

# e-Proceeding

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# RECREATION FACILITIES MONITORING SYSTEM USING ENTITY RELATIONSHIP DIAGRAM (ER DIAGRAM)

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## Abstract

This paper emphasises on the process of database formation for recreational facility elements using the Entity Relationship Diagram (ER Diagram) method as related to the study area in Seri Iskandar. It is designed to assist the local authority, namely Majlis Daerah Perak Tengah, to collect and store the data of recreational facilities elements in order to facilitate local authority to update and monitor the elements of the area. The formation of the illustration of ER Diagrams in this study is using the concept introduced by Chen in 1976. It is an illustrative diagram that includes three main stages, namely identifying the type of data required, forming entities and attributes and identifying the relationship between the entities.

**Keywords:** *entity relationship diagram; database development; recreation facilities; monitoring system*

## 1.0 INTRODUCTION

As the population of Malaysia becomes more urbanized, and the workplaces become less associated with land, more people are seeking to be away from the hassle and bustle of the cities. Most will look for recreational facilities that will allow them to be near and in contact with nature. The reasons for people to go to these recreational facilities range from enjoying nature, fresh air, beautiful landscapes and sceneries, relaxing, engaging in physical exercise, socializing, outing with families and friends, and many more.

In Malaysia, the public is fortunate to be provided with many recreational facilities, and majority of these facilities are provided and administered by the local authorities. The local authorities play a major and imperative role in providing facilities and opportunities for public's recreation.

We aim to form an ERD by producing a monitoring system towards recreational facilities for local authorities. What is new is not the recreational facilities provision itself, which has been excellently planned but more towards a systematic system to monitor and evaluate post-implementation and at the same time becomes a database for the local authority. We identify three main stages in forming an ERD including identification of required data type, forming entities and attributes and identifying the relationship between the entities. These stages pave the way to the personalization of an ERD for recreation facilities monitoring system.

## 2.0 LITERATURE REVIEW

The public expects the recreational facilities they visit to be attractive, safe, well-maintained, value for money (in paid facilities) and comfortable while being physically and socially active. In short, all the reasons for them to keep coming back. According to Pigram and Jenkins (1999), people's recreation choice is governed by people's perception of what recreational opportunities are offering. To many people, their recreational opportunities arise

and locate within attractive and accessible recreation resources, which may be in the form of natural environment, recreational facilities or even theme parks.

Thus, it is vital for those responsible (namely the local authority) who are planning, managing and maintaining these recreational facilities to implement comprehensive management plans. In many places, many planners and managers of these recreational facilities adopt this approach, but they are faced with issues like lack of information planning (poor documentations of assets), increasing new assets rather than maintaining the existing facilities and the maintenance fund provided by the Council does not meet the needs and principles of asset management. Other aspects in term of community's expectation and standard of facilities provided have increased due the growth of population, and the Councils beliefs of standard type and qualities of facilities as of their neighboring towns, as well as the increasing requirements of corporate governance have impacted these management plans (Alexander, 2003 in Treby and Didcoe, 2004).

In ensuring the effectiveness and efficiency of planning, managing, and maintaining the recreational facilities, one of the key focuses that needs to be considered by the local authorities is the sound information and database system of the recreational assets. Most of the local authorities are still facing issues with their information and database system which may still be disintegrated, segregated or nonexistent at all. Sound inventories of the recreational facilities will allow the local authority to assess the current provision and condition, as well as creating a basis for improvement, future planning, and expansion of the assets (Leeman, 2016).

Compiling information or data available just by a click of the mouse provides new and interesting challenges for many managers and planners of these facilities and infrastructures. These challenges become more outstanding and prominent once public needs, safety and comfort are involved and at stake.

One of the ways to integrate all the information or database of the recreational facilities is by incorporating Geographic Information System in the inventory process. The data and information on recreational facilities collected will be stored and documented in many layers which is organized and easily updated. The basis for creating this new database system is embedded with the Entity Relationship Diagram (ERD) introduced by Chen in 1976.

As stated by Chen (1976), the ERD can be used as a basis for a unified view of a data. The ERD is used in database design and systems analysis to denote systems or problem domains (Song and Froehlich, 2000). In this diagram, data and information are represented by three main components, namely: entity, attributes and relationships.



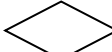
Entity is defined as an object which exists in the real world and can be distinguished from other objects (Watt and Eng, 2014). In addition, Song and Froehlich (1994) stated that entities refer to primary things of a problem domain which needs to be recorded.

A relationship type refers to an association or relationships between or among several entities, of which, the relationships need to be recalled by the database system (Song, Evans and Park, 1995).

Attributes, on the other hand, can be defined as properties of entities or relationships. Entities can be further distinguished by type of properties, namely, identifying attributes and descriptive attributes (Song and Froehlich, 2000).

The major entities and the inter-relationships that exist among these entities are visualized by symbols and connectors in ERD. Chen (2002) illustrated the notation for the basic components as shown below:

**Table 1: ERD symbols**

Components	Shape	Symbols
Entity	Rectangle	
Attributes	Circle	
Relationship	Diamond	

In designing the database, the person responsible should consider the following: the kind of information needed, the user of the information, the location of the information, and the type of data element needed in producing the information (Amran, Mohamed and Bahry, 2018).

According to Abhinav S Sidana (2013), ERD is an excellent method in the formation of a database because it uses diagrams presented in the form of graphical data and information. In addition, ERD is often used by various fields because it is an efficient way to interact with people at all levels. For more effective translation, the formation of a diagram representing each data needs to be more detailed and requires a thorough understanding. The benefits of using ERD are listed as follows:

- i. **Better Visual Representation**  
ERD helps the translation of a visual database that follows the flow of data and works in forming a more effective system.
- ii. **Effectiveness of Communication**  
By using ERD, the use of symbols for entities, attributes and relationships (refer to table 1) facilitates data delivery and data translation in the form of a system.
- iii. **Simple and easy to understand**  
ERD is also very easy to understand because it depends on the data needs of an organization. The organization will determine the appropriate data requirements before it is translated into diagrams.
- iv. **High flexibility**  
In addition, ERD also helps in finding links between one data to another data that is between one entity to another entity. This link is translated in the form of a relationship where although the data is different, the relationship between the data has a link so as to be able to form a complete database.

### 3.0 IMPLEMENTATION OF ER DIAGRAM: CREATING ENTITIES, ATTRIBUTES AND RELATIONSHIP

The focus of the formation of ERD is divided into three (3) main components introduced by Chen in 1976, namely the formation of entities, attribute and relationship which refers to the management, maintenance and monitoring of recreational facilities in the administrative area of the Majlis Daerah Perak Tengah (MDPT). So as a case study at MDPT, the entity will refer to the public recreation park and local authority as the second entity. As for the attributes for the public recreation park entity, it refers to Fort Collins City Council (2008) which uses the Level of Service Analysis (LOS) method in reviewing the Parks and Recreation Assessment and Implementation Plan in the City of Pueblo. A LOS has generally been defined in parks and recreation master plans as the capacity of the various components and facilities that make up the system to meet the public demands. The characteristics of LOS that need to be taken into account and will form attributes are quality, condition, location, comfort, convenience, and ambience (Fort Collins City Council, 2008). Apart from referring to LOS, there are four (4) other attributes that need to be considered namely the type of facilities, the name of the park and the responsible party for managing, monitoring and maintaining the park. The following are the attribute details for the entity of public recreation parks (refer to table 2):

**Table 2: Attribute for public recreation parks entity**

Attribute	Type of facilities	Types of facilities in public recreation parks that refer to the Recreational Park Planning Guidelines
	Quality	The quality of service that is being offered
	Condition	The condition of a park element also affects the amount of service it offers
	Location	All elements are placed geographically using GPS coordinates and GIS tools
	Comfort	Comfort improves the experience of using a component
	Convenience	Convenience allows people to use a component
	Ambience	This includes a sense of security and protection and a friendly atmosphere, great scenery and a sense of place
	Maintenance	The party responsible for the management, maintenance and monitoring of either the local authority or the contractor
	Responsibiliti	

es	
Name	The name of a public recreation park where every recreation park has a different name

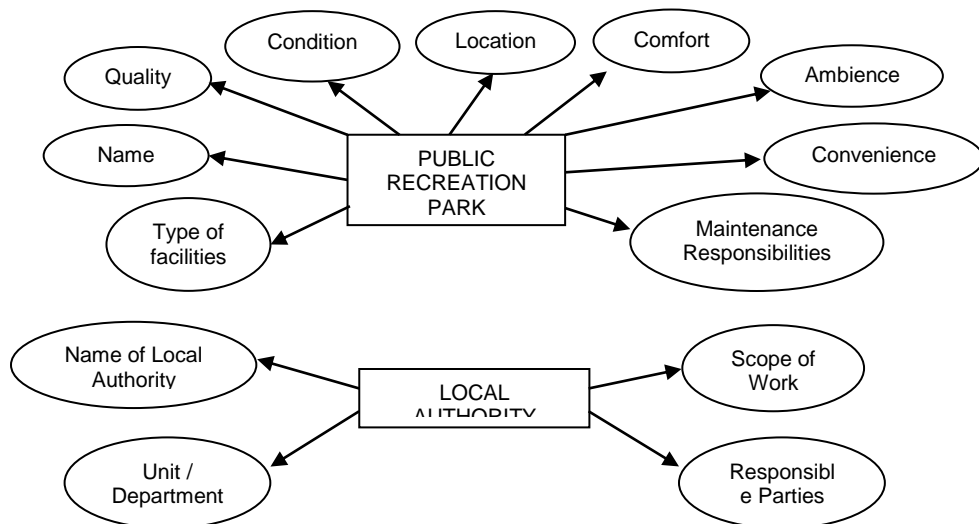
(Source: Fort Collins City Council, 2008)

Based on preliminary searching, the formation of attributes for local authority entities includes 4 items, namely, the name of local authority, unit or department, responsible parties and scope of work. The following are the attribute details for a local authority entity (refer to table 3):

**Table 3: Attribute for local authority entity**

Attribute	Name of Local Authority	Name of the local authority that manages the related park.
	Unit or Department	Units or departments under local authorities involved in the work of management, maintenance and monitoring facilities
	Responsible Parties	Parties involved in management, maintenance and monitoring work, either local authorities or contractors
	Scope of Work	Scope of work done by the party such as public cleaning, maintenance and others

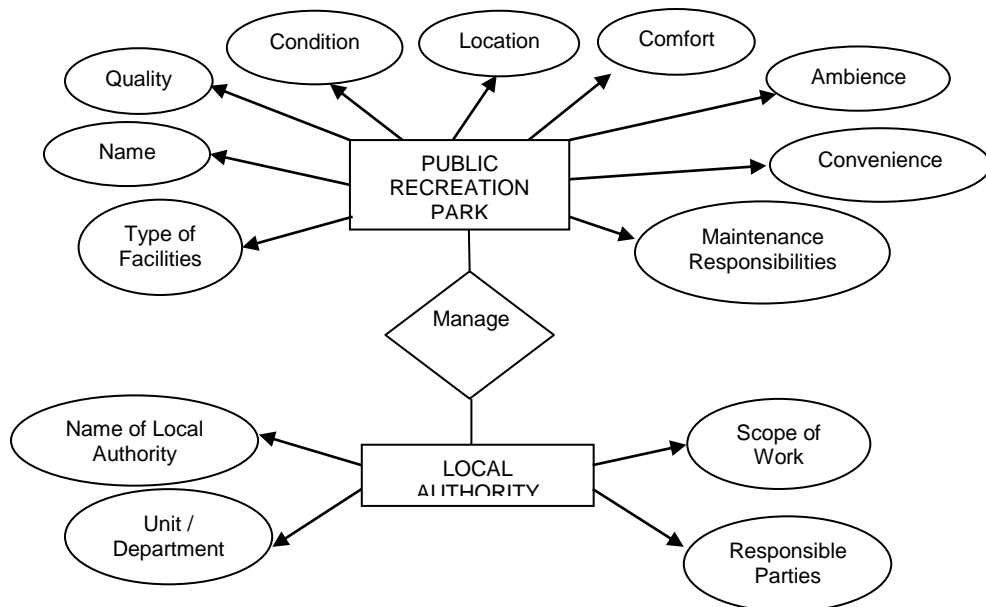
To translate entities and attributes, drawing in the form of diagrams will be easier, concise and can help data processing (Bagui and Earp, 2003). As stated in the literature review, ERD introduced by Chen has symbols that refer to entity, attribute and relationship (refer to Figure 1).



**Figure 1: Entities and attribute diagram**

The next step is to define a relationship between the two entities. Relationship refers to when one entity's attribute refers to another entity's attribute then a relationship exists between those two entities, e.g. (refers to figure 2).





**Figure 2: The 'PUBLIC RECREATION PARK' entity with a relationship to the 'LOCAL AUTHORITY' entity**

In figure 2, the relationship is portrayed as managerial. The meaning of this relationship is that of a verb that links two nouns (entities). All connections are two-way relationships. For example, in the Chen-like model, the relation is 'PUBLIC RECREATION PARK' is managed by 'LOCAL AUTHORITY' and 'LOCAL AUTHORITY' is managing 'PUBLIC RECREATION PARK'.

#### 4.0 CONCLUSION

The data base formed in this study only focuses on the ERD introduced by Chen where in fact many more notations have been introduced and have been widely used in various fields of work. The database in this study only formulates ERD in the scope of management, maintenance and monitoring of recreational facilities in local authorities which means that entities and attributes are limited according to the data needs of a local authority. To further strengthen the collection of data to form a database, local authorities need more detailed data and it will involve the formation of new entities and attributes and indirectly new relationships will be formed. In implementing ERD, local authorities need to take into account various aspects such as the appropriate GIS application to be used and the budget allocation of a local authority. This is because in Malaysia, GIS has many applications that can translate ERD to database system such as MapInfo, ArcGIS, GRASS, QGIS and other applications that have been used by various fields whether private or government sector. Next, local authorities will experience the issue of allocation in an effort to implement ERD for the scope of their work because not all local authorities in Malaysia have high allocation that can be invested for the purchase of GIS applications. Local authorities have the data on the management, maintenance and monitoring of recreational facilities, only they do not have a more systematic system such as ERD that can help them store the data better. Therefore, the use of ERD in the management, maintenance and monitoring of recreational facilities can help not only local authorities but various parties and other sectors in identifying problems, making decisions, planning, monitoring, managing and updating data related to recreational areas.

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Timbalan Ketua Pustakawan

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