

PATTERN OF WAYFINDING AND SPATIAL COGNITION FOR EFFECTIVE  
SPATIAL PLANNING OF THEME PARK

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requirements for the award of the degree of  
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To my late father, Arwah Haji Hashim bin Hj. Abu Bakar,  
beloved mum, parents and husband

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## **ABSTRACT**

Theme parks have emerged as a major tourist attraction in Asia. Their design and layout are often sophisticated and thus constitute a challenge to the way visitors navigate in unfamiliar surroundings. Developing a theme park identity is essential for successful wayfinding and for creating space for a more legible and user-friendly experience. In recent years, wayfinding has become an issue on how visitors find their way around the theme park. However, only a few studies have explored visitor behaviour related to wayfinding and the choice of activities that visitors prefer most. This research investigates visitors wayfinding behaviour in a theme park by determining the pattern of movement to improve the physical environment. The study was conducted at the Universal Studios in Singapore. The researcher used a questionnaire survey to elicit data from 229 theme park visitors. The study investigated visitors' perceptions on the design layout, facilities and choices of attractions. In addition, a behavioural observation was conducted to complement the questionnaire. The data were analysed using the Rasch Model analysis. The findings reveal that intentions, attitudes, and motivation were mostly identified through the environment and behavioural responses. It was also discovered that the ability of visitors wayfinding can be grouped into three types: adaptability, visual connectivity and flexibility. Both from environment responses and behavioural responses of visitors merged to improve the flow of visitors. This indicates that spatial and individual factors affect familiarity with the environment. Therefore, in wayfinding behaviour, visitors tend to look for a strategic preference in facing the difficulties they encounter with the activities in each zone, base on individual cognitive performance. This study contributes to theme park management, space design and policy making in tourism and recreational industry to improve the theme park experience for visitors.

## ABSTRAK

Taman tema telah muncul sebagai salah satu daya tarikan pelancongan utama di Asia. Reka bentuk dan susun atur taman tema ini selalunya canggih, justeru menjadi cabaran kepada pengunjung mencari tuju di kawasan yang tidak dikenal pasti persekitarannya. Membangunkan identiti taman tema adalah penting untuk panduan mencari arah tuju dengan berkesan bagi mewujudkan ruang untuk pengalaman yang mesra pengguna. Kebelakangan ini, panduan mencari arah tuju telah menjadi satu isu untuk cara pengunjung mencari arah jalan mereka di dalam taman tema. Bagaimanapun, tidak banyak kajian dilakukan ke atas tingkah laku pengunjung yang berkaitan dengan perancangan ruang arah tuju dan pilihan aktiviti yang disukai pengunjung. Kajian ini mengkaji perilaku pengunjung mencari arah tuju di taman tema dengan menentukan corak pergerakan bagi mempertingkatkan persekitaran fizikal taman tersebut. Kajian ini dijalankan di Universal Studios yang terletak di Singapura. Penyelidik menggunakan soal selidik bagi mendapatkan data daripada 229 pengunjung taman tema tersebut. Kajian ini termasuk persepsi pengunjung terhadap reka bentuk, kemudahan, dan pilihan tarikan permainan. Selain itu, pemerhatian terhadap tingkah laku dijalankan bagi melengkapkan soal selidik. Data kajian dianalisis menggunakan analisis Rasch Model dan mendapati bahawa tujuan, sikap dan motivasi adalah aspek paling penting yang telah dikenal pasti melalui tindak balas persekitaran dan tingkah laku pengunjung. Penemuan kajian menunjukkan bahawa kebolehan pengunjung mencari arah tuju boleh dibahagikan kepada tiga jenis: penyesuaian, sambungan visual dan fleksibiliti. Tindak balas persekitaran dan tingkah laku pengunjung boleh digabungkan untuk meningkatkan aliran pengunjung, yang mana faktor ruang dan individu memberi kesan kepada penyesuaian persekitaran. Oleh itu, tingkah laku pengunjung dalam mencari arah tuju, cenderung kepada mencari strategi dalam menghadapi kesukaran yang di temui dengan aktiviti-aktiviti di setiap zon, berdasarkan prestasi kognitif individu. Kajian ini menyumbang kepada pengurusan taman tema, rekabentuk ruang dan pembuatan polisi dalam industri pelancongan dan rekreasi sekaligus mempertingkatkan pengalaman di taman tema bagi pengunjung.

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## **LIST OF ABBREVIATIONS**

USS	-	Universal Studios Singapore
PIDM	-	Person Items Distribution Map

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

Places of attractions are crucial to boosting the tourism industry. They are the elements that will motivate tourists to visit several destinations in the location. Most tourists have their own intentions when they choose a holiday destination and they base that choice on what destination will give them full satisfaction by offering a relaxing and enjoyable time. Most important are the memories that they will capture or share with others. With the rapid development of the tourism industry, places like hotels, zoos, museums, retail shopping, and theme parks are now being extended vigorously. Such entertainments lead to increased tourism, which is expected to expand the economic growth on an annual basis (Eindhoven and Rem, 2000). Theme parks are designed to provide leisure and entertainment that offer the visitor unique experiences and emotions. Furthermore, they have become places that combine entertainment, food and beverage services, and retail shops (Ho and John, 2009). Because of the recent increase in the number of new theme parks, there is competition between developers, as can be seen in the addition of new play zones. According to Gina (2010), currently, the number of visitors has increased, and they are clear in choosing which theme park they prefer the most. Therefore, planning the park and selecting the theme are the most crucial stages in designing the theme park. At this stage of the design, it is important to incorporate the routes that will allow visitors to move easily from one place to another. With this, they are free to reach their favourite play zones without having to follow the map hierarchy; they can use short cuts to access different zones and reach the same spot.

The routes access system is designed to allow visitors to move freely. It helps visitors to find the best route and engage in the activities of their favourite zone. However, getting lost or confused is common for first time visitors. Reorientation will depend on the wayfinding strategy they use and will require them to take time to orientate themselves and locate the correct path. Once they are familiar with the surroundings and can find their way to the exact location, the overall experience will be much more enjoyable and memorable. Thus, they depend on external information, known as knowledge of the world (Raubal, 2001). As Kober (2007) mentioned, wayfinding requires the processing of information in advance. The basic elements of navigation tools are the position of signs, and the use of brochures, maps, and other wayfinding aids which motivate visitors to reach their destinations as quickly as possible. Most wayfinding research has focused on the creation and development of theme parks and how visitors, especially if they are first time visitors, become disoriented and feel confused. In this case, a planning and route strategy is needed. However, less research has been conducted to determine the ability and efficiency of the navigation tools that influence visitors' wayfinding performance especially in theme parks, and so it is this element that will be discussed in this research.

Thus, the researcher chose Universal Studio Singapore (USS) as the case study to better understand how visitors' ability to move around the theme park is affected by the physical environment. This research focuses on the circular route, which identifies major routes within the play zones and allows visitors to find all the active zones without having to wait in long queues.

## **1.2 Research Background**

The theme park USS is located in Sentosa Island. It is significantly smaller than other Universal Studios in other countries. The detailed discussion of the background of USS will be given in Chapter Three. The main focus of the discussion here is that USS, like many other theme parks, focuses on how visitors utilize their main attractions, such as The Lost World, Ancient Egypt, and Sci-Fi City, and how they locate their favourite zones. However, there are also other attractions for different age groups, such as the Far Far Away, Madagascar, New York, and Hollywood zones, and the crowd's occupancy of each zones has a significant impact on visitors' wayfinding movements. Indeed, visitors' wayfinding performance depends on the environment as this can have a significant influence on their behaviour. Therefore, different types of visitors will act very differently when they engage with the activities on each play zone.

## **1.3 Research Problem**

In today's context and strong economic environment, increasing numbers of tourists are able and willing to spend their money on building up quality time and participating in leisure activities with the family (Pearce, 1988). Thus, theme parks are experiencing an increasing number of visitors, and especially during weekends and on public holidays, are packed with many types of visitors. Usually, visitors will wait for a long weekend when they have more time, or if they receive an extra wage bonus, they will spend the money by visiting a theme park. To encourage visitors to spend their money, a theme park should maintain the quality of the attractions regularly and update with new attractions.

Usually, visitors to theme parks orientate themselves by using maps to show them the right direction; this is known as 'survey knowledge'. As Wickens and Hollands (2000) stated, there are three kinds of knowledge that can be used during wayfinding: landmark knowledge, route knowledge, and survey knowledge. That is

why many first-time visitors face difficulties in keeping track of their current location and orientating themselves in the different environments (Siegel and White, 1975). Landmark knowledge is related to a particular location that sets a reference point which is easy to identify. As well as confirming the location of the destination, it can also be useful in connecting the routes. As Cornell et al. (1992) commented, route knowledge is the process of creating a sensory path linked to the landmark. Therefore, visitors spend time and effort in figuring out spatial information to add as survey knowledge and environmental information about their surroundings (Montello, 1998). They derive such information from the prominent landmarks; these can be architectural elements, such as buildings, sculptures, and signages. All the survey knowledge will be utilized in route planning (Belingard and Peruch, 2000). However, not all visitors are familiar with the outdoor environments, or sometimes, they do not want spend time looking at the details of the environment. Thus, moving around in USS has to be made more practical by assigning a pattern of movement and taking into account the characteristics of individual behaviour. Visitors' preference for different play zones is shown by their movements and defines the sequence of paths they take, moving from a major path to minor paths. USS offers many kinds of information that visitors can use as part of their route strategies. Indeed, visitors will use different kinds of strategies depending on their experiences during the wayfinding. This is related to visitors' emotions and their ability to determine their destinations (VanderKlipp, 2006). The theme park experience is intangible, and the outcomes can be seen after the visitors have experienced or participated in the activities.

Once visitors have experienced all the play zones, the good memories and the enjoyment that result from the visit will remain with them. Nowadays, visitors' expectations of the theme park are increasingly high. As a new theme park and the second largest in South East Asia, USS has developed very rapidly by creating several activities. Another strategy in what is an increasingly competitive market is to upgrade the activities offered by USS. For example, on 1 March 2013, USS opened another new attraction in the New York section, namely, Sesame Street Spaghetti Chase, a ride for children. However, with new attractions, theme parks become increasingly crowded during the holiday season. Therefore, some visitors

will find the wayfinding experience more difficult. This situation not only costs time and money but can affect their psychological experience of the theme park.

Within the general problem, this research focuses on two specific elements:

- i. USS needs a more rigorous analysis for understanding the visitor behaviour.
- ii. USS needs to improve in tracking the changes in the physical surroundings.

#### **1.4 Research Gap**

Several studies have shown that different kinds of strategies are used depending on visitors' experiences with their surroundings. These are related to the individual strategies visitors use when finding on their own way. Most of the research describes visitors revisiting attractions once, supported by survey strategies, they are familiar with the surrounding environment. Prestopnik et al. (2000) claimed that people having a sense of which direction they need to take may lead to better wayfinding. However, when an individual has little experience of an environment and becomes lost or disoriented, he or she cannot rely on survey strategies. Thus, seeking information from another media may be the best strategy to find their way leading to them developing a wayfinding movement pattern in the theme park, and this information can relate to emotional variables. However, when visitors' anxiety levels increase, navigation errors will affect their wayfinding abilities (Lawton and Kallai, 2002). Consequently, this research has been undertaken to explore first, how visitors extend their knowledge in finding their own way through the environmental variables, and second, how the experience affects their wayfinding cognitive performance.

## **1.5 Research Aim and Objectives**

The aim of this research is to study visitors' pattern of wayfinding behaviour and perception regarding the surrounding environments as a strategic approach to improve the wayfinding experience in theme parks. To achieve this aim, the following research objectives and research questions were formulated:

### **Objective 1:**

To examine how visitors' ability movement around a theme park is affected by the physical elements.

### **Question 1:**

How does the physical elements contribute to make wayfinding easy in USS?

### **Objective 2:**

To define the relationship between park legibility and visitors' spatial cognition on outdoor environments that affect visitors' wayfinding in theme park.

### **Question 2:**

How does the cognitive process influence decision making on the spatial settings and affect the wayfinding experience in theme park?

## **1.6 Scope of the Study**

Initial research shows that many amusement parks have been established in recent years. For example, Universal Studios in Japan is the largest in Asia and has been attracting visitors since 2001 while USS, the second largest theme park in Asia, was officially opened in 2011. This study provides information on and insights into what motivates people to visit USS and subsequently examines the differences in motivations across specific demographic variables (i.e. gender, age, and ethnicity).



This research also examines how visitors interact with their physical surroundings via the activities and their responses to wayfinding situations. When visitors have very diverse ideas regarding how they want to spend their time, they need to find their way around the park easily and quickly. Thus, it is important to see how the effective design can assist the visitor in navigating their way around the theme park.

## **1.7 Significance of Study**

USS is a significant theme park because it offers physical excitement for both children and adults. By understanding visitors' wayfinding abilities and defining their level of anxiety, this research will shape route system performance and show how to balance the number of visitors by having consistent and quality facilities and services throughout the play zones. Therefore, this research is necessary for the future planning and/or upgrading of theme parks. Thus, the management should focus on visitor satisfaction and find a way to keep the visitors in USS longer and thus increase daily revenues.

## **1.8 Structure of the Thesis**

The thesis consists of five chapters. The following sections give information about each chapter.

### **1.8.1 Chapter 1 - Introduction**

This chapter outlines the background and the main focus of this research. It provides an overview of the thesis and describes the background of the research. The second section briefly outlines the problem statement. The third section discusses the research objectives and the research questions regarding visitors' perception of USS. It offers the rationale and significance of the study and explains how visitors'

perceptions will lead to visitor satisfaction and loyalty. The final part of this chapter gives the overview of the structure and summary of each individual chapter.

### **1.8.2 Chapter 2 - Literature Review**

This chapter reviews the relevant literature and theories underpinning the fundamental concepts of the research gap. The literature review consists of two parts. The first part introduces the definition of the theme park and the process of the development of attractions until the present. The second part discusses wayfinding in the context of the history of theme parks and the behaviour and the level of familiarity that affect human cognition and perception.

### **1.8.3 Chapter 3 - Research Methodology**

Chapter 3 explains the methodology and describes the research design according to the mixed methods approach of using photographs, behavioural observation, and a survey questionnaire. The segmentation of the zones in USS with respect to visitors' movements is also described. This research examines the effectiveness of the previous design theory on how wayfinding in the theme park can be controlled by visitors through the character of different locations and based on their experience.

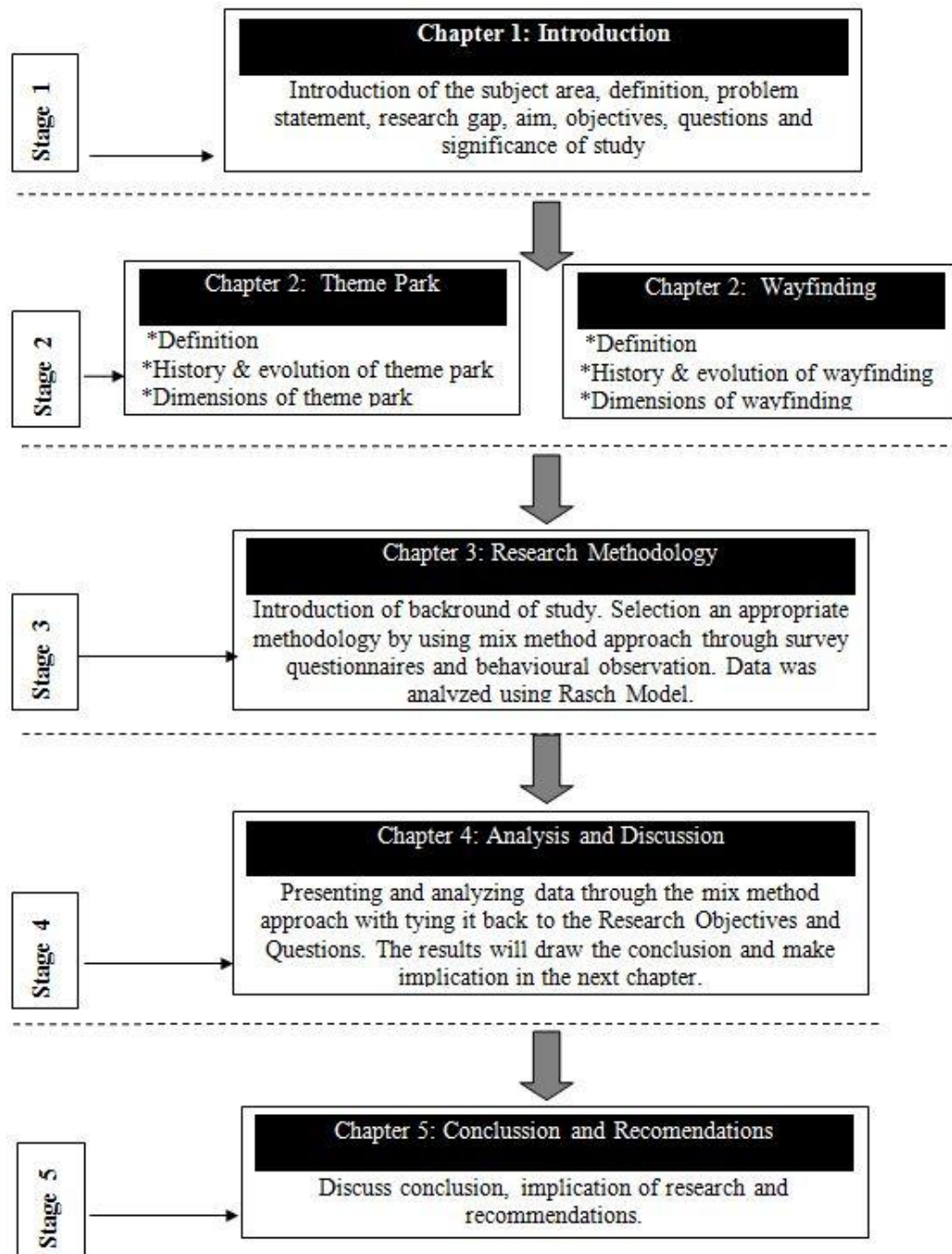
### **1.8.4 Chapter 4 - Analysis, Results and Discussion**

This chapter provides the analysis and discussions of the findings using Rasch Model software. The result from the analysis provides several interesting findings regarding visitor behaviour and activities.

### **1.8.5 Chapter 5 - Conclusion and Recommendations**

The last chapter of this research includes the conclusion and offers recommendations for future enhancements of wayfinding in theme parks. This research is conducted based on the framework shown in Figure 1.1.

## 1.9 Summary



**Figure 1.1:** Flow chart showing structure of the thesis

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