and how much they spend on shopping (Fairhust *et al.*, 2007; Alegre and Cladera, 2012).

The study also found that geography and group conformity, rather than individualism, had a stronger impact on tourist spatial behaviour within clearly defined districts. That is, different travel companions can indirectly influence time spent and attractions visited. This is because respondents might behave and experience a destination differently in groups than when travelling alone or with a companion. Zhu *et al.* (2019) found a clear difference between those who travelled with groups and those that travelled individually. Individual tourists have a more flexible schedule or itinerary, so they are more likely to visit more attractions compared to group tourists. Group tourists often have a tight schedule; thus, they tend to limit their visiting time at each attraction. The current study shows that European respondents visited more attractions compared to Asian respondents. Md Khairi *et al.* (2019), who conducted a study on tourist consumption, also found that European tourists visited more primary elements such as historical monuments compared to Asian tourists, who are more interested in secondary elements such as markets and shopping malls. Yang *et al.* (2018) suggested that the behavioural differences between Asian and European tourists are important elements or topics that need to be studied. The deep-seated cultural differences between these groups reveal their preferences and behaviours.

The number of attractions visited and the time spent at a destination were found to influence the length of stay and the choice of travel companion. Tourists with shorter stays tend to spend more time at a destination by visiting more attractions within a day. In contrast, tourists with longer stays have the freedom to explore Melaka WHS at their own pace. So, they would visit fewer attractions within a day and spend less time at the attractions. The spatial activity of tourists that travelled individually was utterly different from the tourists travelling in groups (friends and family), as the former would personally select the attractions they were interested in visiting. However, within a group, an individual's desire is often disregarded either because of time budget constraints or the overriding consideration of the entire group's will. In their study, Zhu *et al.* (2019) revealed a clear difference between those who travelled in groups and individual tourists. Individual tourists have a more flexible schedule or itinerary, so they are more likely to visit more attractions than group tourists, while group tourists often have a tight schedule, so they tend to limit their visiting time at each attraction.

The findings also indicate that respondents that stayed for two nights tend to spend more time visiting attractions than those that stayed longer. Nicolau *et al.* (2018) also reported the same finding, that individuals who had freedom with their time budget tend to be very selective with the choices of attractions within a one-day trip visit, which is also a relevant tourism management indicator. The tourist's past-visit experience was also found to impact space, time and movement patterns. Tourists tend to conceptualise a place based on their former impression of what it had offered and the experiences they had consumed. The result explains why FT tourists tend to visit more attractions compared to RP tourists. Repeat

tourists are more familiar with the destination, using the information and experience acquired from past visits. This finding is similar to that of McKercher *et al.* (2012), who stated that FT tourists are destination-unaware, while RP tourists are somehow more destination-familiar. The results also suggest that the FT respondents spent more time at the destination compared to the RP respondents. Lehto *et al.* (2017) also affirmed that changes in RP tourist behaviour are likely a result of pre-trip decision-making and how they select on-site destination activities. The tourists' movement pattern also changed based on the time spent and the number of attractions visited. McKercher and Lau (2008) and De Cantis *et al.* (2016) also found an association between tourist itinerary patterns and experience from previous visits.

### 5.1 Practical contributions

The findings from the study point out practical contributions, especially for the local authorities, namely, the MBMB, to better manage Melaka as a WHS. The most significant practical implication can be found in the identification of the most appealing characteristics that influence tourist behaviour. The study highlights that different groups of tourists (segment) have different preferences and behaviours. The local authorities can apply the information gathered to develop a visitor management plan and design effective wayfinding for tourists at Melaka WHS. This wayfinding can help tourist distribution around the area to prevent the places from becoming congested, as this could degrade the site's heritage values. In Melaka WHS, pedestrian facilities are essential for tourists because they are the ones who primarily walk throughout the mentioned areas. High volumes of tourists in the heritage area can harm the buildings due to the excessive use of its major streets. The streets of Melaka WHS are mostly located between old buildings, making it likely to induce unwanted disturbances and pollution into the locality. This situation will also affect one of Melaka WHS' OUVs.

Thus, tourist movements should be managed and improved to meritoriously control tourist flow within the area. An efficient way of delivering the best experience for tourists is to consider tourist expectations and movement style. Therefore, it is crucial to integrate the understanding of tourists' non-spatial and spatial features to define and develop different wayfinding behaviours based on various tourist demographic backgrounds and travel behaviour. In terms of methodology, the GPS application usage has offered a better understanding of the nature of tourist behaviour and how it can be further expanded. However, this does not mean that traditional approaches should be disregarded. The trip diary can still be used as an alternative instrument for tourist tracking rather than solely relying on GPS. Such methods are still relevant and can effectively collect tourist spatial data, as this study has proven. The results indicate that tourists who visit Melaka WHS have different backgrounds and profiles. So far, only limited attempts have been made to consider the preferences of different groups and their spatial activities. This study is the first to adopt an efficient method to comprehensively capture and measure tourist behaviour.

### 5.2 Theoretical contributions

In terms of theoretical contributions, many researchers have classified the different behaviours of tourists. Additionally, the cited classifications have often become the basis for studies on tourist behaviour. In summary, the complexity of urban areas can contribute to the various behavioural patterns of tourists that pass in and out of cities. The various activities created by the tourism industry also create different types of characteristics and uniqueness at each attraction and thus attract different types of tourist. Many factors have since been identified to influence tourist behaviour at a destination. Previously, studies on tourist behaviour have often aimed to understand the tourists' non-spatial characteristics while the tourists' spatial characteristics are neglected. Therefore, this study has addressed this gap by integrating tourists' non-spatial and spatial characteristics to gain insight into the overall tourist behaviour at a destination.

## 6. Conclusion and recommendations for further research

Tourism studies have helped bring in more recent and updated knowledge, which further contributes towards the improvement of a destination. This is true for destinations that are highly dependent on tourism, such as Melaka WHS. The current study was conducted within limited locations in Melaka city centre. Thus, it might not be possible to generalise the findings to other tourist spots and attractions in Malaysia. Besides, the findings assume that each location may only incorporate a small section of what is a larger potential tourist site and, as such, could be overlooked as a potential location. Likewise, it should be noted that each particular attraction has different attribute meanings, and not all heritage attractions serve the same products and services. The variables and findings from the study can be further tested and carried out in other attractions, especially the ones that promote historical elements as their main products, such as George Town WHS, Penang, Malaysia. The identification of tourist behaviour in other heritage cities may result in varied tourist consumption and new patterns of tourist behaviour. Such information on tourist behavioural pattern can give more insightful and useful information concerning how tourists behave based on their consumption at different heritage destinations.

The study of tourist behaviour is a complex phenomenon that involves a variety of influential factors. Therefore, further studies should investigate other factors, such as motivational factors, to better understand tourist behaviour, especially in urban heritage destinations. Further research on tourist behaviour should also apply both qualitative and quantitative methods. This study has shown that both non-spatial and spatial data are quantifiable and can be measured. Interviews can be done with the tourist respondents to get a more in-depth understanding of their behaviour after gathering the spatial information. The data would be richer if variables related to emotion, motivation and affective values towards the destination were added. Such findings could provide a huge advantage and contribute immensely to how tourists behave and consume cities. Additionally, the qualitative method of inquiry will provide richer and more nuanced insights into tourist behaviours, especially in the Malaysian context.

## References

Ab Aziz, K. and Siang, T.G. (2014), "Virtual reality and augmented reality combination as a holistic application for heritage preservation in the UNESCO world heritage site of Melaka", *International Journal of Social Science and Humanity*, Vol. 4 No. 5, p. 333.

Abdul Ghani, N., Shimizu, T. and Mokhtar, S. (2015), "Assessment of pedestrian facilities in Melaka world heritage site, Malaysia using P-Index method", *Journal of the Eastern Asia Society for Transportation Studies*, Vol. 11, pp. 1535-1554.

Alazaizeh, M.M., Hallo, J.C., Backman, S.J., Norman, W.C. and Vogel, M.A. (2016), "Value orientations and heritage tourism management at Petra archaeological park, Jordan", *Tourism Management*, Vol. 57, pp. 149-158.

Alegre, J. and Cladera, M. (2012), "Tourist characteristics that influence shopping participation and expenditures", *International Journal of Culture, Tourism and Hospitality Research*, Vol. 6 No. 3

Allan, J.R., Venter, O., Maxwell, S., Bertzky, B., Jones, K., Shi, Y. and Watson, J.E. (2017), "Recent increases in human pressure and Forest loss threaten many natural world heritage sites", *Biological Conservation*, Vol. 206, pp. 47-55.

Amir, S., Mohamed Osman, M., Bachok, S. and Ibrahim, M. (2014), "Understanding tourists' profile and preference of tourists' destination choice: a case study in Melaka world heritage city", *Planning Malaysia*, Vol. 12 No. 3, pp. 81-94.

Amir, S., Osman, M.M., Bachok, S. and Ibrahim, M. (2015), "Sustaining local community economy through tourism: Melaka UNESCO world heritage city", *Procedia Environmental Sciences*, Vol. 28, pp. 443-452.

Ashworth, G.J. and Page, S.J. (2011), "Urban tourism research: recent progress and current paradoxes", *Tourism Management*, Vol. 32 No. 1, pp. 1-15.

Aziz, K.A. and Siang, T.G. (2014), "Virtual reality and augmented reality combination as a holistic application for heritage preservation in the UNESCO world heritage site of Melaka", *International Journal of Social Science and Humanity*, Vol. 4 No. 5, pp. 333-338.

Bauder, M. and Freytag, T. (2015), "Visitor mobility in the city and the effects of travel preparation", *Tourism Geographies*, Vol. 17 No. 5, pp. 682-700.

Buhalis, D. (2000), "Marketing the competitive destination of the future", *Tourism Management*, Vol. 21 No. 1, pp. 97-116.

Buning, R.J. and Gibson, H.J. (2016), "The role of travel conditions in cycling tourism: implications for destination and event management", *Journal of Sport & Tourism*, Vol. 20 Nos 3/4, pp. 175-193.

Choibamroong, T. (2006), "Knowledge of tourists' behaviour: a key success factor for managers in tourism business", *International Journal of Tourism Research*, Vol. 1, pp. 1-8.

Conservation Management Plan (2011), Conservation Management Plan and Special Area Plan 2011, Historic Cities of the Straits of Melaka: Government of Malaysia, Melaka and George Town.

De Cantis, S., Ferrante, M., Kahani, A. and Shoval, N. (2016), "Cruise passengers' behaviour at the destination: investigation using GPS technology", *Tourism Management*, Vol. 52, pp. 133-150.

Dejbakhsh, S., Arrowsmith, C. and Jackson, M. (2011), "Cultural influence on spatial behaviour", *Tourism Geographies*, Vol. 13 No. 1, pp. 91-111.

den Hoed, W. and Russo, A.P. (2017), "Professional travellers and tourist practices", *Annals of Tourism Research*, Vol. 63, pp. 60-72.

Edwards, D. and Griffin, T. (2013), "Understanding tourists' spatial behaviour: GPS tracking as an aid to sustainable destination management", *Journal of Sustainable Tourism*, Vol. 21 No. 4, pp. 580-595.

Ertan, T. and Egercioglu, Y. (2016), "The impact of UNESCO world heritage list on historic urban city centers and its place in urban regeneration: the case of Melaka, Malaysia and tire, Turkey", *Procedia - Social and Behavioral Sciences*, Vol. 216, pp. 591-602.

Fairhurst, A., Costello, C. and Fogle Holmes, A. (2007), "An examination of shopping behaviour of visitors to Tennessee according to tourist typologies", *Journal of Vacation Marketing*, Vol. 13 No. 4, pp. 311-320.

Garcia, N.R. and Corbett, J. (2018), "From archaeological site to world heritage site: the emergence of social management at monte Alban, Mexico", *Aspects of Management Planning for Cultural World Heritage Sites*, Springer, Cham, pp. 39-48.

Garcia-Hernandez, M., De La Calle-Vaquero, M. and Yubero, C. (2017), "Cultural heritage and urban tourism: historic city centres under pressure", *Sustainability*, Vol. 9 No. 8, p. 1346.

Glasgow, M.L., Rudra, C.B., Yoo, E.H., Demirbas, M., Merriman, J., Nayak, P. and Mu, L. (2016), "Using smartphones to collect time–activity data for long-term personal-level air pollution exposure assessment", *Journal of Exposure Science and Environmental Epidemiology*, Vol. 26 No. 4, pp. 356-364.

Gravari-Barbas, M., Robinson, M. and Bourdeau, L. (2016), "Tourism at world heritage sites: community ambivalence", in Bourdeau, L., Gravari-Barbas, M. and Robinson, M. (Eds), *World Heritage Sites and Tourism: Global and Local Relations*, Routledge, London, pp. 1-28.

Hallo, J.C., Beeco, J.A., Goetcheus, C., McGee, J., McGehee, N.G. and Norman, W.C. (2012), "GPS as a Method for assessing spatial and temporal use distributions of nature-based tourists", *Journal of Travel Research*, Vol. 51 No. 5, pp. 591-606.

Horner, S. and Swarbrooke, J. (2016), *Consumer Behaviour in Tourism*, 3rd ed., Routledge, London.

Hsiao, T.Y. and Chuang, C.M. (2016), "The cooperation model between tourism development and traditional culture: new perspectives on regional context", *Journal of Tourism and Cultural Change*, Vol. 14 No. 2, pp. 91-106.

Khairi, N.D., Ismail, H.N. and Jaafar, S.M.R.S. (2020), "Embracing tourist behaviour in managing Melaka WHS", *E&ES*, Vol. 447 No. 1, pp. 012035.

Kim, S. (2016), "World heritage site designation impacts on a historic village: a case study on residents' perceptions of Hahoe village (Korea)", *Sustainability*, Vol. 8 No. 3, p. 258.

Krejcie, R.V. and Morgan, D.W. (1970), "Determining sample size for research activities", *Educational and Psychological Measurement*, Vol. 30 No. 3, pp. 607-610.

Kuusik, A., Tiru, M., Ahas, R. and Varblane, U. (2011), "Innovation in destination marketing", *Baltic Journal of Management*, Vol. 6 No. 3, pp. 378-399.

Lehto, X.Y., Fu, X., Li, H. and Zhou, L. (2017), "Vacation benefits and activities: understanding Chinese family travelers", *Journal of Hospitality & Tourism Research*, Vol. 41 No. 3, pp. 301-328.

Lehto, X.Y., Cai, L.A., O'Leary, J.T. and Huan, T.C. (2004), "Tourist shopping preferences and expenditure behaviours: the case of the Taiwanese outbound market", *Journal of Vacation Marketing*, Vol. 10 No. 4, pp. 320-332.

Leung, X.Y., Wu, B., Xie, F., Xie, Z. and Bai, B. (2016), "Overseas tourist movement patterns in Beijing: the impact of the Olympic games", *Travel and Tourism Research Association (TTRA)*, 20-22 June 2010, San Antonio, TX, pp. 1-7.

Lew, A. and McKercher, B. (2006), "Modelling tourist movements: a local destination analysis", *Annals of Tourism Research*, Vol. 33 No. 2, pp. 403-423.

Li, Y., Xiao, L., Ye, Y., Xu, W. and Law, A. (2016), "Understanding tourist space at a historic site through space syntax analysis: the case of Gulangyu, China", *Tourism Management*, Vol. 52, pp. 30-43.

Liu, B., Huang, S.S. and Fu, H. (2017), "An application of network analysis on tourist attractions: the case of Xinjiang, China", *Tourism Management*, Vol. 58, pp. 132-141.

Lu, J., Hung, K., Wang, L., Schuett, M.A. and Hu, L. (2016), "Do perceptions of time affect Outbound-Travel motivations and intention? An investigation among Chinese seniors", *Tourism Management*, Vol. 53, pp. 1-12.

Luberichs, J. and Wachowiak, H. (2010), "Geographic information System-Supported segmentation study of visitors to Majorca island", in Joseph, S.C. (Ed.), *Advances in Hospitality and Leisure*, Vol. 6, Emerald Group Publishing Limited, pp. 135-166.

McKercher, B. and Lau, G. (2008), "Movement patterns of tourists within a destination", *Tourism Geographies*, Vol. 10 No. 3, pp. 355-374.

McKercher, B., Shoval, N., Ng, E. and Birenboim, A. (2012), "First and repeat visitor behaviour: GPS tracking and GIS analysis in Hong Kong", *Tourism Geographies*, Vol. 14 No. 1, pp. 147-161.

Md Khairi, N.D., Ismail, H.N. and Syed Jaafar, S.M.R. (2019), "Tourist behaviour through consumption in Melaka world heritage Site", *Current Issues in Tourism*, Vol. 22 No. 5, pp. 582-600.

Moscardo, G., Faulkner, B. and Laws, E. (2001), "Cultural and heritage tourism: the great debates", in Moscardo, G., Faulkner, B. and Laws, E. (Eds), *Tourism in the Twenty-First Century: Reflections on Experience*, Continuum, London, pp. 3-17.

Musa, S.H., Sauti, N.S., Nasir, F.M., Abdullah, N.A. and Ahmad, Y. (2020), "The development of GIS-Based digital archive for heritage building in Melaka world heritage site (UNESCO), Malaysia", *International Journal of Engineering Advanced Research*, Vol. 1 No. 3, pp. 1-16.

Nicolau, J.L., Zach, F.J. and Tussyadiah, I.P. (2018), "Effects of distance and first-time visitation on tourists' length of stay", *Journal of Hospitality & Tourism Research*, Vol. 42 No. 7, pp. 1023-1038.

Noguti, V., Singh, S. and Waller, D.S. (2019), "Gender differences in motivations to use social networking sites", *Gender Economics: Breakthroughs in Research and Practice*, IGI Global, pp. 676-691.

Nur, H., Hairul, N.I. and Zainab, K. (2019), "Mapping the sensory values in the core zone area of Melaka world heritage Site", *Tourism, Leisure and Global Change*, Vol. 5, pp. 10-18.

Rahman, J.I., Ismail, H.N. and Wai, C.L. (2011), "Inquiry into tourists' movement flow pattern in the Melaka world heritage site: a space syntactic analysis", *Proceedings in the 11th International Congress of Asian Planning Schools Association*, pp. 1475-1485.

Rasoolimanesh, S.M., Jaafar, M., Ahmad, A.G. and Barghi, R. (2017), "Community Participation in World Heritage Site Conservation and Tourism Development", *Tourism Management*, Vol. 58, pp. 142-153.

Raun, J., Ahas, R. and Tiru, M. (2016), "Measuring tourism destinations using mobile tracking data", *Tourism Management*, Vol. 57, pp. 202-212.

Shamsuddin, S., Sulaiman, A.B. and Amat, R.C. (2012), "Urban landscape factors that influenced the character of George Town, Penang UNESCO World Heritage Site", *Procedia-Social and Behavioural Sciences*, Vol. 50, pp. 238-253.

Shoval, N. and Ahas, R. (2016), "The use of tracking technologies in tourism research: the first decade", *Tourism Geographies*, Vol. 18 No. 5, pp. 587-606.

Shoval, N., McKercher, B., Ng, E. and Birenboim, A. (2011), "Hotel location and tourist activity in cities", *Annals of Tourism Research*, Vol. 38 No. 4, pp. 1594-1612.

Silva, R., Breda, Z., Brandao, F. and Costa, R. (2020), "An analysis of the shopping behaviour of international tourists: the case of Porto", *Advances in Tourism, Technology and Smart Systems*, Springer, Singapore, pp. 641-654.

Su, Y.W. and Lin, H.L. (2014), "Analysis of international tourist arrivals worldwide: the role of world heritage sites", *Tourism Management*, Vol. 40, pp. 46-58.

Swanson, K.K. and Horridge, P.E. (2006), "Travel motivations as souvenir purchase indicators", *Tourism Management*, Vol. 27 No. 4, pp. 671-683.

Teo, C.B.C., Khan, N.R.M. and Rahim, F.H.A. (2014), "Understanding cultural heritage visitor behaviour: the case of Melaka as world heritage city", *Procedia – Social and Behavioral Sciences*, Vol. 130, pp. 1-10.

Timothy, D.J. (2011), *Cultural Heritage and Tourism: An Introduction*, Channel View Books, Bristol.

Timothy, D.J. (Ed.) (2017), *Managing Heritage and Cultural Tourism Resources: Critical Essays*, Routledge, London, Vol. 1.

Tourism Malaysia (2013), *Malaysia's 2014 Tourist Arrivals Grow 6.7%*, Ministry of Tourism, Malaysia.

UNESCO (2016), "UNESCO sustainable tourism toolkit", available at: http://whc.unesco.org/sustainabletourismtoolkit/guide (accessed 7 March 2016).

Vu, H.Q., Li, G., Law, R. and Ye, B.H. (2015), "Exploring the travel behaviours of inbound tourists to Hong Kong using geotagged photos", *Tourism Management*, Vol. 46, pp. 222-232.

Wilkins, H. (2011), "Souvenirs: what and why we buy", *Journal of Travel Research*, Vol. 50 No. 3, pp. 239-247.

Xia, J.C., Evans, F.H., Spilsbury, K., Ciesielski, V., Arrowsmith, C. and Wright, G. (2010), "Market segments based on the dominant movement patterns of tourists", *Tourism Management*, Vol. 31 No. 4, pp. 464-469.

Yang, E.C.L., Lee, J.S.H. and Khoo-Lattimore, C. (2018), "Asian cultures and contemporary tourism: locating Asia, cultural differences and trends", *Asian Cultures and Contemporary Tourism*, Springer, Singapore, pp. 1-17.

Zheng, W., Huang, X. and Li, Y. (2017), "Understanding the tourist mobility using GPS: where is the next place?", *Tourism Management*, Vol. 59, pp. 267-280.

Zhu, X., Sun, T., Yuan, H., Hu, Z. and Miao, J. (2019), "Exploring group movement pattern through cellular data: a case study of tourists in Hainan", *ISPRS International Journal of Geo-Information*, Vol. 8 No. 2, p. 74.

## Further reading

Rasoolimanesh, S.M. and Jaafar, M. (2017), "Sustainable tourism development and residents' perceptions in world heritage site destinations", *Asia Pacific Journal of Tourism Research*, Vol. 22 No. 1, pp. 34-48.

## About the authors

Dr Nurul Diyana Md Khairi is a Senior Lecturer at the Department of Urban and Regional Planning, Faculty of Built Environment and Surveying, Universiti Teknologi Malaysia. She received her Doctor of Philosophy in Urban and Regional Planning from Universiti Teknologi Malaysia (UTM). Her research interest areas contain tourist behaviour, tourism planning, world heritage site and urban tourism. Nurul Diyana Md Khairi is the corresponding author and can be contacted at: deannahery@gmail.com

Dr Hairul Nizam Ismail is currently an Associate Professor and the Head of Department (Urban and Regional Planning) in the Faculty of Built Environment, UTM. He is also a Registered Town Planner under Board of Town Planners Malaysia (LPBM) and Corporate Member of Malaysian Institute of Planners (MIP) since 2012. He has Bachelor of Urban &

Regional Planning and MSc in Tourism Planning from Universiti Teknologi Malaysia and a PhD in Tourism from the University of Strathclyde, Scotland. Hairul's main research interests are in the fields of urban tourism, urban planning and tourism in developing countries. His academic interests address the issue of tourism planning and urban planning and expanding to the area such as tourism image, tourist behavior, volunteerism, tourism entrepreneurship and trangenerational business in tourism as well as have published on themes relating to this area.

Dr Syed Muhammad Rafy Syed Jaafar is a Senior Lecturer at the Department of Urban and Regional Planning, Faculty of Built Environment, Universiti Teknologi Malaysia. He studied tourism planning and urban image and awarded a PhD in Urban and Regional Planning from Universiti Teknologi Malaysia. He has interest and passionate with aspects of urban tourism which primarily focussing on destination image, movement pattern and tourist behaviour.