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A GIS BASED DECISION SUPPORT SYSTEM FOR CAR PARKING LOCATION: KARBALA CITY CENTER AS A CASE STUDY

A Thesis Submitted to the Department of Civil Engineering, University of Karbala in Partial Fulfillment of the Requirements for the Degree of Master of Science in Infrastructure Engineering

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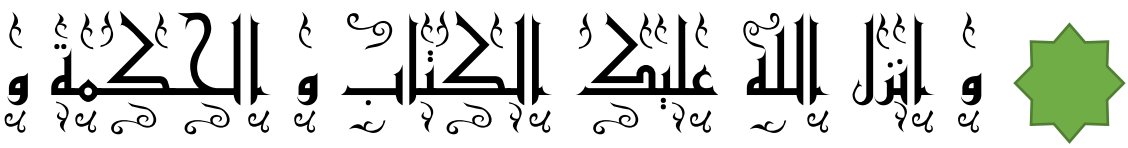
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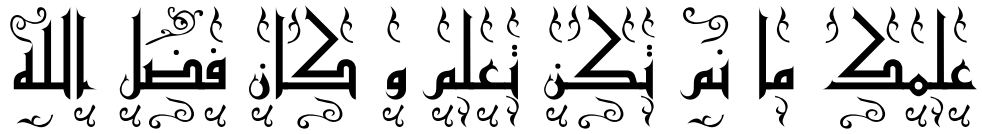
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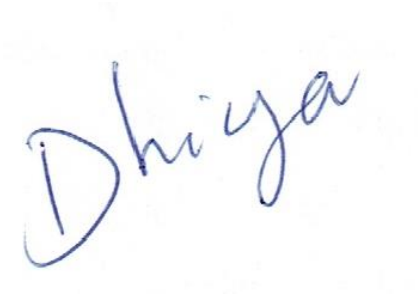
Signature: 

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ABSTRACT

Car parking is an important issue in Karbala Holy City (KHC) in overall and in the city center in particular. This problem has been expected with the predictable growth in the number of cars, buses, medium buses, and other modes of transportation. In the Holy Karbala City Center (HKCC), searching for a car parking currently at some locations is a real challenge due to the lack of available car parking slots. As well, the HKCC is crowded area with tourists and this leads to interaction in traffic, consequently high congestion is developed. Additionally, the numbers of car parking lots exiting in the HKCC are not enough to satisfy the demand in these areas. Also, Current car parking site do not apply basic standards for car parking.

This Thesis concentrates on above and gives attentions on: a survey prepared for all positions of center of the city (shrines, land use, and street). As a result, all information related to HKCC has been gained in order to identify the scale of the car parking problem. Then, weight of all criteria had been gotten from the AHP model, therefore, a technical modeling for site selection for best position of car parking was achieved using GIS program. The results indicate that the modeling of GIS will help in facilitations; the time saving, engineering efforts and the cost in searching for car parking site.

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ABBREVIATIONS/ACRONYMS

AHP	Analytical Hierarchical Process
ArcSIE	Soil Inference Engine
CBD	Center Business District
HKCC	Holy Karbala City Center
DEM	Digital Elevation Model
DSS	Decision Support System
ESRI	Environmental Systems Research Institute
GIS	Geographical Information System
KHC	Karbala Holy City
OWA	Ordered weighted averaging
MCDM	Multi-Criteria Decision Making

Chapter One

Introduction

Chapter 1

Introduction

1.1 Background

Through the years, the car parking systems and accompanying technologies have substantially increased and varied. Actually, when car discovered, the car parking built and developed. In any area where there is an important amount of traffic, subsequently, there are car parking schemes. In response to the need of storage space for vehicles, car parking systems were developed in the early of 20^{th} century.

Today, one of the most problems of the transportation system is congestion of vehicles. So, this vital problem could appear due to increase in number of vehicles searching for car parking in a specific area. Hesamianetal (2004) explained that the problem of increasing population density is related to the development of the city. Consequently, it led to creation of marginal neighborhood, poverty, and falling in level of living; as a result of high congestion and insufficient number of car parking. Bavndpoor and Rostami (2015) pointed out that the best option to this problem is seeking to the best location for car parking by using GIS program, but the erection of car parking costs a lot of efforts, money, and time. This solution depends on the criteria used to erect car parking.

Decision making is a vital issue to reach the optimum solution. However, geographers and spatial planners are absorbed in decision problems which are based on defined criteria such as accessibility, population density, land use, travel time. etc. Jankowski (1995)

demonstrated that the Multi-Criteria Decision Making (MCDM) used to give suitable compare between the criteria, whereas Raheleh Farzanmanesha (2010) used Multi-Criteria Decision Making (MCDM) for describing effective criteria for car parking selection by giving proper weight.

In this Thesis, examine this region to create car parking and defines the most important criteria that govern parking site was conducted. The selected study area is the center of the Holy City of Karbala, where tourists and visitors come mainly for religious tourist further to other activities. A survey and study of the area showed that the criteria that could govern this area are seven: distance from absorbing excursion space, population density, the relationship between demand and supply, the cost of land to be establish as car parking, travel time, accessibility to car parking, land use and activities for car parking requirement.

1.2 Aim of the study

The main aim of this study is to identify the best site selection for car parking in a holy tourist city by using the GIS to help in prioritizing areas as car parking sites. In this Thesis, the methodology has been developed based on GIS to assess the correct locations for car parking using AHP model. There is, already, a priority for the holy city of Karbala; because it is received a huge and enormous numbers of tourists which amounts to several millions in each holy religious event, these tourists often come from different regions and provinces inside Iraq, further to the visitors from outboard. Those visitors are directed, almost to the holy shrines which are located in the city center; however this

makes the city center one of the most densely populated areas worldwide. Thus, the need for parking sites is in high demand.

1.3 Methodology of work

To reach the planned aim, the following steps of methodology of work have been designed:

1. A detailed investigation has been conducted through the previous literatures to identify the current practices for car parking site selection, the most common criteria for site selection, and the current practice of GIS application in site selection.
2. Forms have been designed for the purpose of identifying the site selection criteria. Where different types of questionnaires were designed for current park employees, city guests, city property occupiers (commercial, residential, industrial, etc.), and Imam Al- Hussein and Imam Al- Abbas holy shrines staff. Additional questionnaires were formed for the establishment of land prices.
3. Additional data were collected from available database resources, as well as from the area of the study to complete the analysis and modeling of site selection using GIS. Such data like road geometries, the travel time for such road, population density, land use, the relation between demand and supply levels, accessibility to parking etc.
4. Weighting the criteria has been achieved by AHP model to facilitate the modeling.
5. Criteria have been used with aid of GIS tools to obtain the best site selection for car parking.

However, the scope of this research is related to find the best site for car parking within the normal days (not heavy visiting day events) for the city center of holy Karbala.

1.4 Thesis layout

This Thesis consists of five chapters as follows:

1. Chapter one includes a background about the definition of the problem of car parking site selection, the study question , aim and objectives , and Thesis layout
2. In the next chapter, review through current available literatures were presented in terms of the selection of parking site based on several criteria, the need for the establishment of these parking, the extent of the need to demand for these parking, current GIS application in site selection, and the GIS application in car parking.
3. In Chapter three and explanation for the methodology of the study, the data collection, analysis, and the use of GIS program to determine the best site for parking are demonstrated.
4. Chapter four reflects the implementation of methodology in the study area, and clarifies the procedures and chooses the best site for parking, and mathematical calculations and Equations used in this study.
5. The final chapter of this Thesis includes a brief summary of the main conclusions and recommendations. The usefulness of the results evaluated in terms of the new parking site.

1.5 Case study

Site selection procedure for car parking location was developed for the selected study area within Karbala city. Where, appropriated model for Karbala city will create, using appropriate criteria related to center of Karbala city. In this Thesis the study area is the HKCC; there are many reasons for taking this region. Firstly, Karbala is one of the most important islamic holy cities. Secondly, it is characterized by the historical value; urban and privacy of its existence within urban center is represented the center of the two shrines of Imam Hussein and Al-Abbas. The Husseinia and Abbasia shrines have been located in the center of the old historic center. HKCC and its environs was worthy of human settlements and for several periods of time before the construction of the shrines. The position of Karbala city in Iraq as shown in Fig. 1.1, and HKCC illustrates in Fig. 1.2. HKCC surrounded by Main Street: Maitham al-Tamar Street, Algmehaureh Street, Holi Street, and Bab Baghdad (see Fig. 1.3). As well as, this region represents one of the biggest tourist destinations in the world; visitors coming to this region worldwide to visit Husseinia and Abbasia shrines. So, for this motivation of huge number of people whom come to this area, creation of parking facilities in the optimal positions is very essential for traffic movement within the mentioned area. The data base required for the mentioned modeling is demonstrated in (Fig. 1.4); these data base contain layer of land use (commercial, residential, public...etc.), layer of transportation, and layer of exit car parking.

Figure 1-1 Map of Karbala city explain the position of center of Karbala

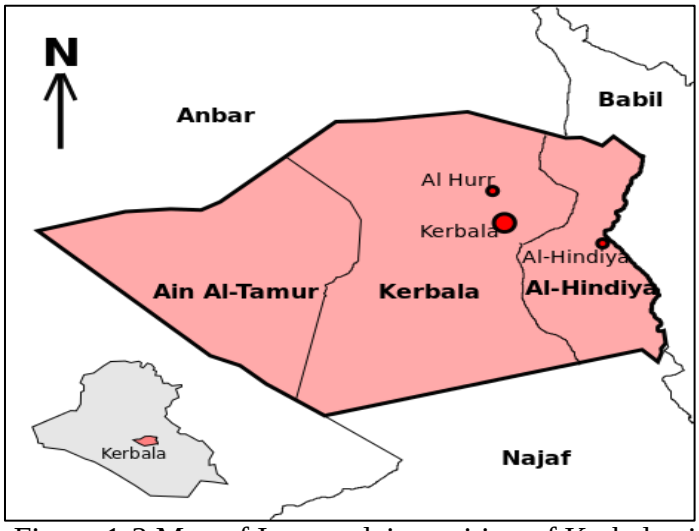

Figure 1-2 Map of Iraq explain position of Karbala city

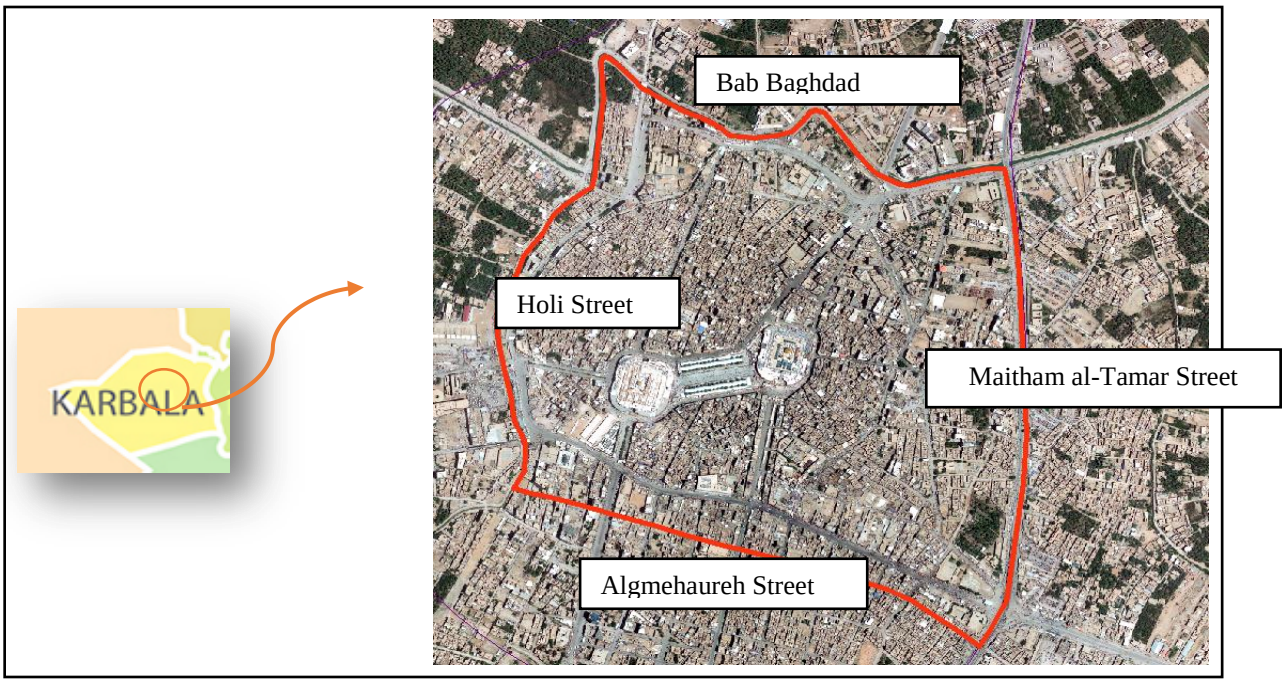

Figure 1-3 Map of center of Karbala city

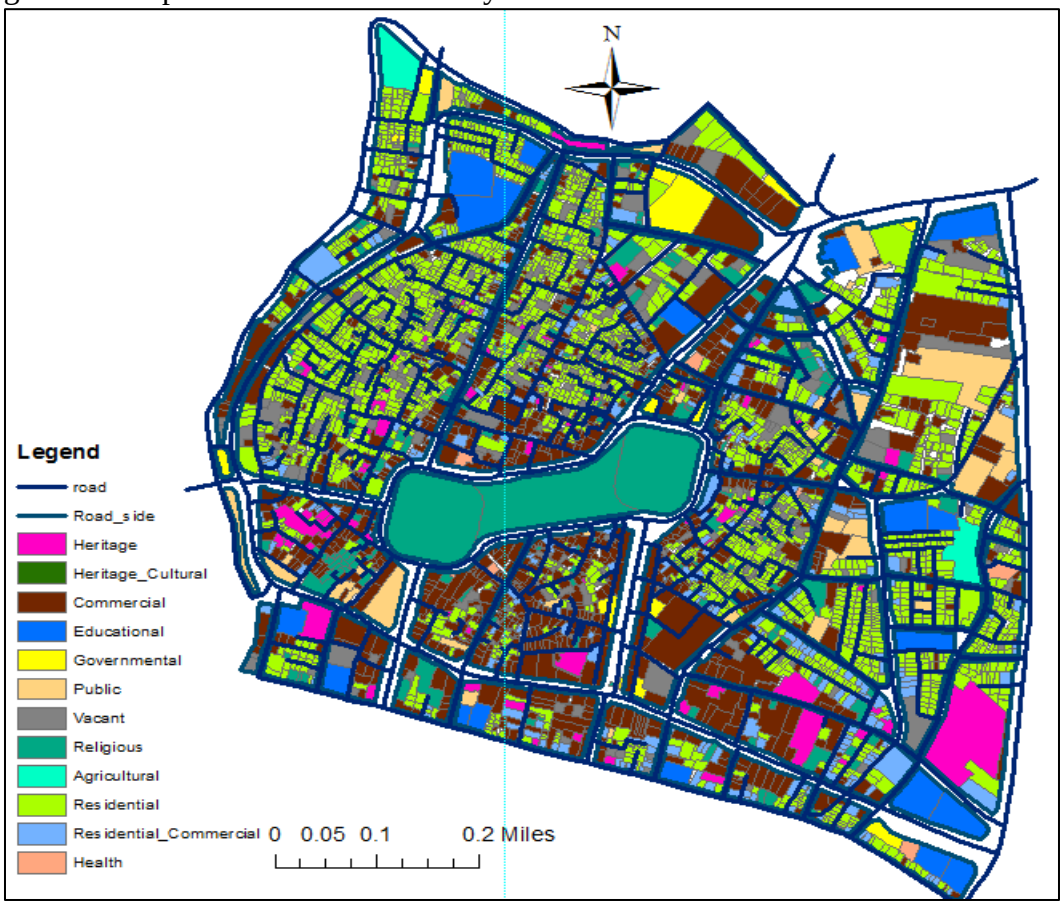

Figure 1-4 Data base of Karbala city

Chapter Two

Literature review

Chapter 2

Literature review

2.1 Parking demand

Now a days, there are several encouragements lead to increase the demand for transportations, which in their turn, lead to increase the number of vehicles and thus increase the demand for car parking (Boamah, 2013). However, many research works have contributed to draw clear picture on such circumstance; e.g. Raheleh Farzanmanesha (2010) demonstrated that the vehicles, pedestrian crossing, and streets in the urban transport system, represented the main elements in current transportation system and human beings. Whereas, the flaws in compatibilities among these elements are reflected as serious problems, which in their turn, result in complications and difficulties in people daily life. Thus, they recommended that one of the solutions to overcome the mentioned problem is by the selection of the correct site for car parking space in order to raise the car parking efficiency. As well as, Bavndpoor and Rostami (2015) suggested additional factors that caused the problem of car parking, such as, increasing the marginal neighborhoods, decreasing living standard, shortage of services, designating land use, and increasing land cost. Murad (2003) demonstrated that the center of city is an important region to erected car parking, because center of city linking the main network of transportation of city. These centers are tackling with many challenges, including fast growing of new commercial centers, thus all of these lead to increase the number of customers, and increase in transport demand,

which lead to increase car parking demand. Palevičius (2013) established on why the increased demand for car parking is due to the increase in number of private cars, as the present level of car ownership in Vilnius, as an example, up to 569 passenger cars for each 1,000 people, which is moderately higher than elsewhere in Europe cities, each 120 passenger cars for 1,000 people all the number of passenger car explained in Fig. 2.1 (Bin, 2016).

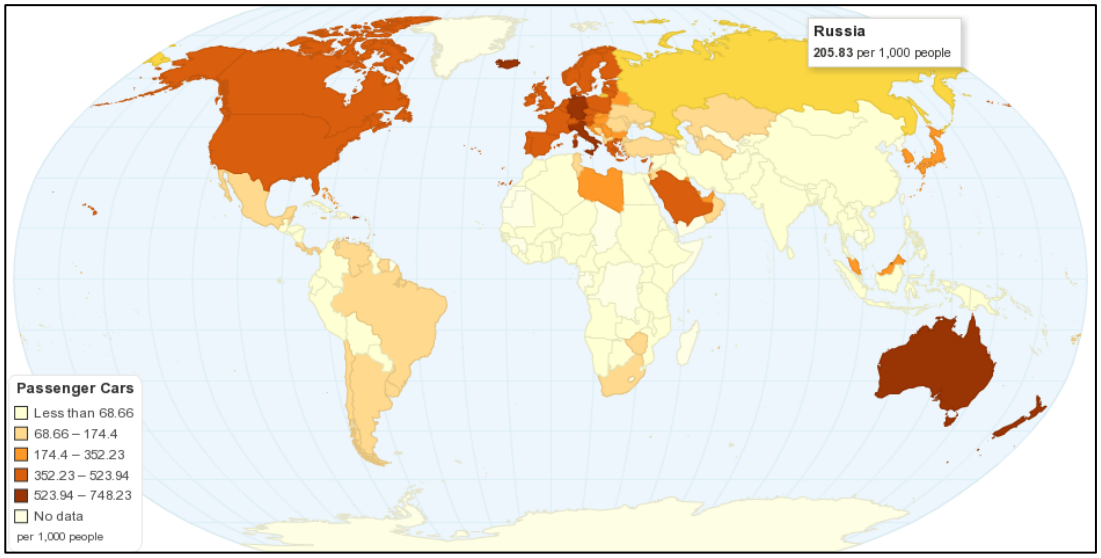

Figure 2-1 Worldwide passenger cars, per 1000 people (Bin, 2016)

Regidor (2010) demonstrated that The car parking area in the Philippines utilized various significant laws relating to the arrangement of off-road stopping for various sorts of improvements, and among these is the National Construction law of the Republic of the Philippines. The review recognized a few parameters for parking necessities for such improvements, for example, net floor territory, net saleable zone, floor zone proportion (thickness), stopping opening expense, and separation from the central business district (CBD). Client (2002) set up a guide

that delineated different in activity area identifying with improvements. This guide sets out the scope of stopping requests prone to happen at a disconnected site, perceiving the effect that it might have on transport approach and travel request. Stopping arrangement ought to be seen as the base alluring necessity, while Gatherings' Stopping Codes are thought to be least compulsory prerequisites, the stopping arrangements suggested are based, wherever conceivable, on physical qualities of the proposed improvement, especially the gross floor territory. The streets and power utilized 85th percentile level of interest in stopping request estimation.

2.2 Park location related factors: background

Extensive research and practical works have been done to specify the factors that influence the choice of car parking sites; below are the summary of the factors, which are determined by these works:

2.2.1 Distance from absorbing excursion space

Ghaziaskari (2005) demonstrated that the civil engineering and traffic experts indicated that the distance from absorbing excursion spaces and major streets is an important criterion. People prefer walking a small distance when move to businesses, restaurants, entertainment venues, and so on; that are scatter across broad areas.

People are no longer spending entire days and weekends adding unnecessary miles to their vehicles. Driving to distances traffic has identified allowable in Table 2.1, as suggested by Raheleh Farzanmanesha (2010). As an example, for the small cities of less than 250,000 inhabitants, walking distances are range between 200 to 320

meters in the case of situations where cars remain a long time (long-term positions), and range between 66 meters to 120 meters in the case of situations where cars remain for a time short (short-term) positions.

Aliniai (2015) explained a criterion related with car parking and walking distance. He suggested, at least 150 m to 300 m starting with managerial centers, 100–350 m starting with business and administration centers, Furthermore, 200-350 m starting with educational, recreational-cultural.

Table 2-1 Maximum walking distance from tourist absorbing centers, after Raheleh Farzanmanesha (2010)

Population	**Parking Type**	
	Short time	**Long time**
< 250000	66-120 m	200-320 m
> 250000	166-266	330-500

2.2.2 Population density

Qorbani (2012) explained that the increase in population density, rise in property of car, and change other factors that lead to increase congestion in traffic; making problems in the movement of passengers, so that the handling of passengers and transport, as the most significant urban development.

Raheleh Farzanmanesha(2010) gave vital weight to population, considering it the one of central criteria to identify the best selection for car parking. They recorded a significant variation in acceptable walking distance according to the population density, as can be seen in Table 2.2.

Table 22-2 Average of walking distances from tourist absorbing centers base on the population (Raheleh Farzanmanesha 2010).

Density / Activity	100000	100000-250000	250000-500000	>500000	Average
Trade centers	105	157	190	187	135
Official centers	137	167	223	217	160
Non-official centers	97	130	150	200	120

2.2.3 The relationship between demand and supply levels

To establish car parking, the quantity of demand must be taken in consideration to supply the suitable magnitude of car parking. The relation between the demand and supply must have the same value, or as much as near magnitude. Therefore, if the magnitude of demand is larger than magnitude of supply the car parking will become insufficient. While, if the supply number of car parking space is larger, so all the unused spaces are not needed, which achieve lost in construction cost of car parking. So, equilibrium must be achieved between demand and supply of car parking space. Stigler (1941) explained that there is an equilibrium point between the demand and supply, and there is a restriction point between production and consumption.

Litman (2012a) explained that the demand and supply for parking of a region are studied by the vehicle owner, trip rates, mode split, term (to what extent drivers stop), geographic location, the nature of travel options, sort of outing, and elements, for example, fuel and street

evaluating. With respect to whether demand impacts supply or the other way around in car parking arranging, issues of reasonable level headed discussions firmly identified with "demand investigated supply" versus "supply-initiated demand" in parking arranging. Amidst these open deliberations, which frames the reason for grounds and another city parking approach is the one certainty that, issues of interest and supply are firmly fixing to cost and benefits. When there is a request (generally decided through overflow stopping or long scan length for parking spaces by clients), an indistinguishable situation from on account of the previous will develop. Subsequently, regardless of the approach embraced, the assurance here should be on the expenses and benefits that should be expected in providing the parking spaces required.

In his argument of the "paradigm shift" in parking planning (as summarized in Table 2.3, Litman (2012b) conveyed to the fore that the new request of things identifies with the how issues are seen and arrangements assessed. In this way, while the old worldview concentrates on expanding supply and minimizing value, the new worldview considers an excessive amount of supply as unsafe as too little, and costs that too low as hurtful as those that are too high (in the same place). Along these lines, the new worldview in parking arranging tries to keep up the harmony amongst request and supply and in addition cost and benefits, to both user and suppliers.

Table 2-3 Old and new parking paradigms compared(Bavndpoor and Rostami, 2015)

Old Parking Paradigm	New Parking Paradigm
"Parking problem" means inadequate parking supply.	There can be many types of parking problems, including inadequate or excessive supply, too low or high prices, inadequate use information, and inefficient management.
Abundant parking supply is always desirable.	Too much supply is as harmful as too little.
Parking should generally be provided free, funded indirectly, through rents and taxes.	As much as possible, users should pay directly for parking facilities.
Parking should be available on a first come basis.	Parking should be regulated to favor higher priority uses and encourage efficiency.
Parking requirements should be applied rigidly, without exception or variation.	Parking requirements should reflect each particular situation, and should be applied flexibly.
Innovation faces a high burden of proof and should only be applied if proven and widely accepted.	Innovations should be encouraged, since even unsuccessful experiments often provide useful information.
Parking management is a last resort, to be applied only if increasing supply is infeasible.	Parking management programs should be widely applied to prevent parking problems.
"Transportation" means driving. Land use dispersion (sprawl) is acceptable or even desirable.	Driving is just one type of transport. Dispersed, automobile dependent land use patterns can be undesirable.

2.2.4 The cost of land to be established as a car parking

As the value of land to be set up as car parking is increased, the total cost of the creation of zones is affected. Lots car parking are erected when the cost of land is low, so if cost of land is medium, multistory parking erection is preferring, but if cost of land is high, underground car parking erection is preferring.

Donald (2015) introduced cost consideration into parking planning; started by asking, "How much cost for a parking space?" Actually, there is no easy answer for this question, easily because; the cost of land for a parking space is determined by its location. Before a specific site is used for surface car parking, it can be asked “How much the structure will cost if a multistory parking is decided to build, and how many such prospective additional stories will add extra parking spaces”. In this situation, the important question is" How much each parking space will cost?" To exemplify the calculation of cost per space extra, a 750-space parking structure was built on a site that required providing 200 surface spaces. While, the structure contains 750 spaces, so additional 550 spaces provided the parking spaces. The building cost was $10.5 million (in 1994). Consequently, each space added to the parking supply a cost of $19,000 ($10,500 divided by 550 spaces). So, the market value of land does not determine the cost/space which is added by the structure, and it can evocatively compare the cost/space which is added by parking structure that is built at different location and times. Table 2.4 shows the estimated cost per parking space added by each parking structure. While, Fig. (2.2) shows the cost per space added by each parking structure, and it reveals a striking pattern.

Table 2-4 The cost of parking space added by 12 parking structure built at the university of California Los Angeles 1961-1991(Donald, 2015)

Year built	Parking structure	Spaces in structure	Surface space lost	Spaces added by structure	Structure cost		Cost per space added	
					Original$	1994$	Original $	1994$
(1)	(2)	(3)	(4)	(5)=(3)-(4)	(6)	(7)	(8)=(6)/(5)	(9)=(7)/(5)
1961	5	765	219	546	$1,091,122	$6,966,550	$2,000	$12,770
1963	14	1,428	355	1,073	$1,754,488	$10,476,589	$1,626	$9,760
1964	3	1,168	213	955	$1,859,001	$10,740,676	$1,946	$11,246
1966	9	1,800	298	1,502	$3,489,706	$18,520,065	$2,323	$12,327
1967	8	2,839	666	2,173	$6,060,753	$30,517,584	$2,789	$14,045
1969	2	2,253	323	1,930	$5,610,206	$23,908,098	$2,907	$12,327
1977	CHS	921	319	602	$7,083,893	$14,871,473	$11,762	$24,693
1980	6	750	200	550	$6,326,135	$10,568,750	$11,499	$19,210
1983	4	448	0	448	$8,849,000	$11,769,409	$19,752	$26,271
1990	1	2,851	346	2,505	$52,243,000	$59,705,071	$20,859	$23,839
1990	RC	144	53	91	$2,040,000	$2,331,381	$22,350	$25,542
1991	SV	716	0	716	$14,945,000	$16,715,805	$20,873	$23,346
Total		16,083	2,992	13,091	$111,343,30	$217,091,45		
Average 1961-1991		1,340	249	1,091	$9,279,000	$18,091,000	$8,500	$16,600
Average 1961-1969		1,709	346	1,363	$3,309,000	$16,855,000	$2,400	$12,400
Average 1977-1991		972	153	819	$15,248,000	$19,327,000	$18,600	$23,600

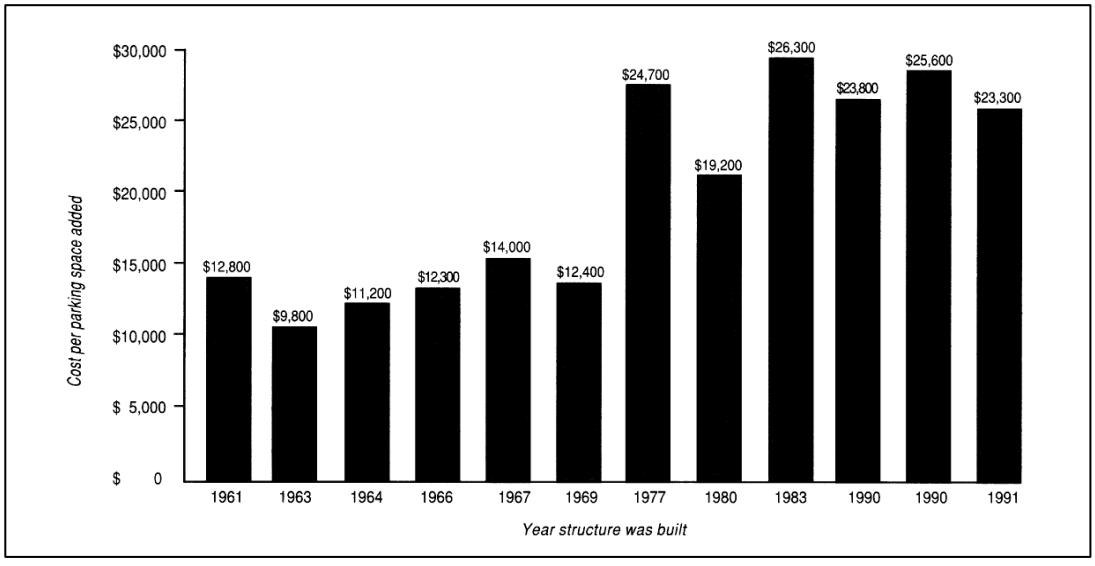

Figure 2-2The cost per parking space added by parking structure at the University of California, Los Angeles(1994)(Donald, 2015)

2.2.5 Travel time

Main influence factors of the vehicle in the process of entering in the car parking lot, is time of crossing , is defined; as the cross through the waiting time to enter in the parking, travel time, download time and upload time. Arnott and Rowse (1999) Demonstrated that auto travel time is more mind boggling. There are two segments of auto travel time: time spent in the auto, and time spent strolling from the car parking area to the goal and back once more. The time spent in the auto can thusly be disintegrated into time invested cruising for car parking and energy spent in "normal" auto travel. Since blockage created by cruising for parking is a critical part of the parking issue. As it is the strolling time when driving, it is essential to model auto go with care. Two rearranging suppositions are made, both of which should be casual in more reasonable models. The first is that autos go at a steady speed, autonomous of the thickness of autos inconsistent movement and cruising for parking; that is, there is no travel congestion. The second is that auto speed is the same whether in normal activity or cruising for parking.

2.2.6 Accessibility to parking

Bruinsma (1990) explained that the accessibility is frequently observed as a requirement for economic development, where it permits the conversation of people (labor) and goods (products), and hence an efficient function of the economy. Hugh Matthews (2002) demonstrated that the access and mobility are important dimensions of excellence of life.

Roess (2011) explained that accessibility is allude to the capacity which pick up section to a specific site or range; openness is the main consideration in the estimation of land. At the point when numerous explorers from numerous potential causes can be gotten to a land, it is more alluring for improvement and, in this way, more significant. Along these lines, the nearness of land to major thruways and open transportation offices is a central point for deciding its esteem. Accessibility requires the capacity to make an exchange from the transportation framework to the specific land allocate which the wanted action is occurring. Accessibility, along these lines, depends vigorously on exchange offices, which incorporate parking for vehicles, open travel stops, and stacking zones. Local Street organizes large accessibility. With the exception of restricted get to offices, which serve just through vehicles (mobility), most different classes of interstate serve both capacities to some degree. Get to moves (e.g., parking and un parking vehicle, vehicles entering and leaving off-road parking by means of carports, transports halting to get or release travelers, trucks ceased to stack as well as empty merchandise), be that as it may, impede the advance of through activity. Fast through movement, interestingly, tends to make such get to capacities more unsafe.

Roess (2011) the openness capacity is the arrangement of offices that permit, for instance, trucks to be stacked and emptied with negligible disturbance to through activity and the accessibility of individuals to a given site. "Accessibility" alludes to the immediate association with adjoining grounds and land utilizes gave by roadways. This accessibility comes as control parking, driveway access to off-road

parking, transport stops, taxi stands, stacking zones, carport access to stacking ranges, and comparative components. The get to work permits a driver or traveler (or merchandise) to leave the vehicle to enter the specific land use being referred to. For land to be beneficially used, it must be accessible. Albeit open transportation can be a noteworthy piece of giving openness in thick urban zones, generally, accessibility relies upon the supply, comfort, and cost of parking offices. The real movement focuses, from local shopping centers to games offices or to air terminals, depend on huge parking supply to give site accessibility. Without such supply, these offices couldn't work productively over a considerable time frame. As a component of state and district primary highway frameworks, they serve a basic mobility function. Extensive quantities of street clients depend on these highways for general treks of critical length. Plan benchmarks for this sort of two-path expressway mostly mirror their utilization in serving higher request streams. Higher outline speeds mirror the essential versatility benefit gave.

Roess (2011) the primary function of such highways is to accommodate fundamental all-climate access to remote or scantily created zones. Since such highways are not utilized by extensive quantities of individuals or vehicles, their plan speeds and related geometric components are regularly not a noteworthy concern.

In view of the expansive differing qualities of utilization on these interstates, the 2000 version of the Highway Capacity Manual (HCM 2010) created two particular classes of rustic two-path, two-way roadways. Class I; these are interstates on which drivers hope to go at moderately high speeds, including real intercity courses, essential

arterial, and day by day worker courses. Class II; these are interstates on which drivers don't really hope to go at high speeds, including access courses, beautiful and recreational course is that are not essential arterials, and courses through rough territory. Class I two-path highways serve fundamentally mobility needs, though Class II two-path highways serve basically get to needs. Indeed, even this arrangement does not totally depict the differences in the "look and feel" of such highways. Courses through tough territory are named Class II, basically in light of the fact that as far as possible the geometry of the roadway, compelling low-speed operation and giving few or no passing open doors. All things considered, some of these streets must serve portability needs where the request is adequate.

Handy (1997) explain that four parts of significance in measuring accessibility: transportation, land-use, individual and temporal. The transportation part portrays the transport system communicated as the disutility for an individual to cover the separation between a starting point and a goal utilizing a particular transport mode. The land-use segment comprises of the conveyance of different sorts of land-uses over space, as characterized regarding amount (residential and employment density) and quality (level of employment, the importance of services or housing values, such as major hospitals or cultural institutions and educational). The fleeting segment mirrors the worldly imperatives, for example, the accessibility of chances at various times of the day, and the time accessible for people to partake in specific exercises (e.g. work, instruction, and amusement). The individual segment mirrors the requirements, capacities, and chances of people.

The degree to which these parts are caught contrasts between accessibility measures.

2.2.7 Land use and activities for parking requirements

To determining the number of space in car parking, so it needs to know the number of car for each land use. For example the number of car parking for commercial land use differs from the residential land use. Al-Sahili (2016) with referenced to the 4^{th} edition of the Institute of Transportation Engineers (ITE) parking generate manual, found sixty nine land use classifications. However this manual depends on the collect data from 1978. Another researcher, Washington (2010) demonstrated that parking generation produced different levels of statistics ranging from weak to strong. For example, when using the all floor area with parking demand it gives high coefficient of determination; however, when using number of employees it gives small coefficient of determination. So that lead to the homogeneous data which give low coefficient and data more details for type of land use give more reliable relationship. Information needed in each land use different, for example the residential land uses is expressed in term of dwelling units, vehicles, persons, and area as independent variable; office land use in terms of area and employees. Douglass (2011) demonstrated a comparison among New Zealand, Australia, UK, and USA information on trip and parking related to land uses.

Roess (2011) explained that the parking generation relates the most extreme watched number of possessed parking spots to one hidden variable that is utilized as a surrogate for the size or movement level of the land utilize included. Early reviews revealed in parking standards set

up favored and option factors for setting up parking era rates. These factors are recorded in Table 2-5 which is a summary of parking generation rates and relationships.

Table 2-5 Parking generation rate and relationship(Roess, 2011)

Land use	Avg Rate	per	Equation	R^2	No. of studies
Residential-low/Mid Rise Apartment(Wkdy)	1.20	Dwelling Unit	$P = 1.43X - 46.0$	0.93	19
Residential-High-Rise Apartment(Wkdy)	1.37	Dwelling Unit	$P = 1.04X + 130.0$	0.85	7
Residential-Condominium/ Townhouse(Wkdy)	1.46	Dwelling Unit	$P = 96.8LnX - 272$	0.90	32
Hotel(Wkdy)	0.91	Room	$P = 1.13X - 60$	0.75	14
Motel(Wkdy)	0.90	Room	$P = 1.03X - 24$	0.76	5
Restore Hotel(Wkdy)	1.42	Room	N/A	N/A	3
Industrial-Light(Wkdy)	0.75	1,000 sq. ft. GFA	$P = 0.61X + 6$	0.81	7
Industry-Warehousing(Wkdy)	0.41	1,000 sq. ft. GFA	$P = 0.76X + 26$	0.66	8
Medical-Urban Hospital(Wkdy)	1.47	Bed	N/A	N/A	23
Medical-Clinic(Wkdy)	4.33	1,000 sq. ft. GFA	$P = 4.24X + 1$	0.99	6
Office-Office Building (Wkdy)	2.84	1,000 sq. ft. GFA	$P = 2.51X + 27$	0.91	173
Shopping-Shopping Center(Sat-December)	4.74	1,000 sq. ft. GFA	$P = 4.59X + 140$	0.84	82
Restaurant-Quality Restaurant(Sat)	17.20	1,000 sq. ft. GFA	N/A	N/A	7
Restaurant-Urban Family Restaurant	10.1	1,000 sq. ft. GFA	N/A	N/A	21
Recreation-Movie Theater(Sat)	0.26	Seat	$P = 0.60X + 542$	0.65	6
Recreation-Health/Fitness Club(Wkdy)	5.19	1,000 sq. ft. GFA	$P = 3.62X + 27$	0.61	20
Religion-Church or Synagogue(Sat/Sun)	7.81	1,000 sq. ft. GFA	N/A	N/A	11

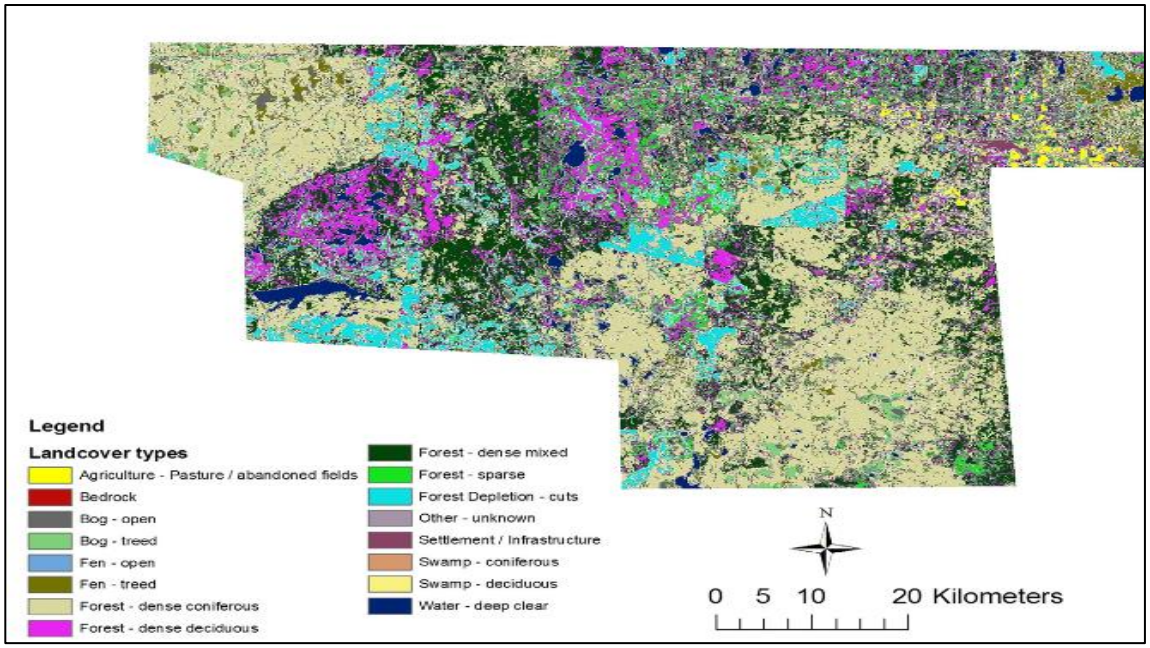

Figure 2-3 The different landcover classes in the study area (Akumu et al., 2015)

2.3 Methods for choosing the best site selection by GIS

The methods used in the selection process of the best location using geographic information systems vary according to the criteria that wished to intend to, and the methods used to input these standards. A review for part of this method demonstrated below:

2.3.1 Soil texture Modeling

The modeling of soil surface was performed in perspective of the soil environment exhibit in ArcSIE. Whereas, biological variables including land cover, rise, incline, surface rhythmic movement, smooth multi-way witness list, method for testimony (material sort) and slope position classification were picked in light of their association with soil surface(Akumu et al., 2015). The land cover map (Fig. 2.3) presents a series of land cover types in the study area of Clay Belt and Horne Payne region in Ontario, Canada as a case study.

It was subsisted to speak to the review territory, resampled to 10-m determination symbolism and utilized as a part of the modeling. A Lidar (Light Detection and Ranging-is a remote sensing method used to examine the surface of the Earth) determined 10-m DEM (Digital Elevation Model) was utilized for the rise and to produce slant for the review territory. The DEM was inferred by extricating plausible ground returns (ground filter) and making a 1-m surface from the beginning by addition. The forecast of soil surface was performed in view of these ecological factors utilizing a case-based thinking approach (worldwide) in ArcSIE. This included the utilization of 1094 spatial focuses (cases) of soil surface Fig. 2.5 that were reviewed via prepared field staffs contracted.

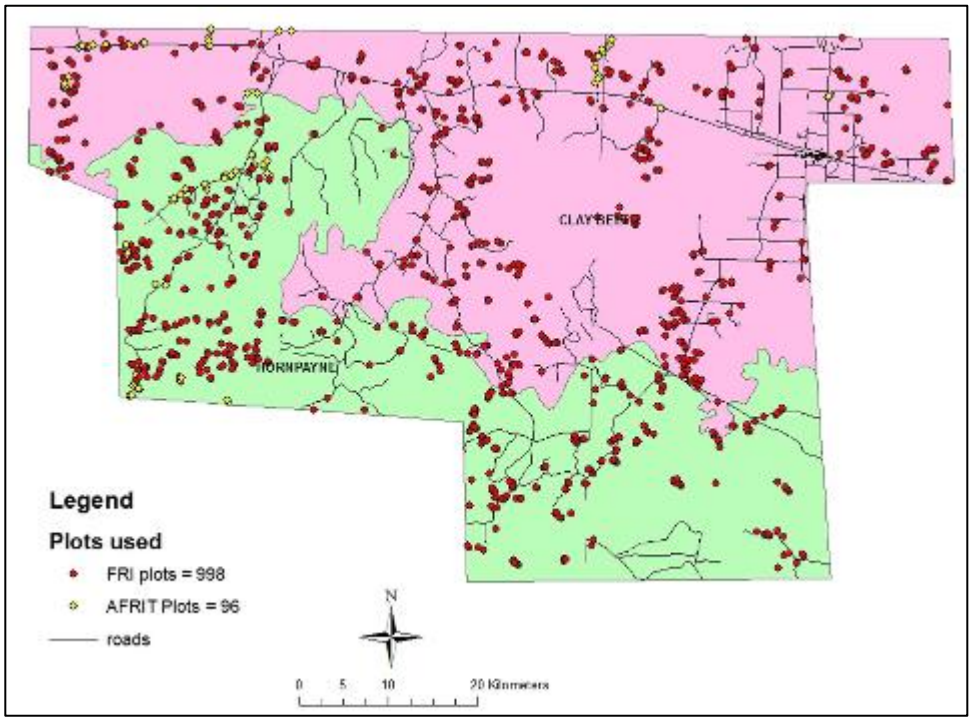

Figure 2-4 Spatial points (cases) used in the modeling of soil texture.

2.3.2 Parking site selection modeling

They will be utilized as a part of the review ranges, Parameters, and sub-parameters in parking site selection and distinguished weighting criteria. Farzanmanesha et al.(2010) demonstrated the Analytical Hierarchical Process (AHP) method, in spite of the previous technique in which faultfinders suppositions were entered as an outright number to the weighting methodology. In this approach, pundit feelings are entered to the weighting methodology as a number base, which communicates a non-certainty to the faultfinder sentiments completely. This number base is entered to the weighting methodology, which is known as Byte and 0-255, which comprises of the result of models of the second and third level. Table 2.6 demonstrates the standard of separation to the road by fluffy technique. The Ordered Weighted Averaging (OWA) administrator, Which was at first presented by Yager RR (1988), has pulled in much enthusiasm among specialist. From that point forward a few utilization of the OWA administrators are accounted for in various territories, for example, basic leadership, master frameworks, neural systems, cooperative choice making and fluffy frameworks and control. More utilization of OWA is as of late reported in numerous criteria basic leadership and inclination positioning. The all-inclusive statement of OWA is identified with its capacity to execute diverse mix administrators by selecting suitable request weights. By indicating reasonable request weights, it is conceivable to change the type of conglomeration from the base sort blend weighted straight mix, to the most extreme sort mix. This review concentrates on the OWA strategy and IDRISI Andes in parking site determination.

Table 2-6 Standard of distance to street by fuzzy method (Raheleh Farzanmanesha 2010)

Distance	0	120	200	320	800
Fuzzy Logic	1	0.678	0.153	0.082	0.001

Remove from retaining journey spaces is the most critical and effective element. The presence layer in sub-classes is coordinated by together and related guide to primary classes are readied. At this stage, the parking site selection guide was separated into seven classes and the outcomes from this strategy are appeared in Fig. 2.5.

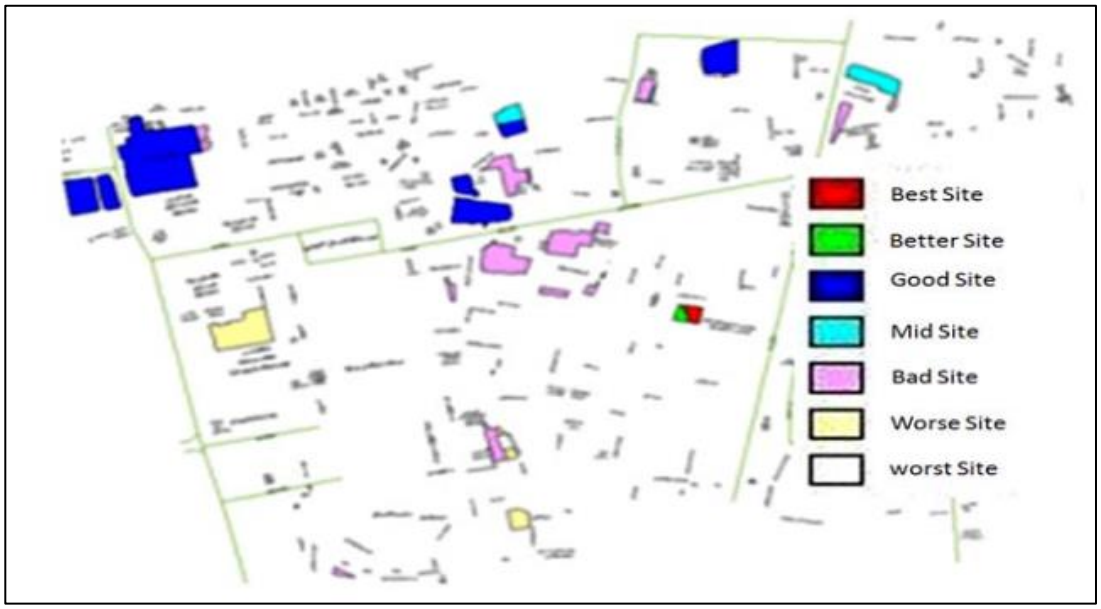

Figure 2-5 The best suitable parking site selection by OWA method, Risk averse and MCE a\min (Raheleh Farzanmanesha 2010)

2.3.3 Locate Urban Parking Model

Using Analytical Hierarchy Process (AHP), the importance of GIS in urban arrangement, urban growth has gone so far that failure to apply the kind of death is defined (Turner, 1997) . The system, with the basic model appropriate for the analysis of land, and with estimate and

determine their site in urban planning, request and vital, and the city is reflected. A vital way to classify and locate a user, and consider their compatibility and incompatibility, unsuitable analysis of their location, GIS has the capability (Abbasi Kalakani, 2011). The role of geographic information systems (GIS), the application of a logical model (step by step) decision to allocate land, more useful selection and the best place to evaluate the appropriate options, and the choice of consistent results (Jankowski, 1995). The ultimate goal of geographic information systems, if support for decision-making.

GIS capabilities in spatial decision support, decision-making procedure is analyzed in three Main stages: Knowledge, design and selection (Malchfsky, 2006). One method of measuring and weighting, Analytical Hierarchy Process, and today is one of the methods are good for weight, is calculated to solve complex multi-criteria difficulties. This powerful and flexible tool for evaluating the quality and quantity issues in some measures, the main character is based on pairwise comparisons (Ngai, 2005). Analytical Hierarchy Process to identify and prioritize the elements of decision-making begins. This includes: the goals, values or specifications and options is possible, the priorities are used. To determine the level of importance (weight) of the following criteria and benchmarks, we will compare them equally. Relationship process had been balanced, the importance and preference or likelihood to compare two elements relative to the component level.

In this way the elements are paired comparison and paired comparison matrix is formed, then use the relative weight of the matrix

elements is achieved. The judgment of options, quantitative scale 9, as given in the following Table (2.7).

Table 2-7 Number of comparison between two criteria.

Description	**importance**
Giving maximum importance	9
Giving too much importance maximum	8
The importance of a very high value	7
The importance of a high or very high	6
A high value	5
Moderate to high importance	4
Average importance	3
A value equal to the average	2
Two factors with a value equal	1

Chapter Three

Research Approach and Methodology

Chapter 3

Research Approach and Methodology

3.1 Introduction

This chapter comprises an overview of a full procedure for the design of the Thesis; collection of information, as well as their method of analysis and creates a model in the GIS that facilitating the optimum parking location. This procedure is well-ordered as a set of steps to touch the main aim of this study.

As stated formerly, the final production of this study was to explain the best position for car parking in the center of Karbala-holy-city. The methodology here was to use the GIS program for site selection of parking depending on the criteria that related to position of parking, as well as extrapolate the procedure of investigation about the criteria such as travel time, population density, etc. For each of these criteria, questionnaire was designed to collect all related information to the criteria, after that GIS was used to generate the parking model for sit selection. Fig. 3.1 established to hypothesize the processer for collection and analyzing data. First, the collection of the data helps to know the criteria that related to the car parking situation, the next step is the analysis of the collected data, and the last step is to create a model in GIS program to facilitate the best site selection.

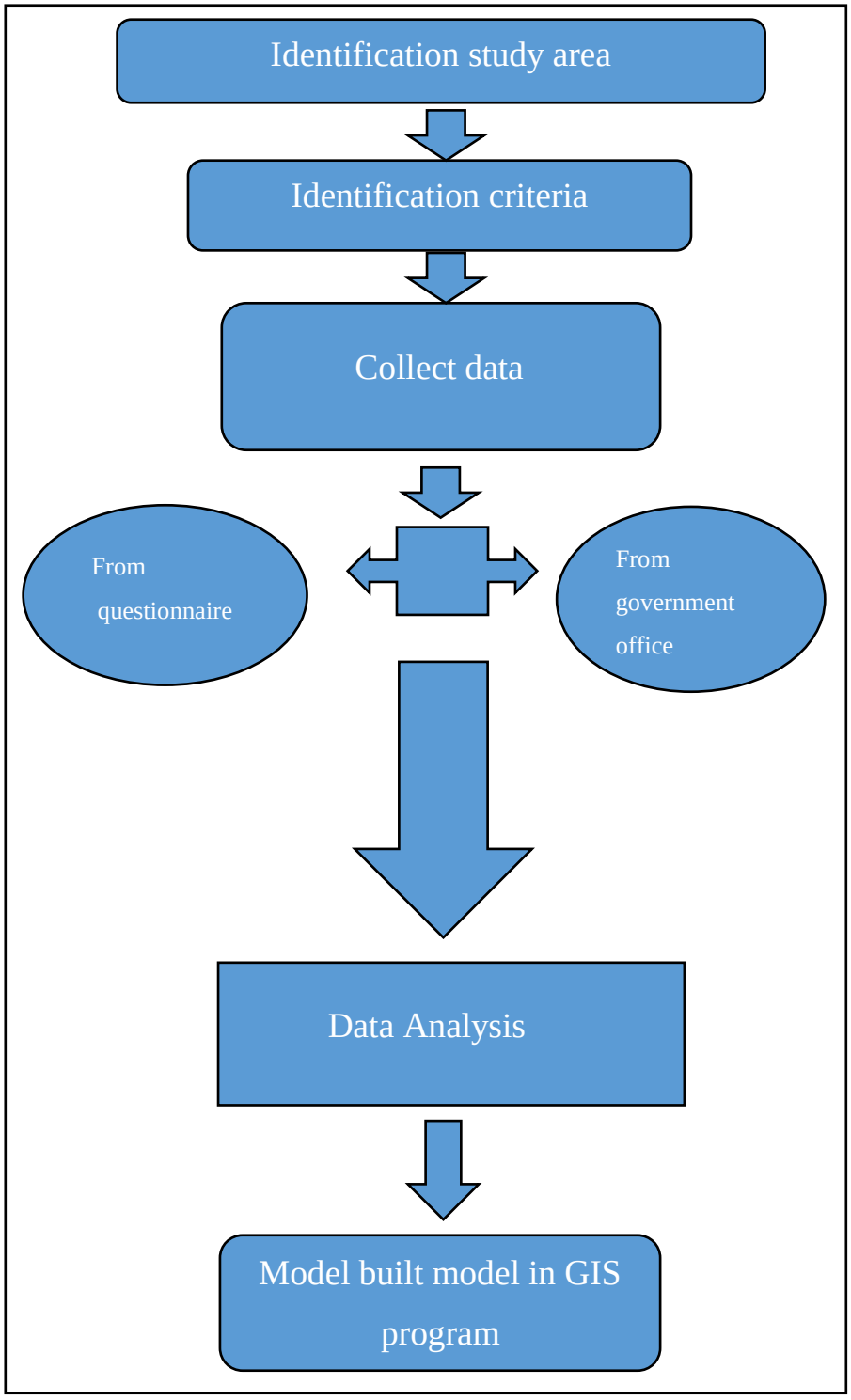

Figure 3-1 Methodology of dessertation

3.2 Identification criteria

After the information had been collected from governmental office, then, expert had been asked besides previous studies about criteria of car parking, consequently, seven criteria related to the HKCC were determined; namely, distance from absorbing excursion space, population density, the relationship between demand and supply, and the cost of land to be establish as parking, travel time, accessibility to car parking, land use and activities for parking requirement. Each criterion identified with more details in chapter 2.

3.3 Identification of target area

As required in Fig. 3.1, the target area was identified. However, the target area normally specified according to the following parameters:

- Man-made boundary, such as Main Street, walls, building, etc.
- Natural boundary such as river, wide green zone.
- Land use, such as CBD, industrial, residential, governmental, etc.

Accordingly, these parameters will be taken into account when identify the target area for this research work.

3.4 Data collection and processing

After explaining the target area in the methodology diagram (Fig. 3.1) which represents the major steps of the system developed, firstly, it is necessary to collect data that needed to know the information about Karbala city; in other words, the information related to criteria that needed to insert in GIS program. Secondly, some calculation, processing and analysis to data collection must be achieved. Elbir (2004) explained that the GIS is used as the main element of the system for capturing,

storing, checking and manipulating data that are spatially referenced. The ArcView GIS application advanced by ESRI (Environmental Systems Research Institute) was selected as a result of its relative user friendliness and its generalized use by local research and authorities institutes. In this software, a particular display of the different shapes (industries, houses and roads) are called themes and can be designated in any order, e.g. location of parking, land use, etc. These themes can be selected or organized according to the modeler criteria, importance to the most relevant features on individual digital maps. It is vital to note, that GIS is not only used as a map viewer, but more as many sources that an integrated tool to handle data from.

3.4.1. Collected data related to study area

Data regarding to the study area (as example, map of center of Karbala city contain the city restriction, transportation of the city, car parking, and land use) were collected from governmental directorates, especially, the Urban Planning Directorate in the holy city of Karbala. So these data used and transferred on to ESRI shape file to use it in ArcGIS 10.3 which has the abilities to process the required analyses. Map, which contains the names of the neighborhoods, was gotten from Municipal department of Karbala; this map helps to know the way of approaching cars. Where, through a questionnaire which was conducted in the Al-Abbasia shrines and Al-Husseinia, ratios for visitors obtained, these percentages include visitors numbers for each province who flock to the shrines.

Table 3-1 Content of required map that need it

Data	Data format	Obtained form
Satellite image of the HKCC	(*.tif)	Urban Planning Directorate in the holy city of Karbala
proposed Geodatabase of Karbala contain land use of the HKCC	(*.mbd)	Urban Planning Directorate in the holy city of Karbala
proposed Geodatabase of Karbala contain transportation of the HKCC	(*.mbd)	Urban Planning Directorate in the holy city of Karbala
Map of Karbala city contain the name of neighborhoods	*.Dwg	Municipality of Karbala Directorate

3.4.2. Collected Data by questionnaires for land use and processing

To get Equation for each area of land use, relating this Equation to the demand of car parking, some related information with habit of land user living style must be known, where some related information to car parking are collected by questionnaire.

The questionnaires are demonstrated in Appendix A; these questionnaires were prepared depending on the information needed to restrict parking on the study area. The processing of questionnaires explained in more detail in chapter 4, however, summary of data collected from these questionnaires are presented in Appendix B.

After completing the questionnaires and collected data, some calculation and processing have been done through related Equations. All these Equations, which are dependent on the area and type of land

use, enter on the layer in ArcGIS program. So, model is created for the land use according to number of car parking. These model will distributed the number of car parking related with land use on the boundary area (HKCC), the modeling have some ArcToolbox (Empirical Baysian Kriging) these tool distributed the number of car parking for each type of land use.

3.4.3. Collected and processing data by questionnaire for the Shrines of Husseinia and Abbasia.

Questionnaires were prepared for visitors of the Holy Husseinia and Abbasia shrines, which could be very essential as the main target for activity of the city center related to visitors that come from different region. These questionnaires have all question needed to make the model in GIS program, the questionnaire included many important questions (see Appendix A).

After the stage of collecting the data in the Holy shrines of Husseinia and Abbasia, data were analyzed through Excel program. However, about 450 questionnaires for the visitors of the shrine of Husseinia were collected, and about 299 questionnaires for visitor of the shrine of Abbasia. Furthermore, 349 and 300 questionnaires for the employees of the shrines of Husseinia, Abbasia were collected, respectively.

3.4.3.1 Sample size

For each questionnaire, the sample size sufficiency was checked using Hoel (2009) formula:

$$N = \left(\frac{Z\,\sigma}{d}\right)^2 \qquad \ldots\ldots (3.1)$$

N = minimum sample size.

Z =number of standard deviations corresponding to the required confidence level for percent confidence level (Table 3.2).

σ = standard deviation.

d =limit of acceptable error.

Table 3-2 Constant corresponding to level of confidence(Garber, 2010)

Confidence Level (%)	Constant Z
68.3	1.00
86.6	1.50
90.0	1.64
95.0	1.96
95.5	2.00
98.8	2.50
99.0	2.58
99.7	3.00

Approximately, some of the questionnaires touch the required sample size, but the visitors of the Imam Hussein holy shrine questionnaires were not achieving the sufficient sample size. So, extra questionnaires conducted to reach the sufficient number; extra 150 questionnaire added. The information gotten it from questionnaire had been processed in Microsoft Excel to determine the percentage that needed in model select best sit selection in GIS program.

3.4.3.2 Calculation the percentage of visitors according to governorate and district

From the questionnaire that had been collected from Husseinia and Abbasia shrine, the question of visitors and employee's origin had

been created. Appendix B, contains all data of questionnaires, so by summation the number of visitors and divided to total number of sample to get the percentage of governorate origin, make alike to the employees to get the origin percentage of each districts. All this percentages facilitate the model of GIS. Expansion the calculation and data processing will present in Chapter 4.

3.4.3.3 Calculation of remain time

Each visitor comes to Imam Hussain and Imam Abbas stayed some time, thus, questions have been raised, how long these visitors remain in the Imam Hussain and Imam Abbas). So, the answer for this question facilitates the determination of the average parking time for the visitors (of course, walking time has to add to remaining time). However, these values are vital for the model of GIS.

3.4.3.4 Calculation of the percentage of car type

Another important question is the visitors or employment vehicle used in travel journey (what type of car used, mini bus, bus, etc.). The determination of car type facilitates drawing the Equation for number of supply car in any land use, all this calculation explained in detail in chapter 4.

3.4.5 Determination of land use

A questionnaire has been prepared for land uses in HKCC which could be very essential. Where, it contained a question about the demand of car parking for each type of land use, because the demand of car parking very important to identify the area that needed to erected car parking. The paper of questionnaire comprised other important questions (see Appendix A).

3.4.6 Determination the cost of car parking

Questionnaire was prepared to determine the cost of land in HKCC; the cost of land nears the shrine more than the cost of land far from it. So, the cost of land consider as the essential part of total park cost, while the other part is the cost of erection. Such cost will be very important criterion for the decision whether the car parking is erected as a flat or a multistory.

3.4.7. Modeling in GIS

After identifying the criteria that related with car parking location and best site selection of the car parking, therefore, the AHP model had been used for giving weight for each criterion, consequently, this weight of criteria had been interred to Raster Calculation in GIS program to weight all criteria and give the best position for car parking.

First criterion is land use, for any type of land use there are different activities specified different number of car, so questionnaire was made for establishment Equation related to the type of land use, there for these equations had been entered to each type of land use, and the weight of each land use had been entered to Raster Calculation tool in GIS program, as consequence, the final weight of all land use had been gotten in one plane explain all these processes in Chapter 4

Second criteria is accessibility, accordingly, as explained in Chapter 2, restrict of accessibility is related to the parking, so three important restrict will take. Firstly, the street adjoining car parking must have at least two lines, secondly, the width of the road must occupy catch all the numbers of cars that enter to the parking, and thirdly no car parking

adjoin to local street, so at least (12m) is the width of adjoin street. All these restrictions of the accessibility will enter to the model in GIS, and the accessibility criterion had been distributed by Empirical Baysian Krinking tool in GIS program.

Third criterion is population density. Qorbani (2012)explained that the increasing in population density, rise in property prices of passenger and change other factors in order to increase traffic, making problems in the movement of passengers, so that the handling of passengers and transport, as the most significant urban development, such as in accessibility criterion, the population criterion had been entered in GIS program.

The forth criterion is distance from absorbing excursion space. Whereas, people are no longer spending entire days and weekends adding unnecessary miles to their vehicles, driving to distances traffic has identified allowable in Table 2.1 in chapter 2. So this distance will enter to the model in GIS to gain the area of land use that satisfy these criteria.

The fifth criterion in importance is the cost of land use and cost of established parking, consequently, the cost had been gotten from experts. In chapter 2 all details related with these criteria were explained, so making model to distinguish the cost in the land use, so the cost had been entered to GIS program.

The sixth criterion is Relationship between demand and supply, also the seventh criterion is travel time, besides all criteria had been given weight previously putted in GIS program.

Chapter four

Data Analysis and Result

Chapter 4

Data Analysis, Results and Discussion

4.1 Introduction

This chapter contains data analysis, data processing, the results obtained from this process, and then the step by step process had been created in GIS program, and then the AHP model had been established for giving weight for criteria, consequently, model for selecting the best site for car parking in the HKCC had been created.

4.2 Car parking

Parking is the act of stopping and disengaging a vehicle and leaving it unoccupied. Parking on one or both sides of a road is often permitted, though sometimes with restrictions. Some buildings have parking facilities for use of the buildings' users. Countries and local governments have rules for design and use of parking spaces. The aim of this study is to build a spatial decision support system for site selection of car parking by using GIS ArcToolbox. Seffino (1999) illuminated that the GIS can provide guidance as a tool to support decision-making to determine the spatial locations economically viable. It enables GIS tools on a wide range of geographical reference data analysis. Each map reveals a preference for a particular set of forms and procedures decision.

Criteria are identified with respect to the determinants of car parking location; these criteria were identified with respect to Karbala city, and related with the natural of region. Holy city of Karbala area is characterized as a tourist area, where flock a lot of tourists during the year as a result of tourism has make it as commercial, heritage, religious city.

So that the selection criteria to determine car parking locations within the city center relied on what suits this city.

4.3 Collected and processed data

Data were collected from HKCC; these data help in knowing the restriction of criteria. Questionnaires were prepared as demonstrated in Appendix A, after that, data collected by distributing the questionnaires paper to: the visitors and employees of AL-Husseinia and Al-Abbasia shrines, land use (Heritage، Heritage_Cultural, Commercial, Educational, Governmental, Public, Vacant, Religious, Agricultural, Residential, Residential_Commercial, and Health), and questionnaire for exiting car parking; all these depends on questionnaire type. In processing of data collection nearly 1500 questionnaire copies were distributed between visitors, employees, and land use related persons (i.e. mangers, landlords, etc.), each paper comprising many questions related to car parking directly and indirectly.

4.3.1 Check sample size of Questionnaire in HKCC.

First questionnaire was achieved for Al-Husseinia shrine, normal day was selected (not religious event day), and consider no any conflict in city. As this study is focused on car parking for normal days, where parking for huge event needs a separate study. However, to check the sufficient of sample size Equation 3.1 is used; from (Table 3-2) confidence level 99% was adopted, so the number of confidence level equal to 2.58.

σ = from data in Appendix B Table B-1 get standard deviation, for visitors of Imam Hussein holy shrine equal to12.24.

d =limit of acceptable error is 1.5, determined from the average different for the data.

$$N = \left(\frac{Z\,\sigma}{d}\right)^2 \quad \ldots\ldots (3.1)$$

So the achieved sample size from Table 4-1 equal 450 >443 from Table 4-2 which indicate that the sample size is sufficient. After completing questionnaire and collecting all data, some important information had been gain from this questionnaire, like percentage of visitors come to visit Imam Hussain and Imam Abbas only mean that the goal of coming to this region for visit only or not, this percentage of visitors explained in Table4-2. Information had been collected from questionnaire, whereas the percentage of visitors who own car and percentage of visitors had cars and came by them. Finally, percentage of visitors faced difficulty to find car parking. All these information demonstrate in Table 4-2 for visitors and Table 4-3 for employees; this information get sensor to the type of movement and park generation in the HKCC. So, after that the sample size was calculated, and checked for it sufficiency; all sample size have to achieve the required number of questionnaires and the size of sample in Table 4-1.

Table 4-1 Number of sample size for questionnair of shrines

Type of questionnaire	**Size of sample**
Sample size for visitors in Husseinia shrine	450
Sample size for visitors in Abbasia shrine	299
Sample size for employees in Husseinia shrine	349
Sample size for employees in Abbasia shrine	300

Table 4-2 Data had been gain from questionnaire of visitors in Imam Hussain and Imam Abbas

No.	Important data	Husseinia shrine	Abbasia shrine
1	Percentage of visitors to coming to visit	95%	96%
2	Percentage of visitors who own a car	37%	32%
3	Percentage of the owners of the car and came	92%	89%
4	Percentage of those who came by car and had difficulty	21%	2%
5	Sample size by groups of visitors	443	98

Table 4-3 Data had been gain from questionnaire of Employment in Imam Hussain and Imam Abbas

No.	Important Data	Husseinia shrine	Abbasia shrine
1	Employees who own a car ratio	18%	12%
2	the proportion of the owners of the car and came	68%	94%
3	Ratio came by car and had difficulty	84%	42%
4	Sample size by employee groups	447	273

4.3.2 Calculate percentage of car parking for each main street

Questionnaires were conducted to obtain information pertaining to the HKCC as explain in Table 4.4, in this table the collected information about visitors for Husseinia and Abbasia shrines. Table 4-5 and Table 4-6 present the percentage of employees according to their disitrict origin.

Determining the origin governorate helps to identify the streets they ride through, and then identify the main street for each origin. Fig. 4.1 demonstrates a map of arterial street in Karbala city with red colour, so from this map the direction of each governorate and district had been

gotten. As example, visitors come from Baghdad, Hila and visitors come from north district of Karbala city; all these visitors come from the main street in North side. To get the total percentage of Bab Baghdad, the north region of HKCC indicated to Bab Baghdad. Equally, in the other side of HKCC, intend add all percentage of each governorate and each district in Karbala city to the four side of HKCC to get the final result of percentage for each side. Table 4-3 presents the total percentage of each side of HKCC, with the total percentage of governorates and district in each entrance to HKCC. From Table 4-3 get the percentage of each side of HKCC and put this percentage in map of HKCC as in Fig. 4.2

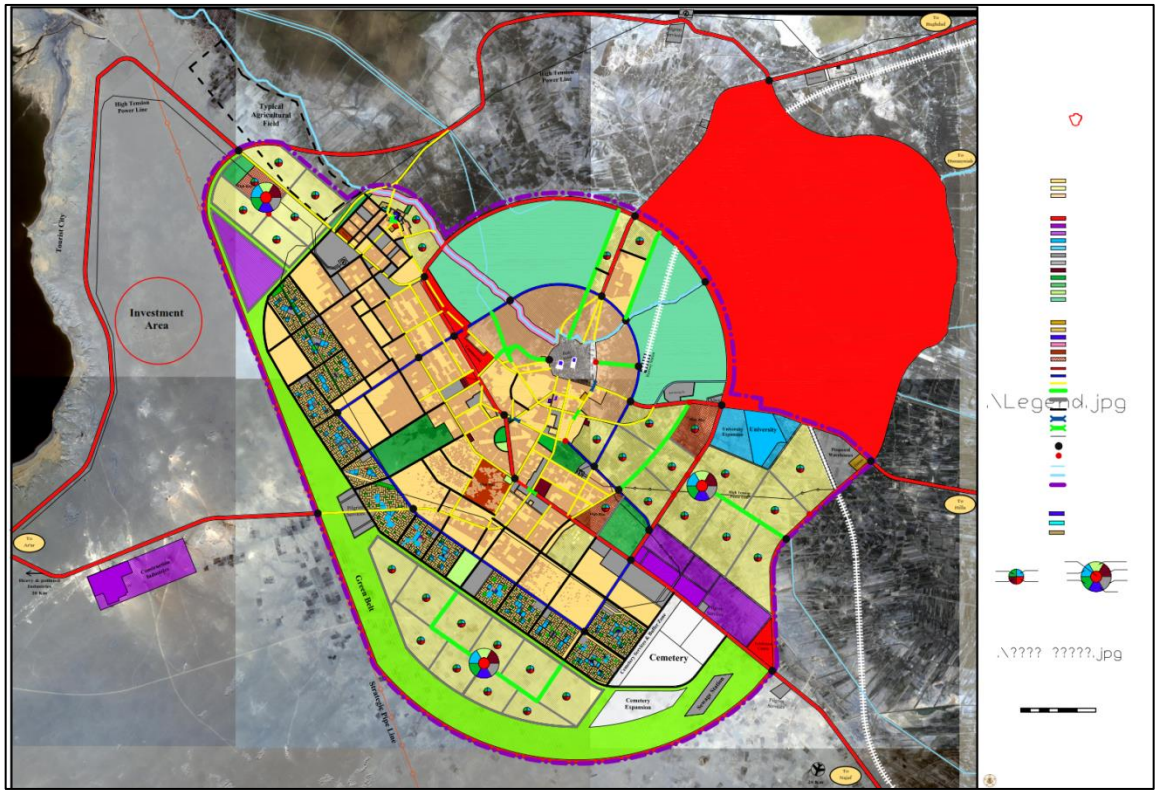

Figure 4-1 Road in Karbala city

Table 4-4 Percentage of visitors according to governorate for Husseinia and Abbasia Shrine

	Name of Governorate	**No of visitors Husseinia shrine**	**Percentage visitors Husseinia shrine**	**No of visitors Abbasia shrine**	**Percentage visitors Abbasia shrine**
1	visitors from Basra	36	8%	24	8%
2	visitors from Maisan	4	1%	5	2%
3	visitors from Karbala	113	25%	101	34%
4	visitors from Karkok	1	0%	0	0%
5	visitors from Babel	70	16%	41	14%
6	visitors from Baghdad	72	16%	36	12%
7	visitors from Kwot	29	6%	6	2%
8	visitors from Dewania	23	5%	23	8%
9	visitors from Nasria	3	1%	19	6%
10	visitors from Deyala	13	3%	1	0%
11	visitors from Muthna	0	0	14	5%
12	visitors from Najaf	86	19%	34	11%

Table 44-5 Persentage of employment that came from neighborhood for Husseinia shrine

	Name of neighborhood	**No**	**percentage**
1	Ghadeer neighborhood	9	4%
2	Abbas neighborhood	14	6%
3	Al-Chaer	4	2%
4	Hindiya	9	4%
6	Al-Husseiniya	20	8%
8	Amel district	13	5%
9	Bab Al Khan	6	2%
11	El-Nasr Neighborhood	3	1%
12	BabAl-Tak	2	1%
13	Al-Hur neighborhood	26	11%

	Name of neighborhood	No	percentage
14	Aboubiat	9	4%
15	Al-Mamalchi neighborhood	2	1%
16	Bab Baghdad	4	2%
18	Qadisiyah neighborhood	2	1%
19	Al-Gamea	15	6%
20	Rawdhaten neighborhood	4	2%
21	Al-Baladai district	3	1%
22	Al-Mowedhafen	2	1%
23	Ahmed al-Waeli Street	3	1%
24	Neighborhood Al-Tahadi	4	2%
25	Al-Moalemen neighborhood	2	1%
26	Bab Alsalima	6	2%
27	Bab Tourij	4	2%
28	Neighborhood Al-Teawen	3	1%
29	Al-Gahez	4	2%
30	Al- Zahraa district	4	2%
31	Mamalchi	2	1%
32	Al-Askari	2	1%
33	Neighborhood Al-Mowedhafen	2	1%
34	Ghadeer neighborhood	9	4%

Table 44-6 Persentage of employment that came from neighborhood for Abbasia shrine

	Name of neighborhood	No	percentage
1.	Ahmed al-Waeli Street	3	1%
2.	Al-Etarat neighborhood	1	0%
3.	Imam Mahdi neighborhood	1	0%
4.	Imams neighborhood	4	1%
5.	Husseiniya	6	2%
6.	Al_wend	1	0%
7.	Imam Ali neighborhood	1	0%
8.	Bab Al Khan	1	0%
9.	Al-Boubiat	8	3%
10.	Neighborhood Al-Tahadi	2	1%
11.	Neighborhood Al-Taaleb	3	1%
12.	Al-Gahez	2	1%
13.	Al-Chaer	3	1%
14.	Al-Gamea	8	3%
15.	Al-Hur neighborhood	35	12%

	Name of neighborhood	No	percentage
16.	Al-Hussein neighborhood	16	5%
17.	Ramadan neighborhood	11	4%
18.	al Zahraa district	1	0%
19.	Al-Saadia	2	1%
20.	Salam neighborhood	9	3%
21.	Saif_Saad	11	4%
22.	Al-Taka neighborhood	4	1%
23.	Mulhak Saif_Saad	4	1%
24.	Tourij	1	0%
25.	Amel neighborhood	30	10%
26.	Abbas neighborhood	11	4%
27.	AbbasiaAl-Sharqiya	2	1%
28.	AbbasiaAl- Garbeia	2	1%
29.	Al Askari district	3	1%
30.	Ghadeer neighborhood	3	1%
31.	Kantara Al-Salam	1	0%
32.	Qadisiyah neighborhood	3	1%
33.	Fares neighborhood	1	0%
34.	Al-Askari	2	1%
35.	Al-Moderaa neighborhood	2	1%
36.	Mulhak	3	1%
37.	Al-Naqeeb neighborhood	6	2%
38.	District staff	16	5%
39.	District Moalemen	12	4%
40.	Hindiya	2	1%
41.	Neighborhood Al_wefaa	3	1%
42.	Mamalchi	3	1%
43.	El-Nasr Neighborhood	24	16%
44.	Ahmed al-Waeli Street	25	8%

Table 4-7 Percentage of car parking for each main street

Name of street	Percentage of car parking
Al- Shuhadaa Street	9.24%
AL-Abbas street	40.32%
AL-Tourij Street	29.68%
Bab Baghdad	20.76%

The percentage for each main street explains the map in Fig. 4-5.

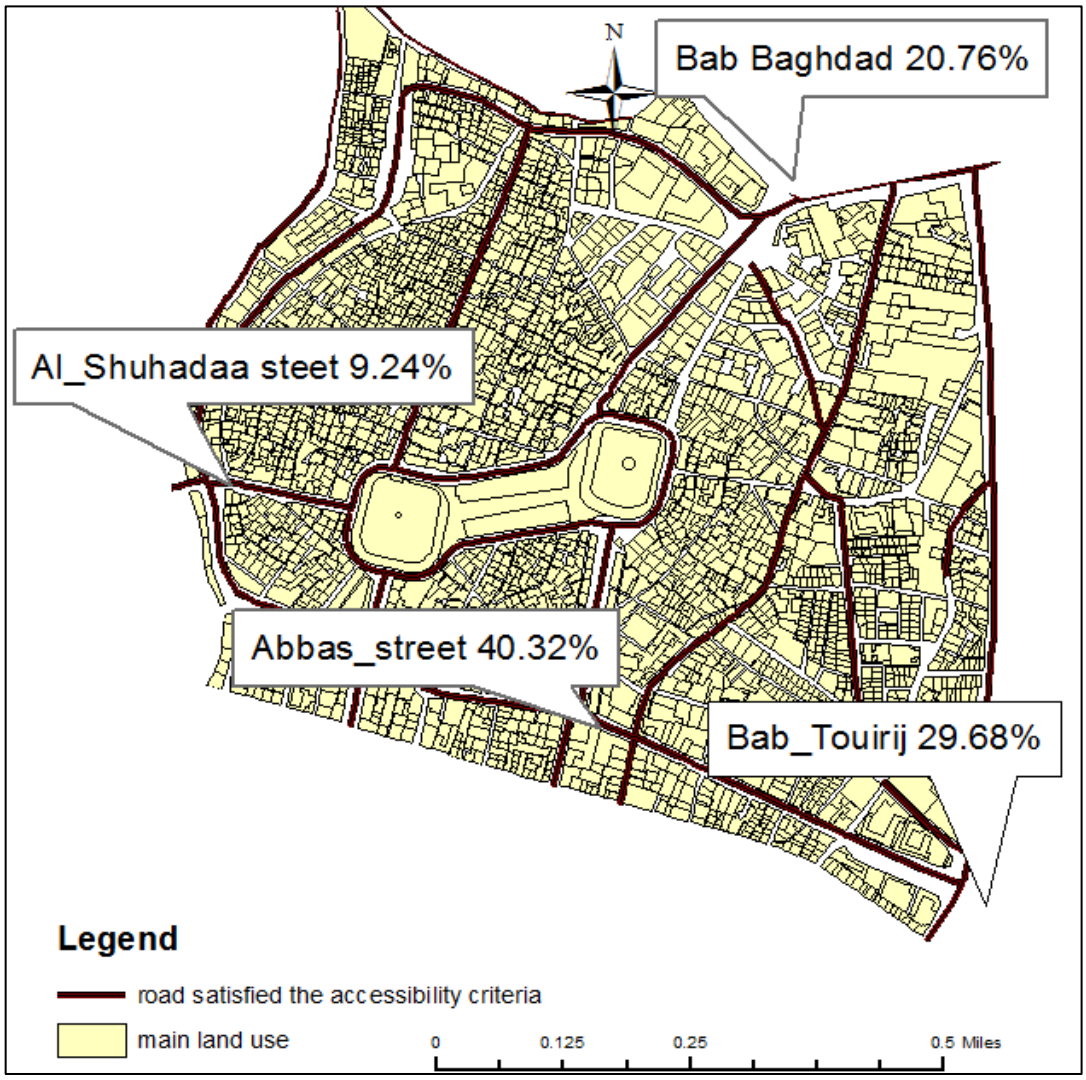

Figure 4-2 Percentage of car parking in each access

4.3.3 Determination the remain time

One of question has been asked to the visitors of Imam Husain and Imam Abbas, is how long they remain in the shrines, this time give indicator for the rest time in the car parking.

Table 4-4 presents the percentages of remain time for the visitors in Imam Hussain and Imam Abbas. It was noted that higher percentage is 2 hr., but for more accuracy the remain time determined as the 85th % of the

collected remain time as can be seen in Table 4-5, 4-6. however, this done by drawing relationship between remain time and cumulative percentage as can be seen in Fig. 4-4, 4-5, then the remain time that represent 85% cumulative percentage were determined . Table 4-5, in which the time classes are listed in column 1 and the mid values are in column 2. The number of each class is listed in column 3; the cumulative percentages of all time are listed in column 6.

Table 4-8 Persentage of time stay in Husseinia and Abbasia shrines

	Time	**Frequency Husseinia shrine**	**Perception Husseinia shrine**	**Frequency Abbasia shrine**	**Perception Abbasia shrine**
1	1/4 Hour	2	0%	9	3%
2	1/3 Hour	2	0%	1	0%
3	1/2 Hour	24	5%	29	10%
4	3/4 Hour	3	1%	3	1%
5	1 Hour	68	15%	88	29%
6	1.5 Hour	24	5%	17	6%
7	2 Hour	118	26%	79	26%
8	2.5 Hour	9	2%	6	2%
9	3 Hour	74	16%	29	10%
10	3.5Hour	67	15%	1	0%
11	4 Hour	16	4%	19	6%
12	5 Hour	40	9%	6	2%
13	6 Hour	0	0	2	1%
14	7 Hour	0	0	1	0%
15	8 Hour	0	0	6	2%
16	10 Hour	0	0	3	1%

Table 4-9 Calculation for determine the cumulative percentage of remain time in Imam Husain

Time class	**Class Mid value h**	**Class frequency f**	**f*h**	**Percentage of class**	**Cumulative percentage**
0_1	0.5	31	15.5	6	6
1_2	1.5	92	138	20	26
2_3	2.5	127	317.5	28	54
3_4	3.5	141	493.5	31	85
4_5	4.5	16	72	4	89
5_6	5.5	40	220	9	98
6_7	6.5	0	0	0	98
7_8	7.5	0	0	0	98
8_9	8.5	0	0	0	98
9_10	9.5	0	0	0	98
		Σ=447	Σ=1256.5		

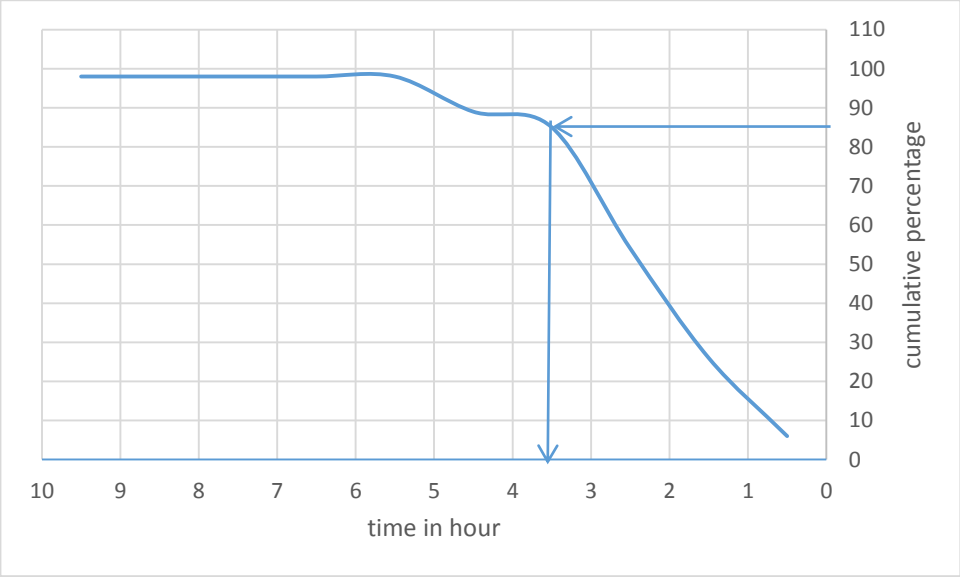

Figure 4-3 Cumulative percentage of remain time in Imam Husain

85th-percentile staying time in the Husseinia shrine is obtained from the cumulative frequency distribution curve as 3.5 hour, see Fig. 4.4. Where, the 85th-percentile staying time in the Abbasia shrine is obtained from the cumulative frequency distribution curve as 3.8 hour see Fig. 4.5.

Time stay for Husseinia shrine equal to 3.5 and for Abbasia shrine equal to 3.8 these time consider short time(Raheleh Farzanmanesha 2010), add time walking from parking to the shrine and inverse add about half hour for all these processing, the final time become 4.8hr and 4.5hr.

Table 4-10 Calculation for determine the cumulative percentage of remain time in Imam Abbas

Time class	Class Mid value h	Class frequency f	f*u	Percentage of class	Cumulative percentage
0_1	0.5	42	21	11	11
1_2	1.5	105	157.5	35	46
2_3	2.5	85	212.5	28	74
3_4	3.5	30	105	10	84
4_5	4.5	19	85.5	6	90
5_6	5.5	6	33	2	92
6_7	6.5	2	13	1	93
7_8	7.5	1	7.5	2	95
8_9	8.5	6	51	3	98
9_10	9.5	3	28.5	1	99
		Σ299	Σ714.5		

4.4.4 Determination parking bay characteristics

One of question had been asked to visitors is vehicle type they used for travel, in order to obtain the percentage of each vehicle type. In other word, this portrait an indication for the required pattern car parking. Tables 4-11 and 4-12 show the percentage of each vehicle type used.

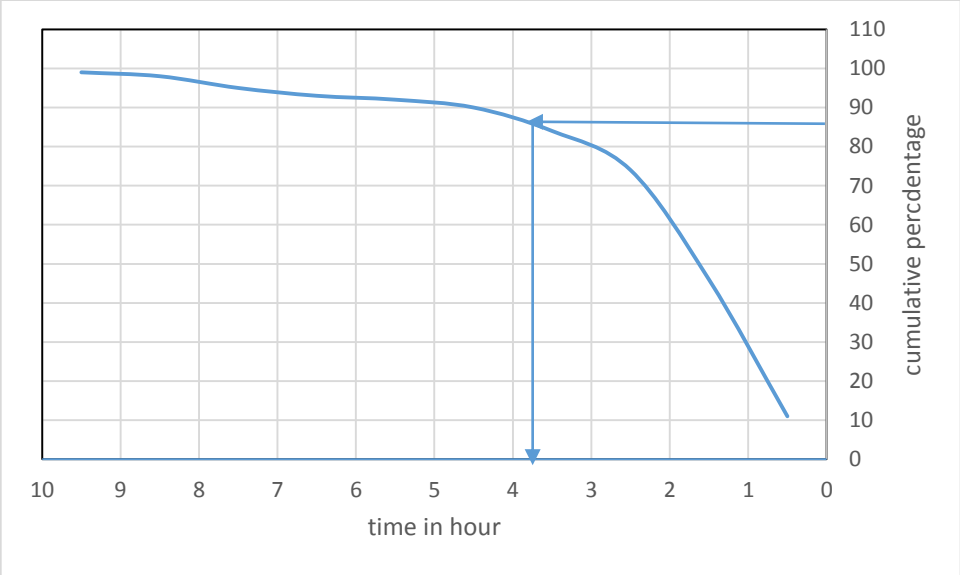

Figure 4-4 Cumulative percentage of remain time in Imam Abbas

Table 4-11 Persentage of vehicle types used by visitors of Husseinia and Abbasia shrine

	Come by	**Sample size Husseinia shrine**	**Percentage Husseinia shrine**	**Sample size Abbasia shrine**	**Percentage Abbasia shrine**
1	Small bus	20	4%	3	1%
2	Private car	106	24%	80	27%
3	Taxi	41	9%	29	10%
4	Walk	4	1%	11	4%
5	Medium bus	222	49%	137	46%
6	Large bus	53	12%	31	10%
7	Motorcycle	2	0%	2	1%
8	Bicycle	2	0%	0	0%
9	Private car rent	1	0%	5	2%

Table 4-12 Persentage of vehicle type used by employee of Husseinia and Abbasia shrine

	Come by	**No of employment Husseinia shrine**	**Percentage Husseinia shrine**	**No employment Abbasia shrine**	**Percentage Abbasia shrine**
1	Small bus	17	5%	**12**	**4%**
2	Private car	20	6%	**21**	**7%**
3	Taxi	9	3%	**8**	**3%**
4	Walk	27	8%	**8**	**3%**
5	Medium bus	41	12%	**7**	**2%**
6	Large bus	4	1%	**6**	**2%**
7	Motorcycle	138	40%	**196**	**65%**
8	Bicycle	16	5%	**16**	**5%**
9	Private car rent	48	14%	**20**	**7%**

Results are shown that small bus and private car have been used significantly by visitors. However, small bus, private car, and taxi required approximately same dimension for parking bay and maneuver. However, such vehicles represent 37% of the total vehicles used for travel, as can be seen from (Tables 4-11, and 4-12). On the other hand, small bus represents 49%.

it was suggested that bay for private car is 3 m x 6 m, and for medium bus =3.75 m x 7.5 m (Bank., 2008). Additionally, share area is required for maneuver of the vehicles, where a 2.5m is added to length of space. As a result the dimension of space becomes (3.75m X 10m) for medium bus, and (3m X 9.5m) for private car. Moreover, 10 % of the required area is

add to the total area for to accommodate the additional area required for entering , exit, and serves (like stars, mortaring room, guardroom, etc.). However, the following Equation can be used as a consequence of the above calculations to determine the number of bay (space) which can provide by any specific area (A)

$$N.O.Space = 0.0334A \quad \text{.....4.4 ....}$$

4.4.5 Determination total demand for car parking in HKCC

For determine the car parking demand in HKCC need many information, firstly some information about type of land uses and the percentage of each type in the city is needed. Such information has been gotten it from the questionnaire making in 2011 by Dewan, as can be seen in Table 4-13.

Table 4-13 Percentage and area of land use (Dewan, 2011)

Type of land use	Area	percentage	Number of building
Residential	296767.135	56%	2547
Commercial	204488.58	24%	1089
Vacant	70936.12	7.43%	336
Religious	66372.8494	4.44%	201
Public	52443.76	0.93%	42
Governmental	18554.4356	0.40%	18
Educational	44769.972	0.35%	16
Health	2059.1485	0.15%	7
Agricultural	24807.49	0.07%	3

However, the questionnaire conducted by the researcher for HKCC portraits and the required number of car for each land use, Appendix B includes such data. Consequently, it was found that the relation between land use and number of space need in each type of land use as demonstrates in Table 4-14.

Table 4-14 Parking generation for land use

Type of land use	Number of car parking
Heritage	For each 100 m² equal to 8
Commercial	For each 100 m² equal to 2
Educational	For each 100 m² equal to 1
Governmental	For each 100 m² equal to 3
Public	For each 100 m² equal to 2
Vacant	For each 100 m² equal to 1
Religious	For each 100 m² equal to 10
Residential	For each 100 m² equal to 2
Health	For each 100 m² equal to 6

From Table 4-14 the relation between the demand and area of land use had been gotten. After that, model in GIS program to analysis the generation Equation was created, as can be seen in Fig.3.7 in Chapter 3. Consequently, the demand of car parking according to the land uses is determined by the GIS, as can be seen in Fig. 4.9.

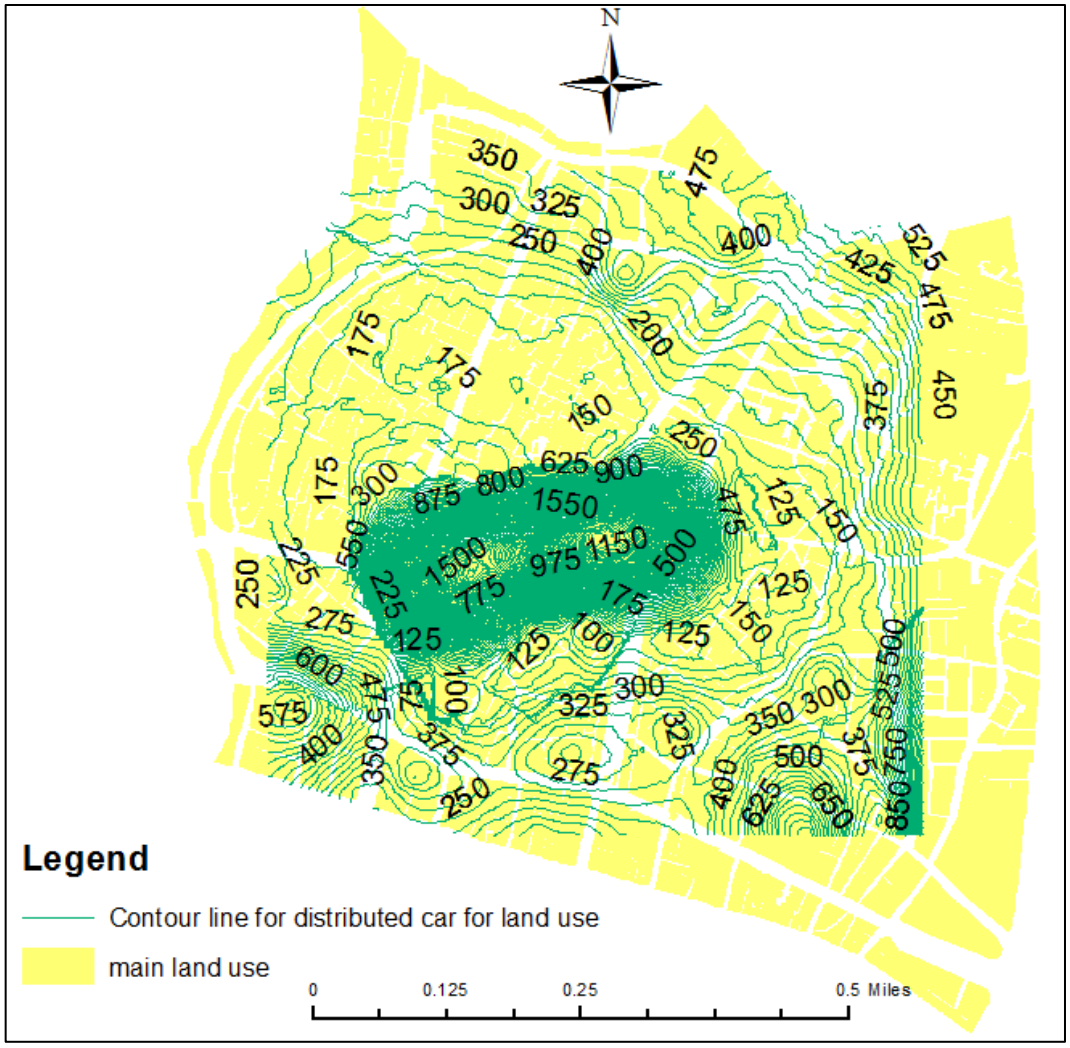

Figure 4-5 Car parking demand in (HKCC) according to land uses

4.4.6 Determination the cost of car parking

Questionnaire was conducted to know the cost of erected car parking. For each square meter of area the cost is divided in to two parts; the cost of erection surface lot car parking, the second for the cost of building and third cost of land use. From the questionnaire about 250,000ID is the cost of erection for each square meter of surface lot, while the cost of erecting multistory car parking is about 562,500 ID (analysis cost) for each square meter.

Moreover, the cost of land can be designated in to two prices; the land near the shrines which is 10,000,000 ID approximately, while the land little far from shrines is about 7,000,000ID for each square matter. It has to say that this cost is not constant and may change with many factors that related with the HKCC.

4.4 Model in GIS

After identifying the criteria that related to car parking location (distance from absorbing excursion space, population density, the relationship between demand and supply, and the cost of land use, travel time, accessibility to parking, and land use). Then, the weight for each criterion had been given by the AHP model has been used to solve complex multi criteria problem, formerly, all these criteria will process in the layer of Arc GIS and built model in GIS to determine the best site selection according to these criteria. In all models offered by GIS program there are three shape with different colour; namely, ellipse with blue colour which indicated to main layer with major information, square with yellow colour which indicated to processing, finally ellipse with green colored which indicated output layer.

4.4.1 Land use

First step of explained the best position for car parking is giving the vital for each type of land use, there are nine type of land use, namely; Heritage, Commercial, Educational, Governmental, Public, Vacant, Religious, Residential and Health, Consequently, after the each type of land use has been defined in the HKCC, the method of AHP for weighting the each type of land use has been used, Subsequently, we will compare these types by estimating the importance of each land use for the other land

use, consequently, using the Table 2.7 to give each criteria number according there importance, therefor, the importance of each type of land use estimated by number of car parking by pre-calculated equations and type of land use, accordingly, this importance had been putted by experts.

Before the weights are introduced for each type of land, the Empirical Baysian Kinking tool had been used as in Fig. 4.9 for the distribution of the standard and its ratio to the study area. Fig. 4.10 to 4.17 illustrates this process, then combination all type of land use by one plan each according to the weight obtained from AHP As shown in Table 4.15 and 4.16. the weight have been explained in the final column in Table 4.16 ,now, insert the weights into a tool called Raster Calculation as shown in Fig. 4.18, subsequently, final result distribution weight of all criteria had been gotten as shown in Fig. 4.19. The plan that got from the Fig.4.19 consider the land use criterion, and then used in the next steps.

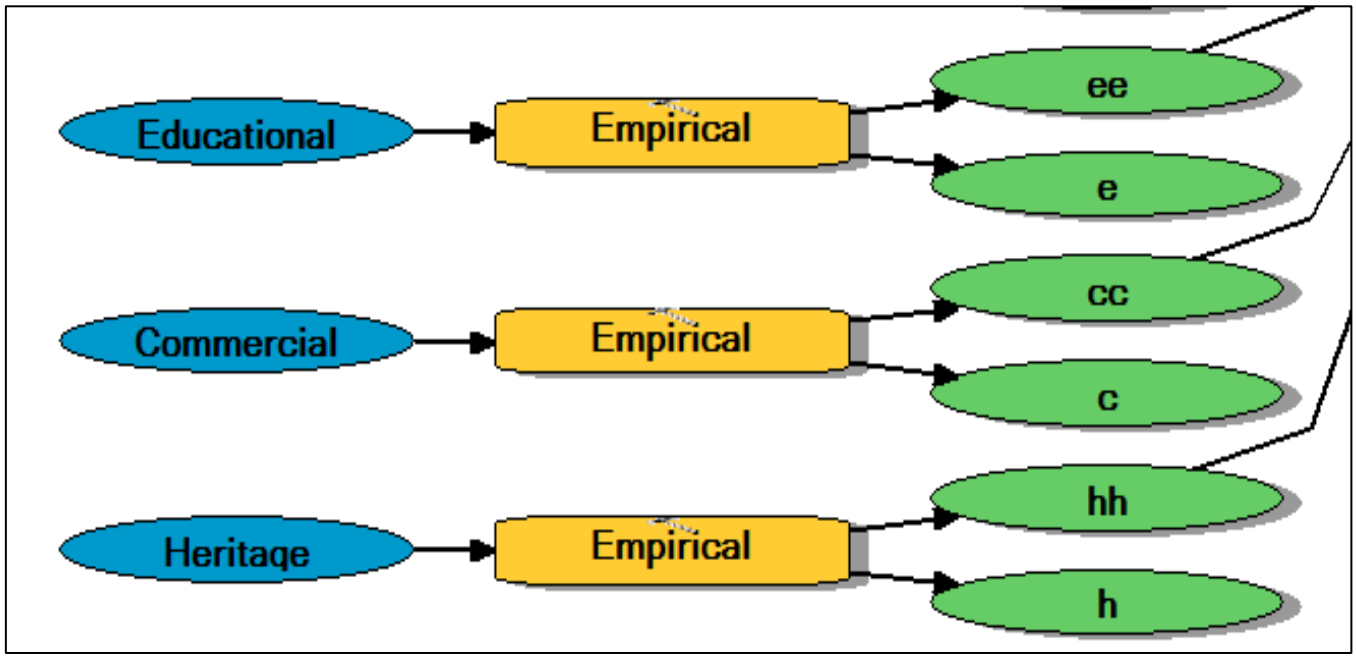

Figure 4-6 Distributed the criteria by using Empirical Baysian Krinking

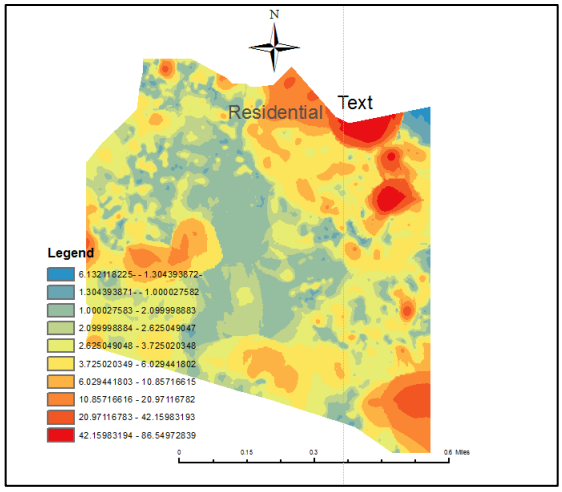

Figure 4-8 residential land use

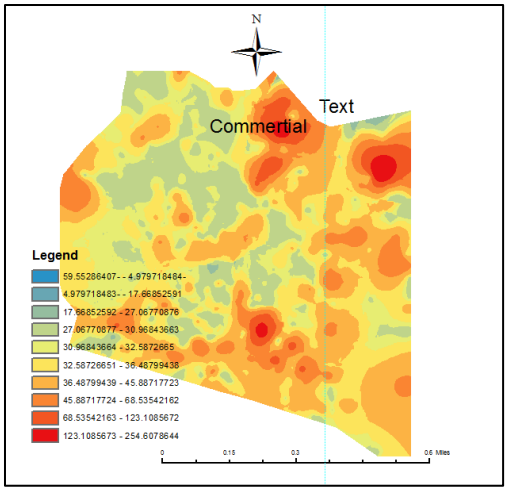

Figure 4-7 commercial land use

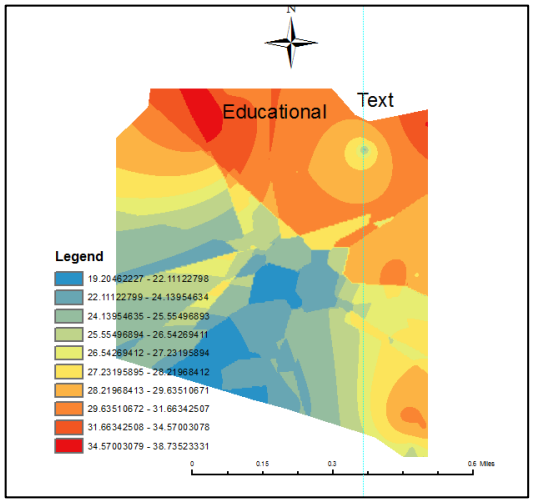

Figure 4-9 Educational land use

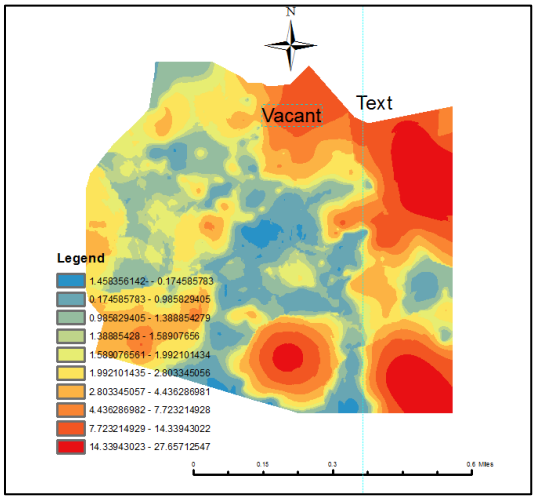

Figure 4-10 Vacant land use

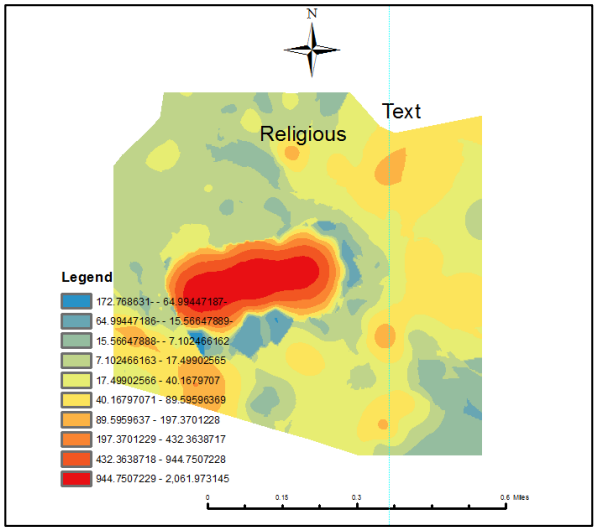

Figure 4-11 Religious land use

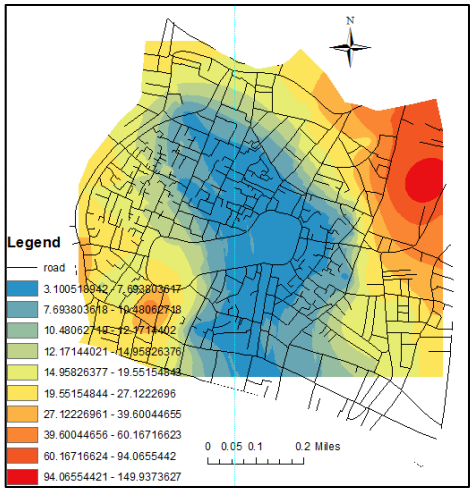

Figure 4-13 Publice land use

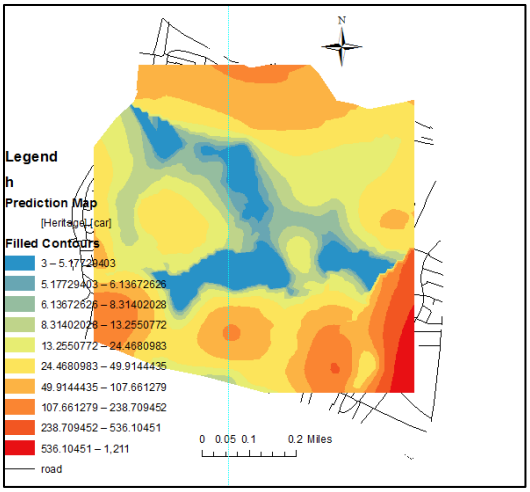

Figure 4-12 Heritage land use

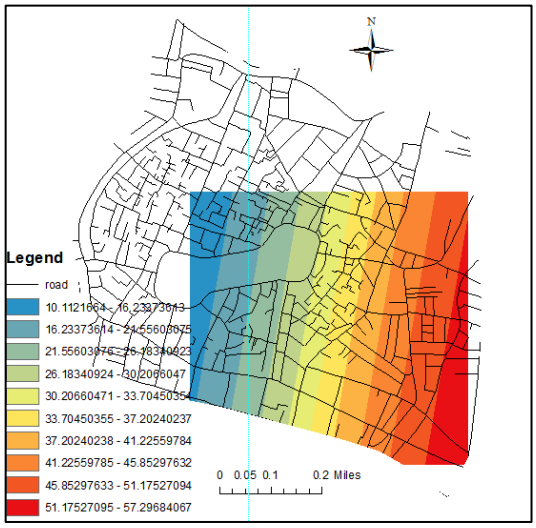

Figure 4-15 Health land use

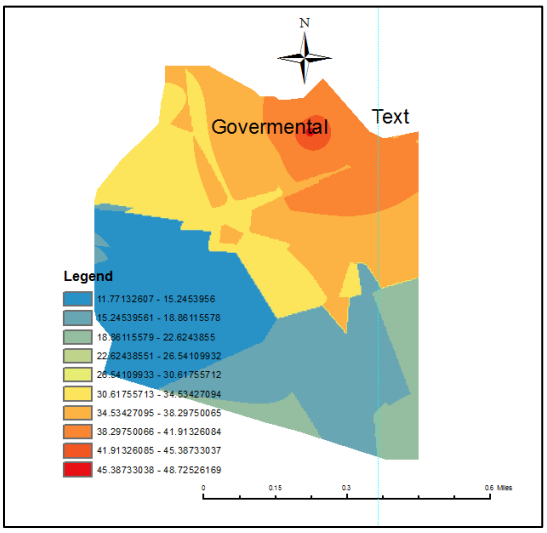

Figure 4-14 Governmental land use

Table 4-*15*- Comparison of land use, the AHP model

	residential	commercial	public	vacant	religious	health	heritage	governmental	educational
residential	1	2	3	4	9	8	6	8	8
commercial	0.5	1	2	3	9	8	6	8	8
public	0.333	0.5	1	3	9	8	6	8	8
vacant	0.250	0.333	0.333	1	9	8	6	8	8
religious	0.111	0.111	0.111	0.111	1	9	6	8	8
health	0.125	0.125	0.125	0.125	0.111	1	6	8	8
heritage	0.167	0.167	0.167	0.167	0.167	0.167	1	8	8
governmental	0.125	0.125	0.125	0.125	0.125	0.125	0.125	1	9
educational	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.111	1
	2.736	4.486	6.986	11.653	37.528	42.417	37.250	57.111	66

Table 4-16- *The weight of each land use*

	residential	commercial	public	vacant	religious	health	heritage	governmental	educational	sum	percentage
residential	0.365	0.446	0.429	0.343	0.240	0.18	0.161	0.140	0.121	2.435	27.053
commercial	0.183	0.223	0.286	0.257	0.240	0.189	0.161	0.140	0.121	1.800	20.002
public	0.122	0.111	0.143	0.257	0.240	0.189	0.161	0.140	0.121	1.485	16.496
vacant	0.091	0.074	0.048	0.086	0.240	0.189	0.161	0.140	0.121	1.150	12.778
religious	0.041	0.025	0.016	0.010	0.027	0.212	0.161	0.140	0.121	0.752	8.356
health	0.046	0.028	0.018	0.011	0.003	0.024	0.161	0.140	0.121	0.551	6.123
heritage	0.061	0.037	0.024	0.014	0.004	0.004	0.027	0.140	0.121	0.433	4.808
governmental	0.046	0.028	0.018	0.011	0.003	0.003	0.003	0.018	0.136	0.266	2.952
educational	0.046	0.028	0.018	0.011	0.003	0.003	0.003	0.002	0.015	0.129	1.432
										Sum=	100

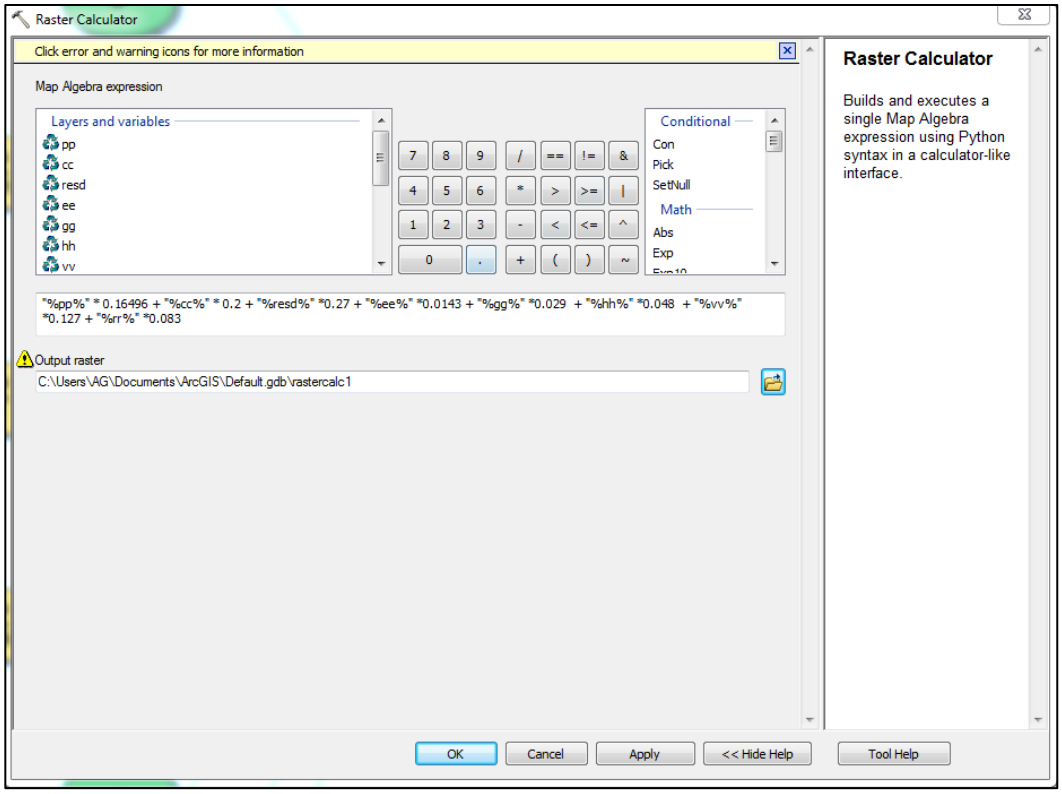

Figure 4-17 Insert weight in raster calculation tool in GIS program

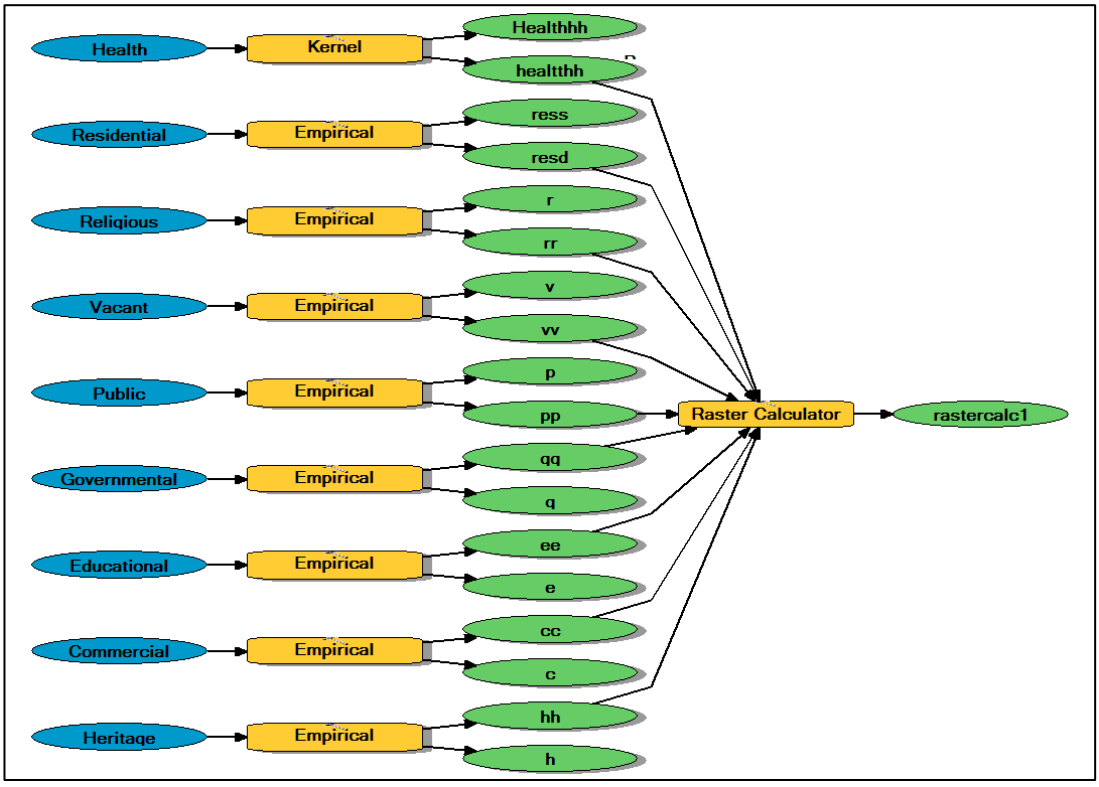

Figure 4-16 Model in GIS program using raster calculation for combination land use

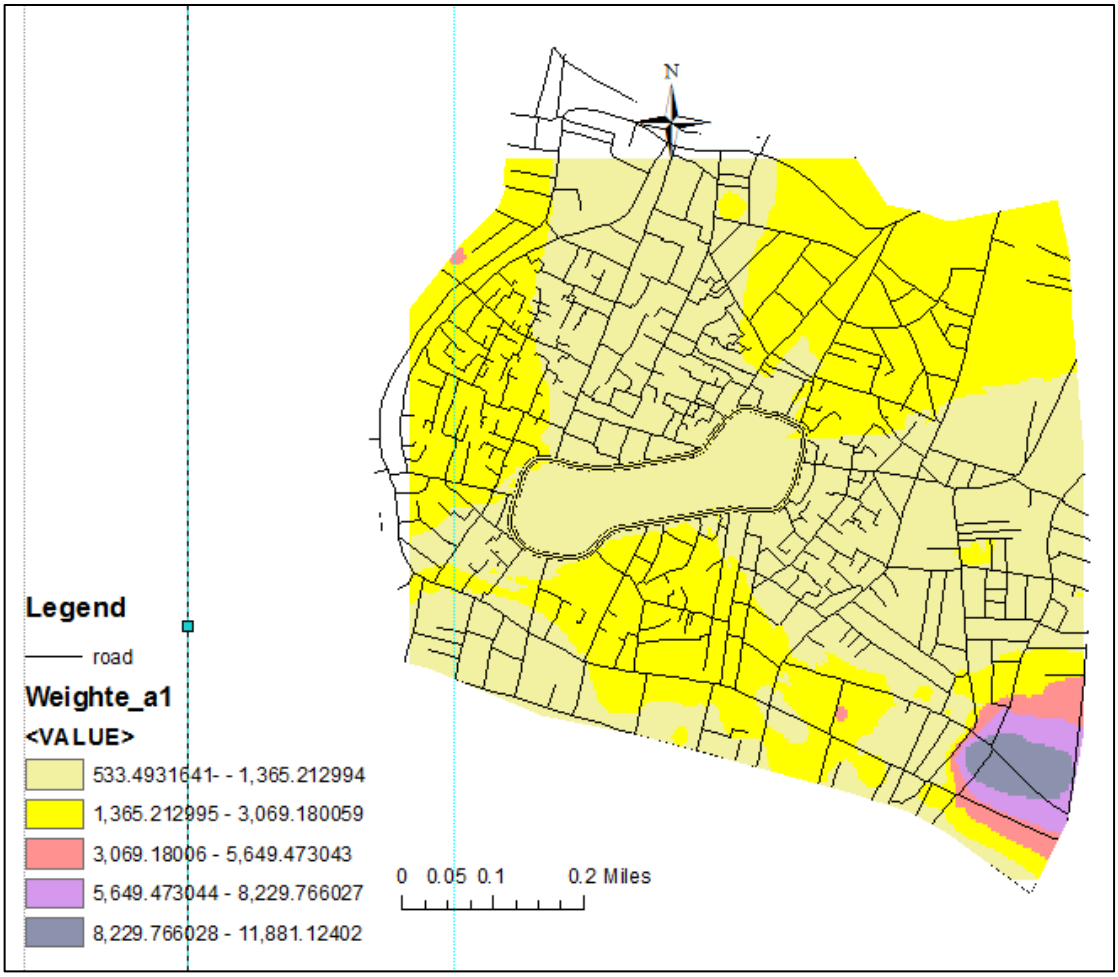

Figure 4-18 Final result after using raster caculation

4.4.2 Accessibility process

Second criterion use in the model is accessibility. Accessibility refers to the ability to improvement entry to a particular site or area, accessibility is a main criterion in parking. As explained in chapter 3, there are many restrictions of accessibility, which are related to the parking. All these restrictions of the accessibility entered to the model in GIS as shown in Fig. 4.22. Whereas, the ellipse with blue colour indicates the layer of roads, the square with yellow colour indicates the select processing, and ellipse with green colour indicates the output layer that satisfied

accessibility. Fig. 4.23 explains the entered Equation to the selected processing.

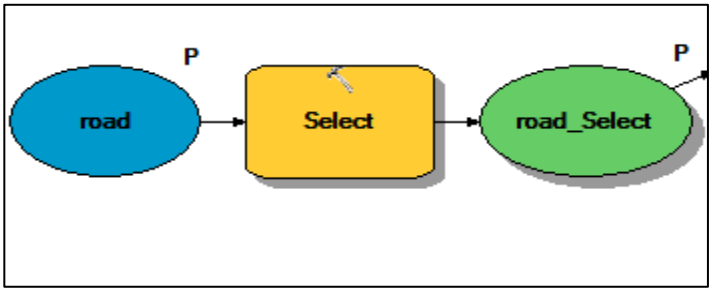

Figure 4-19 Part of model for sit selection car parking have accessibilty part

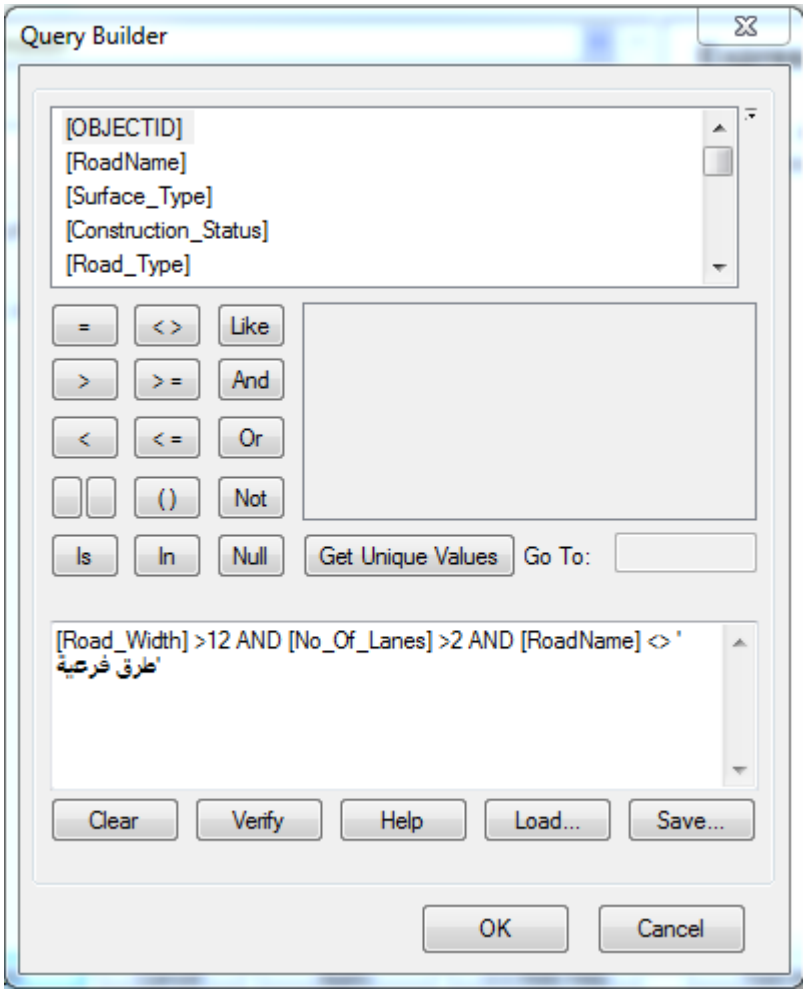

Figure 4-20 Equation used to model accessibility in GIS

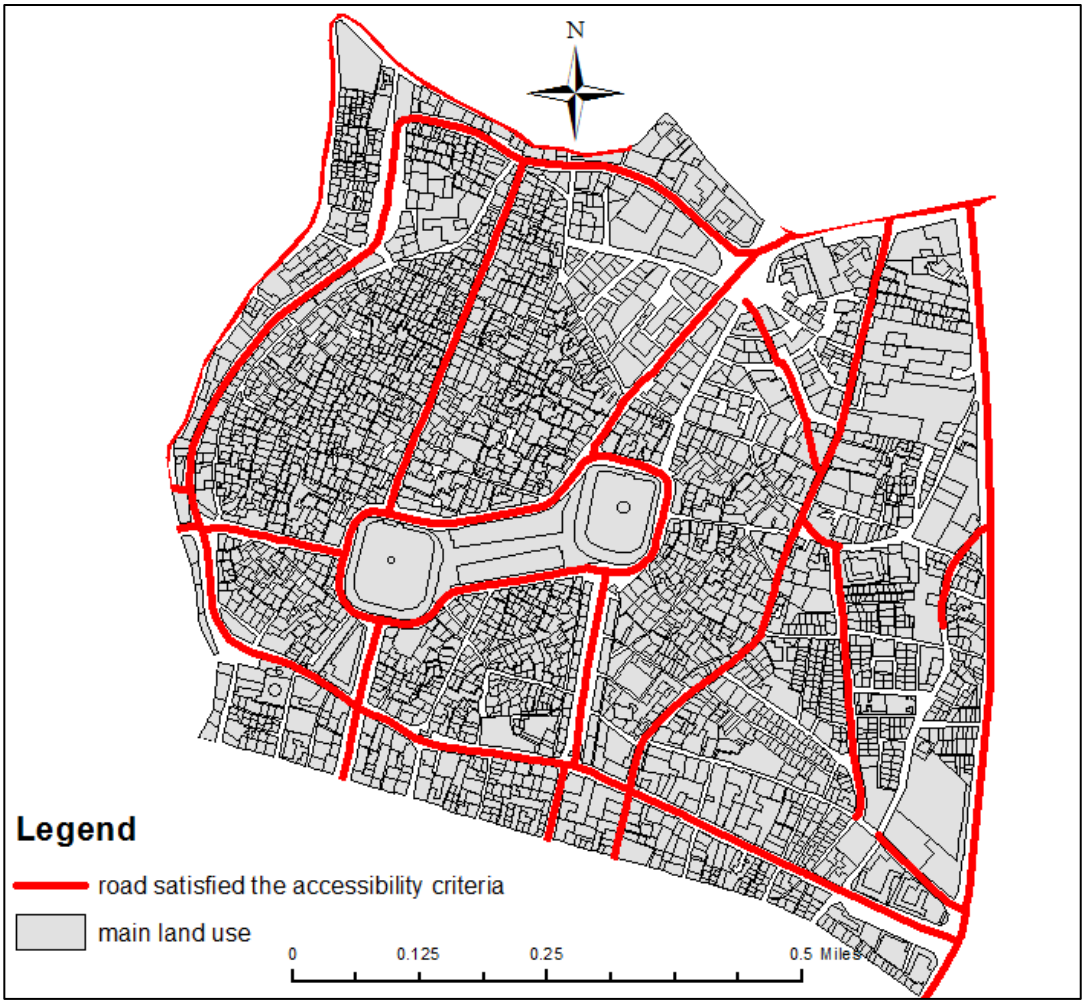

Figure 4-21 road satisfied the accessibility criteria

After entering the criteria of accessibility to the model, the model select the road that satisfy the accessibility as can be seen in Fig. 4.24, the colour of the selected road that satisfying this criterion is red, subsequently, the Empirical Bayesian Kriging had been used to distribute the accessibility criterion as can be seen in Fig. 4.24

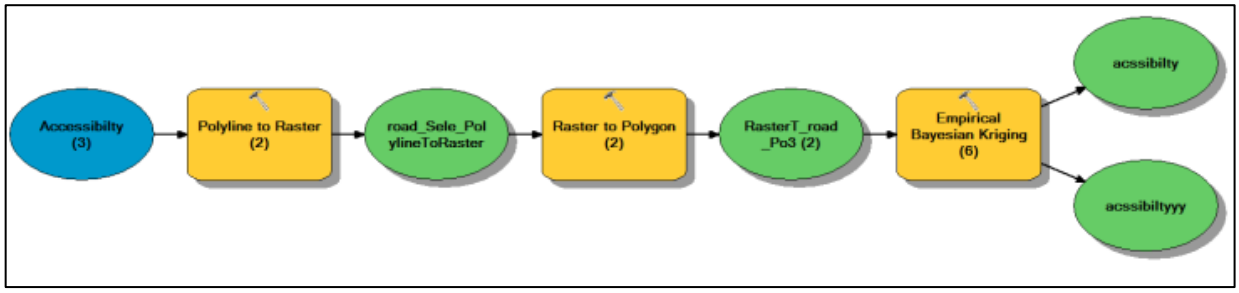

Figure 4-22 Model in GIS program for distribution accessibility criterion

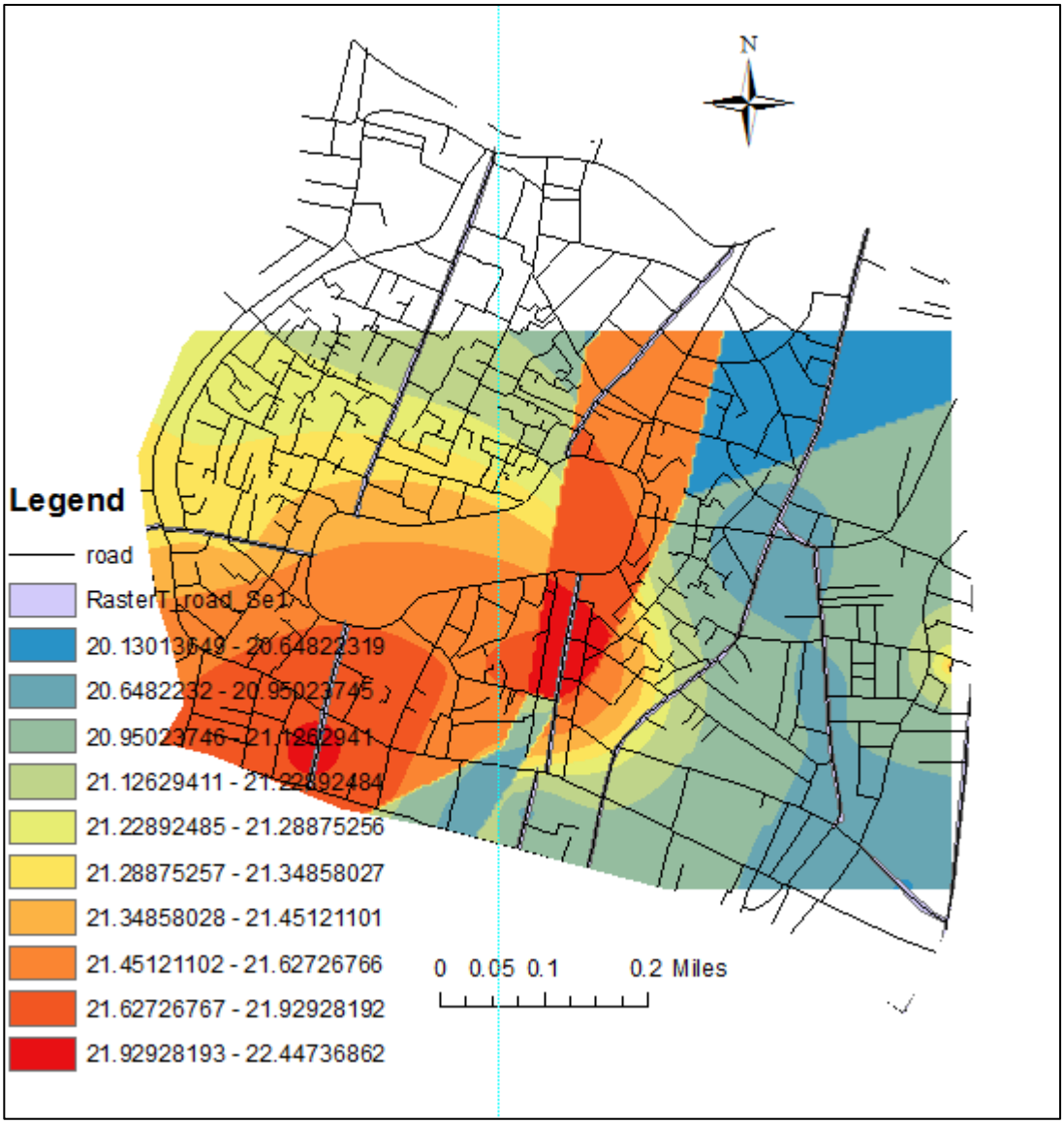

Figure 4-23 Distribution accessibility criterion in the study area

4.4.3 Population density

Third criterion is Population density. Qorbani (2012) explained that the increasing in population density, rise in property prices of passenger and change other factors in order to increase traffic, making problems in the movement of passengers, so that the handling of passengers and transport, as the most significant urban development. However, the following process is used to modeling this criterion:

- Obviously, the center of HKCC city population density is more than 500000 (Dewan, 2011).
- When enter a value of population density in Table 4.17, and consider the center of city is non-official center, it can be noticed that the distance to the target destination by visitors and employees must be greater than 200 meters to avoid the negative action of high interaction between vehicles and pedestrians.
- By entering this distance to the model in GIS by the tool as shown in Fig. 4.27, in this model need to position of center of city, the Street between the two Holy indicate to center of city see (Fig. 4.28).
- The result of this criterion can be seen in Fig. 4.29.
- Empirical Baysian Krinking had been used as in Fig. 4.30 to distribute the population density in study area as shown in Fig. 4.31.

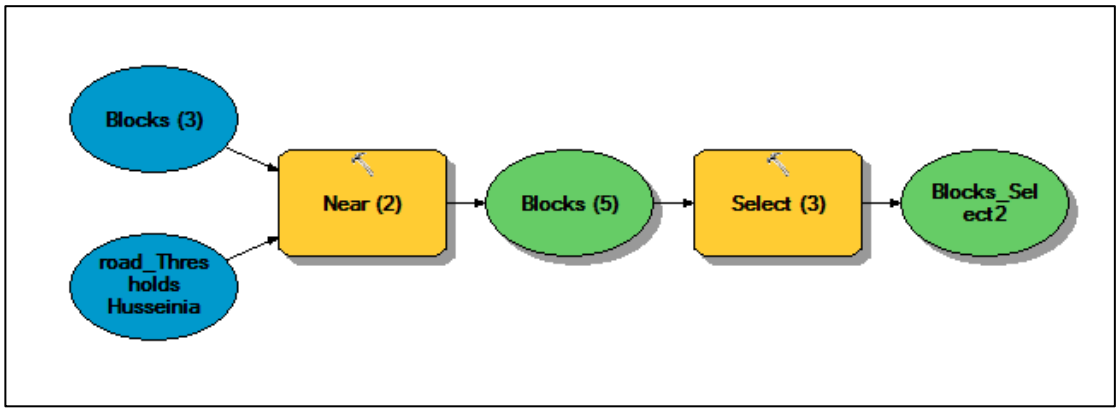

Figure 4-24 Part of model for sit selection car parking related with population density

Table 4-17Average of walking distances from tourist absorbing centers base on the population

Density / Activity	100000	100000-250000	250000-500000	500000 >	Average
Trade centers	105	157	190	187	135
Official centers	137	167	223	217	160
Nonofficial centers	97	130	150	200	120

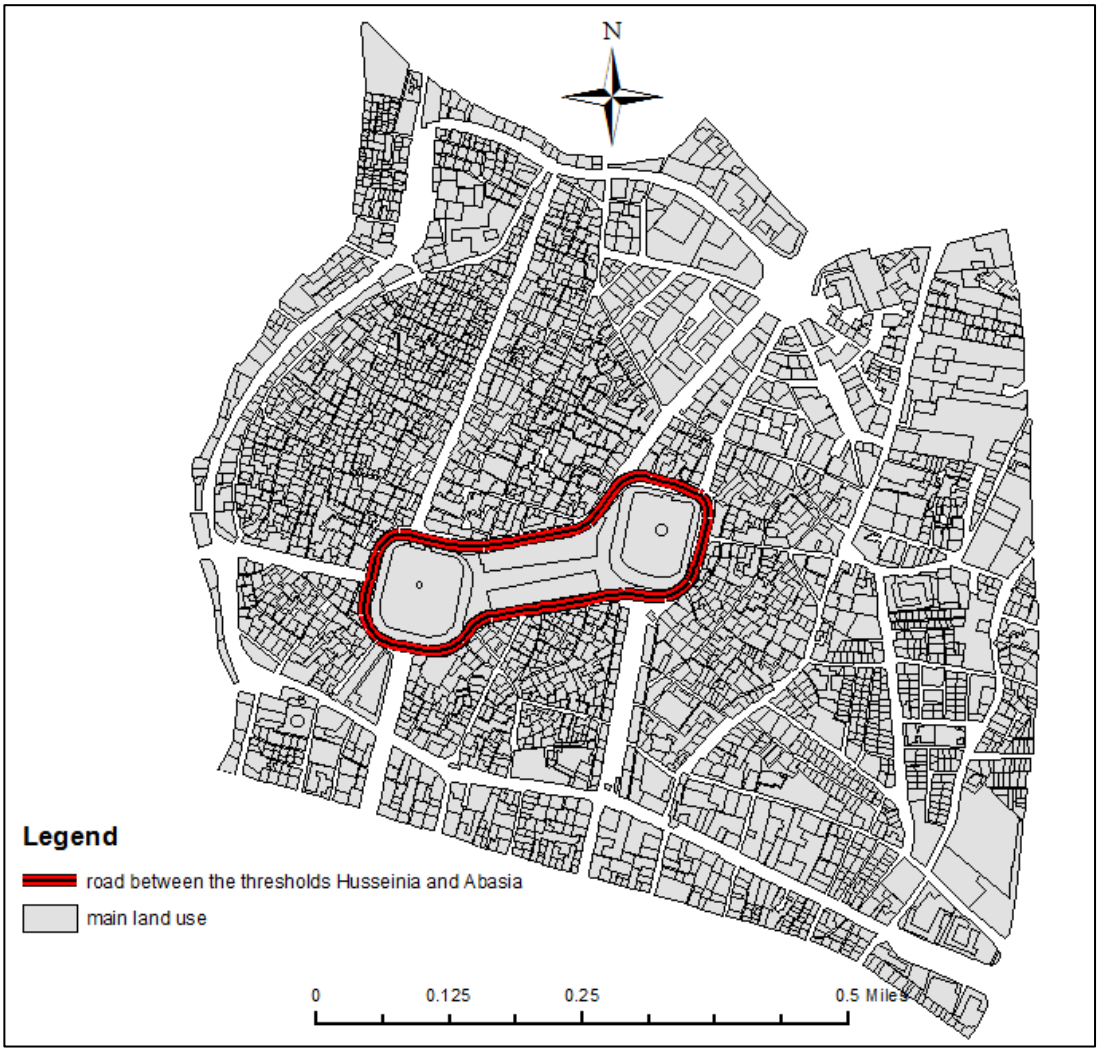

Figure 4-25 The boundary road between the shrines of Husseinia and Abbasia

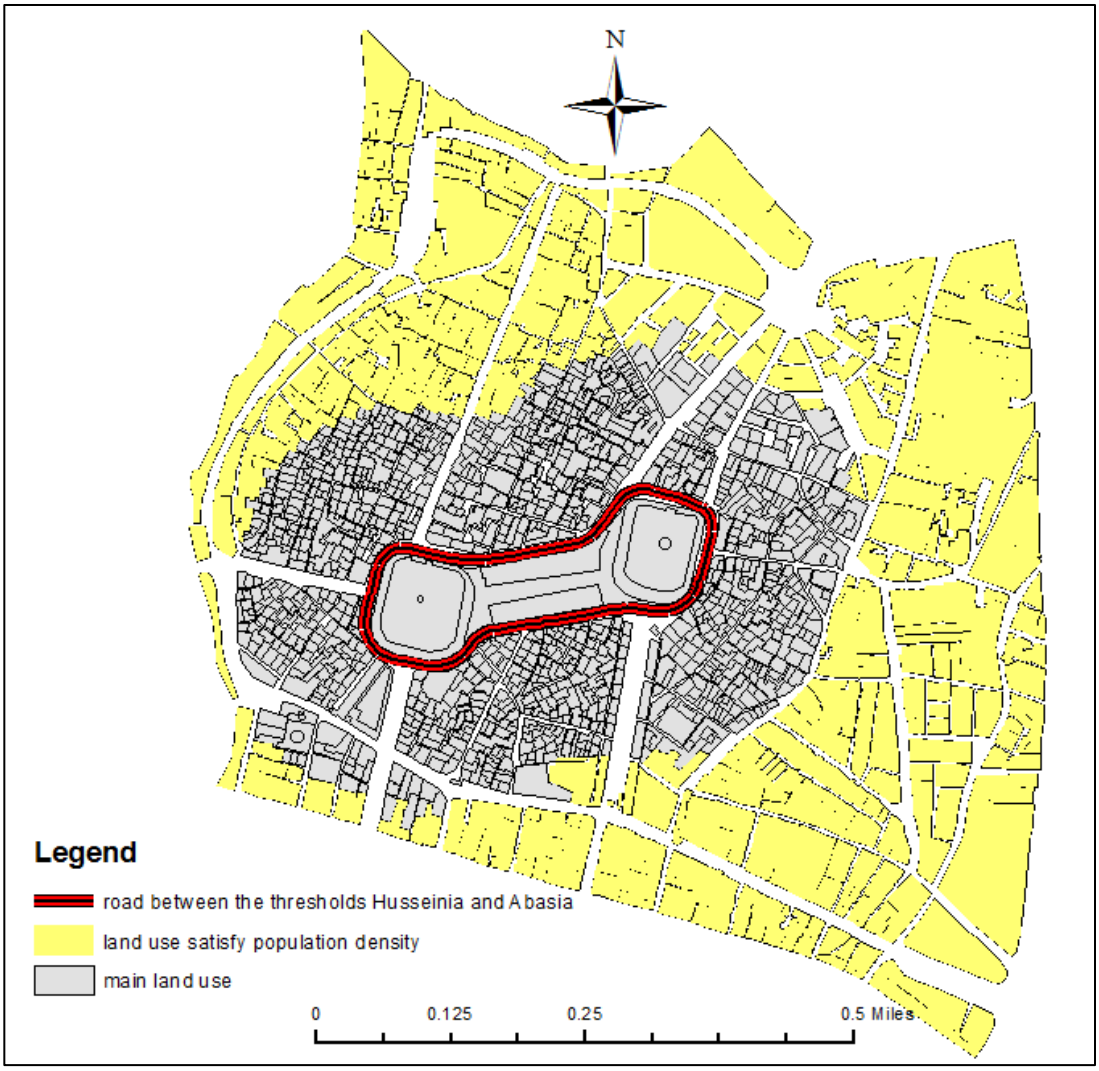

Figure 4-26 Selected land use that satisfied population density criterion

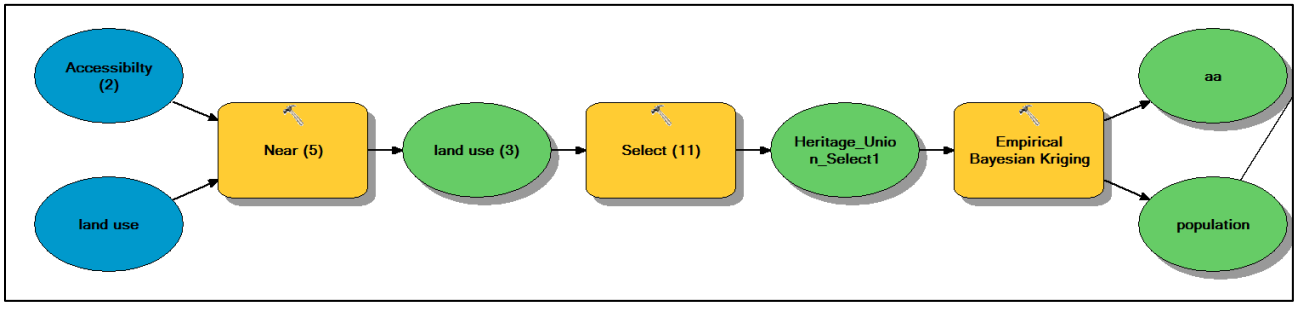

Figure 4-27 Empirical Bayesian Kinging used to distribute population criterion

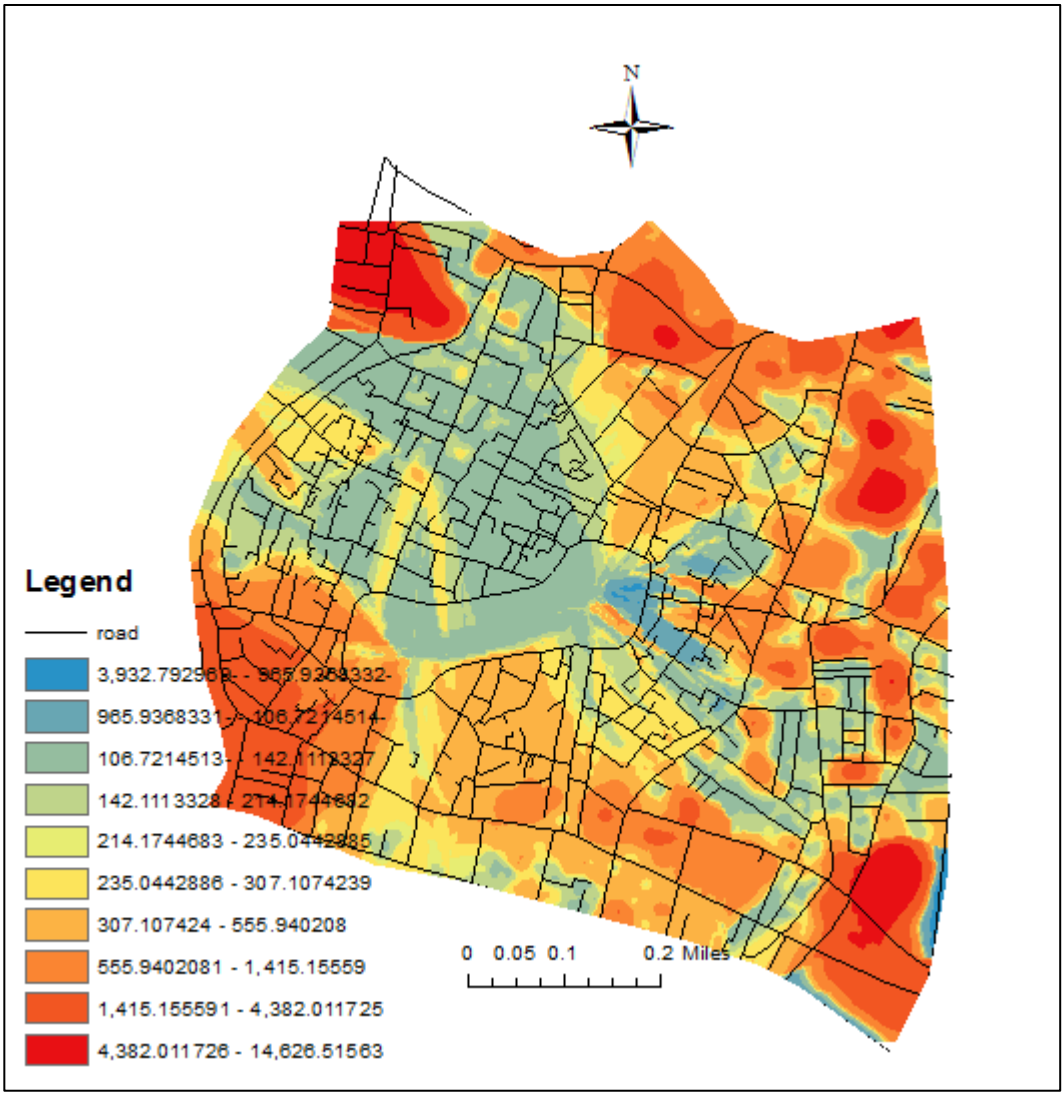

Figure 4-28 Population criterion distributed in case study

4.4.4 Distance from absorbing excursion space process

The forth criterion is distance from absorbing excursion space, so people are no longer content spending entire days and weekends adding unnecessary miles to their vehicles

Explain these criteria in more details showed in Chapter 2. where this distance divides: for the small cities of less than 250,000 inhabitants, walk distance ranges between 200 to 320 meters in the case of situations where cars remain a long time (long-term positions), while walk distance

ranges between 66 meters to 120 meters in the case of situations where cars remain for a short time (short-term) positions (Raheleh Farzanmanesha 2010).

Population in HKCC more than 250000 and the parking type is short time (as proved from the related questionnaire) so the distance of absorbing distance is as can be seen in Table 4.18.

Table 4-18 Maximum walking distance from tourist absorbing centers, after Farzanmanesha et al. (2010)

Population	**Parking Type**	
	Short time	**Long time**
< 250000	66-120 m	200-320 m
> 250000	166-267	330-501

consequently, such distance entered to the model of GIS to gain the area of land use that satisfy this criterion, as can be seen in the model in Fig. 4.32.

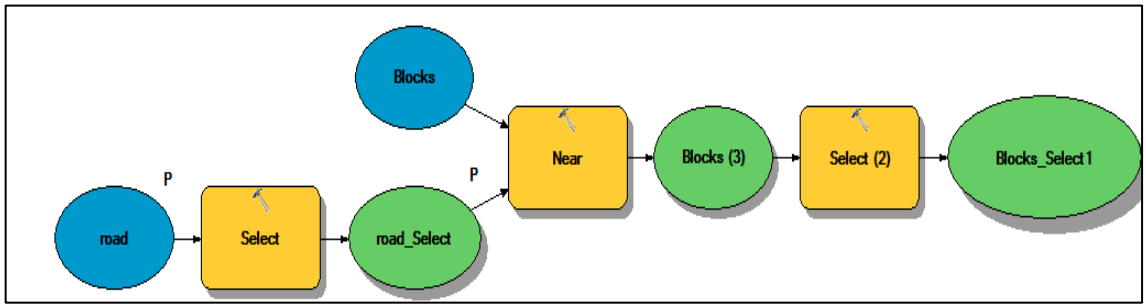

Figure 4-29 Part of model for sit selection car parking related with Distance from absorbing excursion space process

After run the model in GIS program, the model select the areas of land that satisfied the distance from absorbing excursion space demonstrated in Fig. 4.33, the colour blue explain the area have this distance.

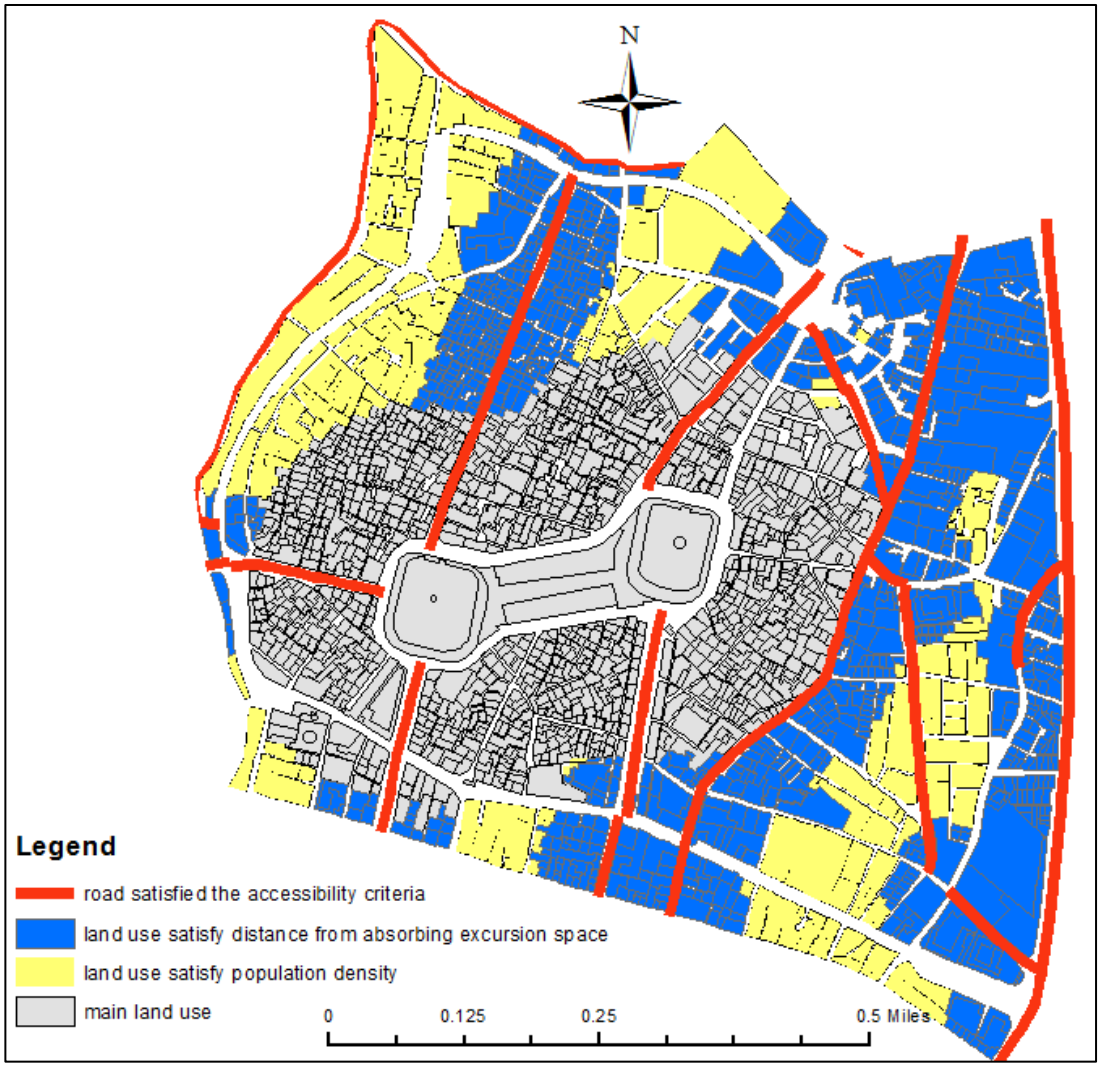

Figure 4-30 Distance from absorbing excursion space

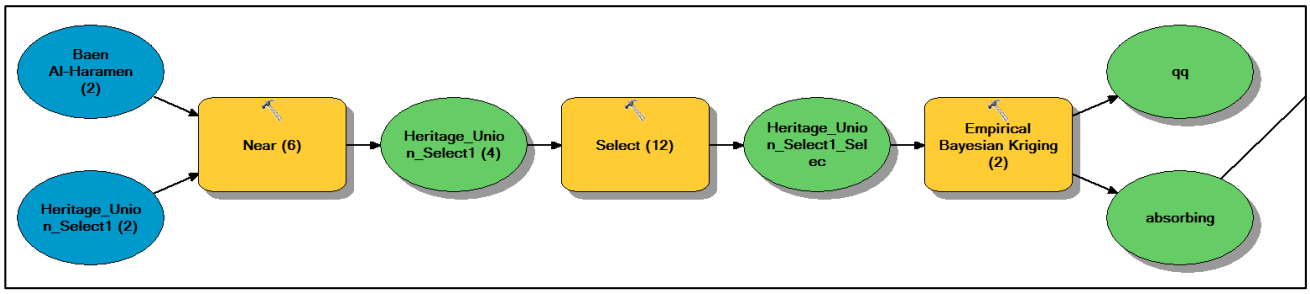

Figure 4-31 Empirical Bayesian Kinging used to distribute distance from absorbing criterion

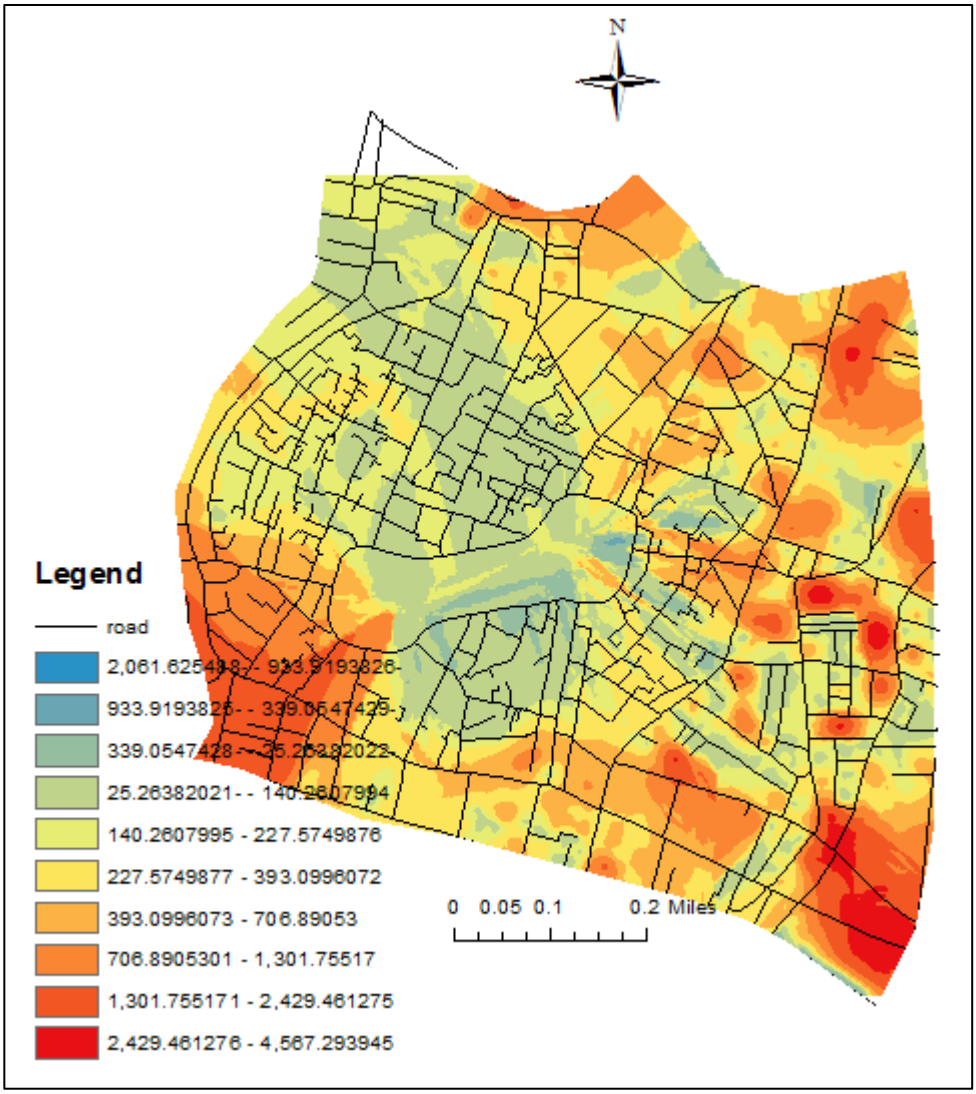

Figure 4-32 Distance from absorbing criterion distributed in case study

4.4.5 Cost of land process

The fifth important criterion is cost of land use and cost of establish parking. Questionnaire has been achieved to establish this cost. However, questionnaire results indicated that the cost of erected for each square meter equal to; 250,000 ID/m² for ground floor and 562,000ID/m² for each store. And cost of land equal to; land near to holy shrines for each square meter 10,000,000ID and out the boundary line for each square meter

7,000,000ID. All these information entered to the land use layer of GIS program. In chapter 2 all details related with this criterion has been explained, so the model to distinguish the cost in the land use as can be seen in Fig. 4.36.

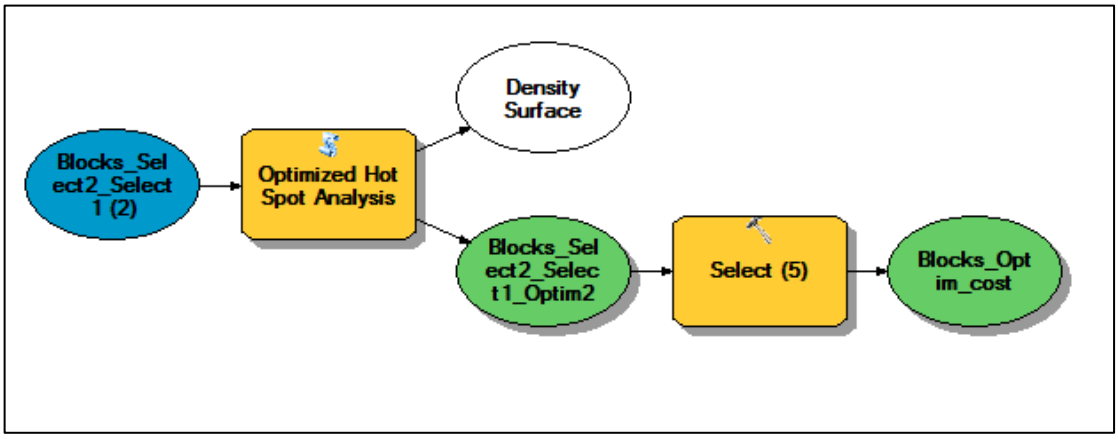

Figure 4-33 Part of model for sit selection car parking related with cost

However, the production of this model as can be noticed in Fig. 4.37, which portrait the lowest land use selected by GIS.

After that the Empirical Baysian Krinking had been used to distribute cost criterion in case study, consequently, the model of this operation explain in Fig. 4.37, accordingly, the result had been gotten from Fig. 4.37 low weight had been given high value of cost and high weight had been given low value of cost, subsequently, to explain the low cost is important than the high cost, afterward, the map in Fig. 4.37 had been used in next step, aimed at, the final combination result had been given.

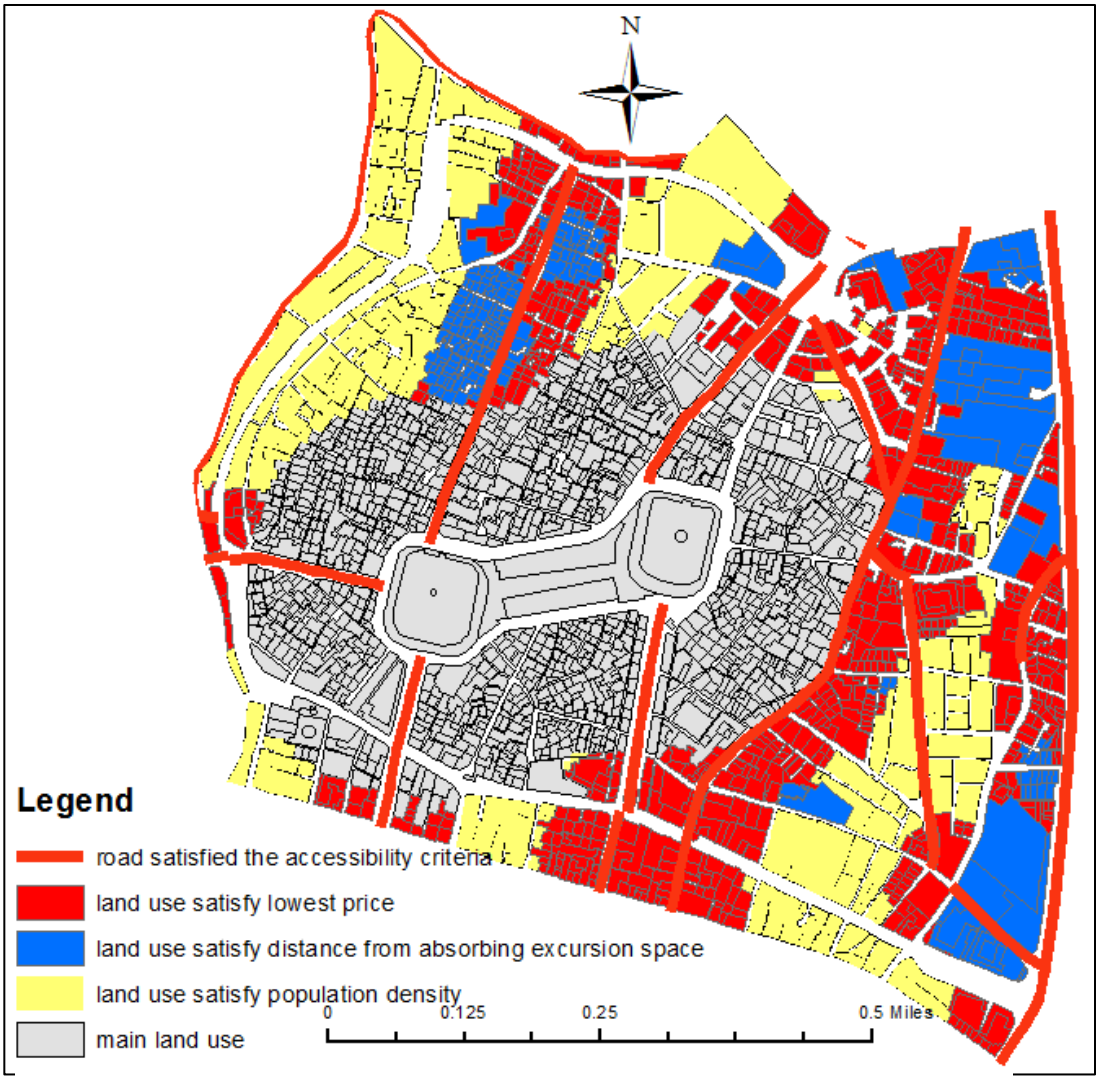

Figure 4-35 Result of medel of GIS that determine the cost of car parking

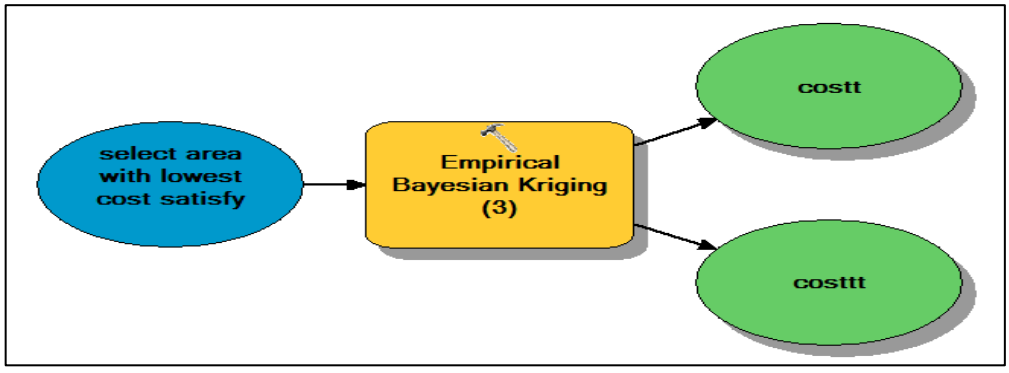

Figure 4-34 Empirical Bayesian Kinging used to distribute cost criterion

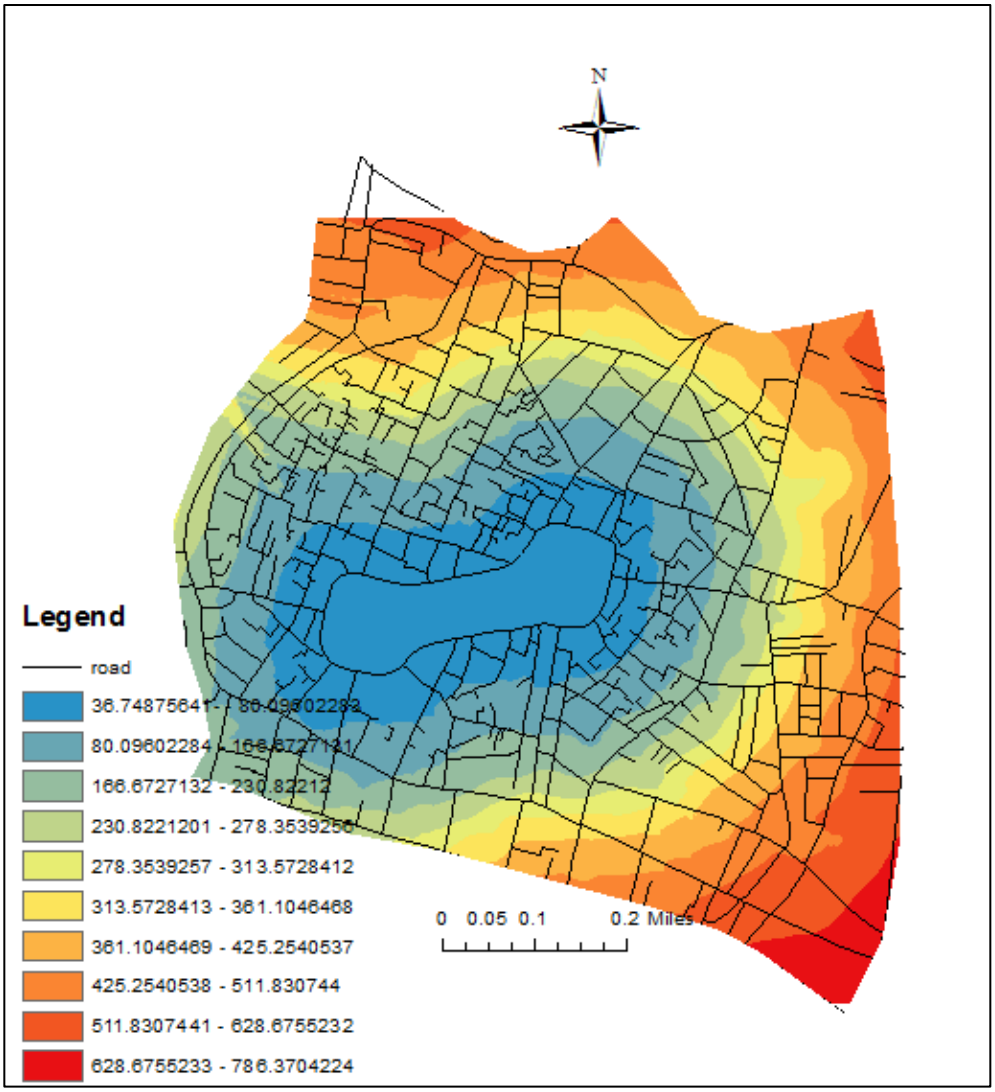

Figure 4-36 Cost criterion distributed in case study

4.4.6 Relationship between demand and supply.

The sixth important criterion is relation between demand and supply. To establish car parking, the quantity of demand must take in considerations, so to supply the suitable magnitude of car parking. The relation between the demand and supply must have the same value, or as much as near magnitude.

The land use that satisfied above criteria had been gotten, as well as, the equation 4.4 that got from determination parking bay characteristics,

then, this equation had been entered to this land use to get the land use that have high number of supply, after that Empirical Baysian Krinking had been used to distribute supply car parking as in Fig. 4.40, consequently, supply car parking had been distributed in Fig 4.41

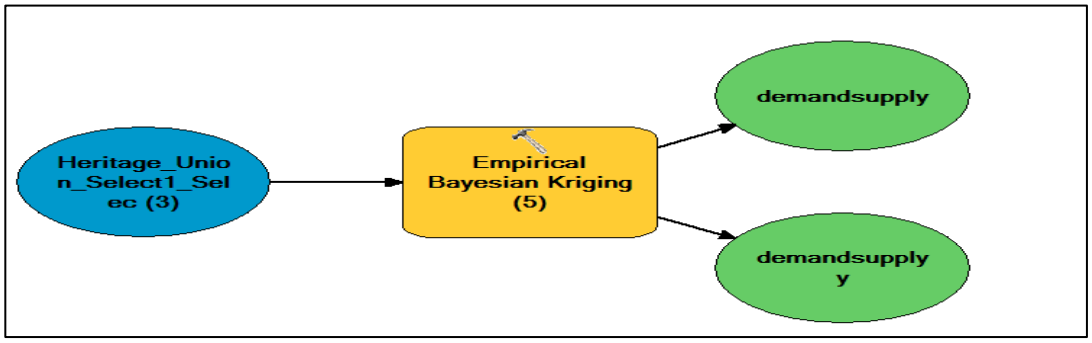

Figure 4-37 Empirical Bayesian Kinging used to distribute supply car parking in land use

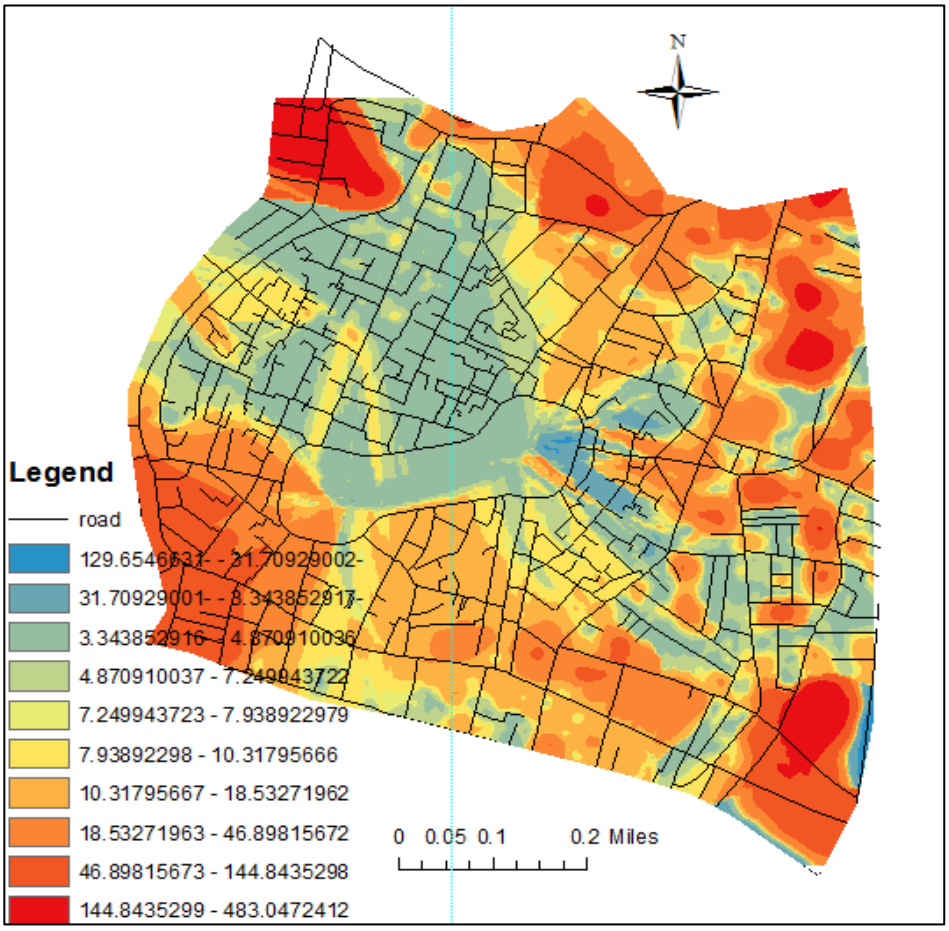

Figure 4-38 Supply car parking in land use distributed in case study

4.4.7 Travel time

Seventh criterion is travel time, afterward that the travel time in each street has been determined using travel car, and travel time for; walking distance, upload, and download. Travel time had been entered to each street in the layer in GIS, after that convert each road from polyline to polygon in GIS program, and distributed travel time in study area by using Empirical Baysian Krinking Fig.4-39, consequently, the travel time had been distributed in Fig. 4.40.

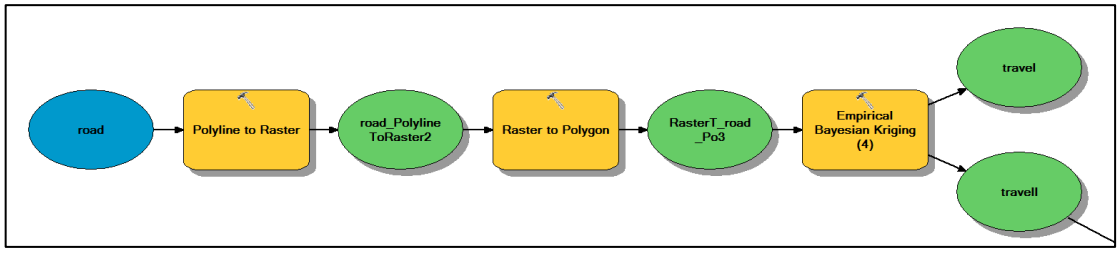

Figure 4-39 Empirical Bayesian Kinging used to distribute travel time

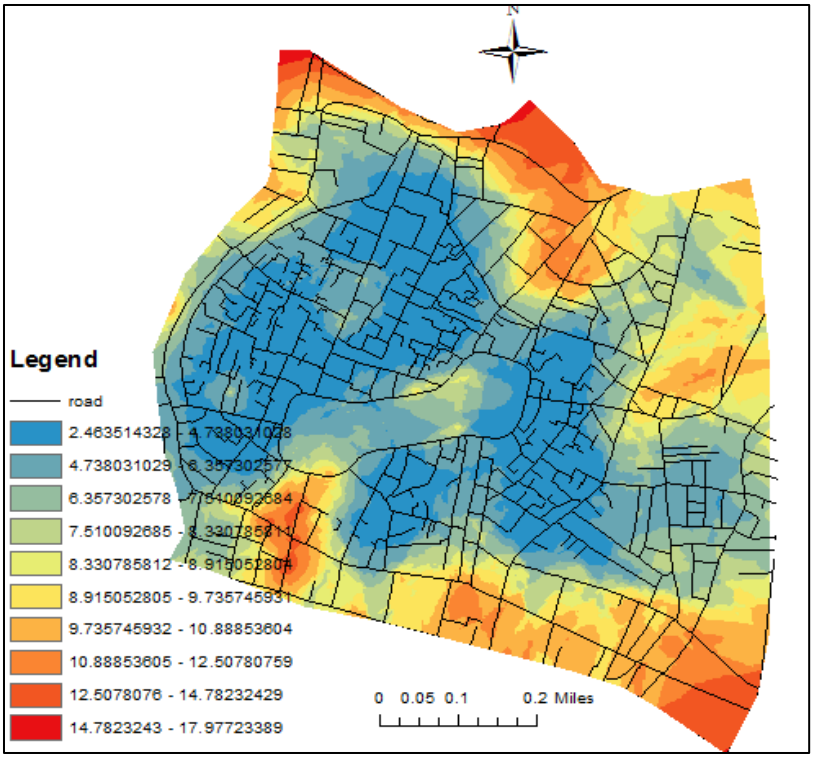

Figure 4-40 Travel time criterion distributed in case study

4.4.8 Using AHP model for solve complex multi-criteria

Seven criteria had been used to select best position for car parking in HKCC, therefore, using number in Table 2.7 to give each criteria number according there important, then, criteria's important had been given by expert as explain in Table 4.19, accordingly, the weight had been gotten from AHP model explain in tenth column in Table 4.20.

Table 4-*19*-AHP model

	population	Accessibility	land use	absorbing	cost	supply	travel time
population	1	2	3	4	3	5	5
Accessibility	0.5	1	2	8	3	4	5
land use	0.333	0.5	1	7	2	6	5
absorbing	0.250	0.125	0.143	1	3	6	5
cost	0.333	0.333	0.500	0.333	1	4	5
supply	1.000	0.250	0.167	0.167	0.250	1	2
travel time	0.200	0.200	0.200	0.200	0.200	0.5	1
	3.417	4.208	6.810	20.500	12.250	26	27

Table 4-*20*- Weight for each criterion

	population	Accessibility	land use	absorbing	cost	supply	travel time		
population	0.293	0.475	0.441	0.195	0.245	0.192	0.185	2.026	28.943
Accessibility	0.146	0.238	0.294	0.390	0.245	0.154	0.185	1.652	23.598
land use	0.098	0.119	0.147	0.341	0.163	0.231	0.185	1.284	18.342
absorbing	0.073	0.030	0.021	0.049	0.245	0.231	0.185	0.833	11.907
cost	0.098	0.079	0.073	0.016	0.082	0.154	0.185	0.687	9.816
supply	0.293	0.059	0.024	0.008	0.020	0.038	0.074	0.518	7.395
travel time	0.059	0.048	0.029	0.010	0.016	0.019	0.037	0.218	3.111

The weight had been gotten from Table 4.20 entered in Raster Calculation tool in GIS program, accordingly, the final model with Raster calculation is explained in Fig. 4.41. The weight had been inserted in Raster Calculation tool to get the final weight for all criteria is clarified in Fig. 4.42, subsequently; final weight had been gained in Fig 4.43 and the best position for car parking had been explained with dark colour.

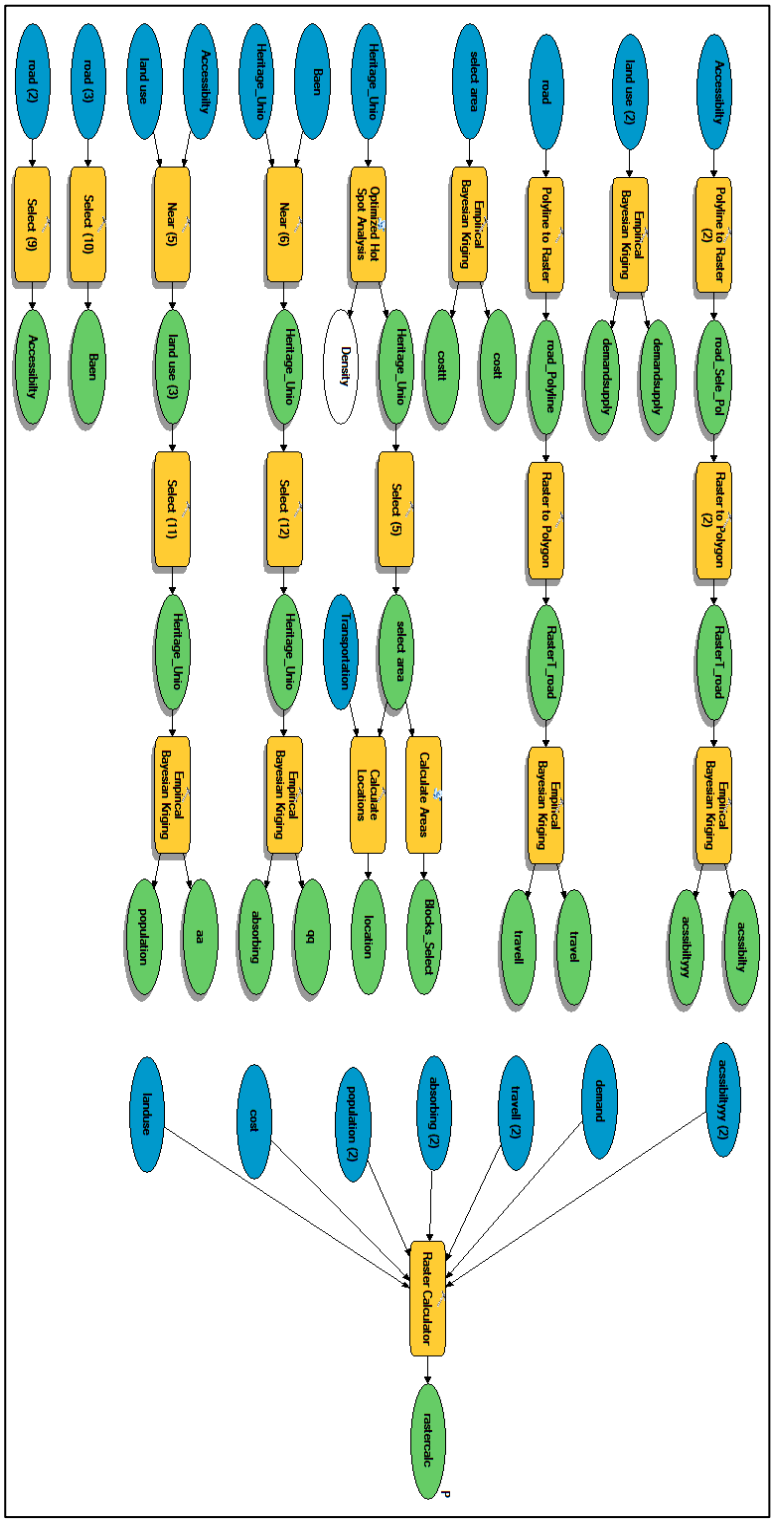

Figure 4-41 Final model in GIS program

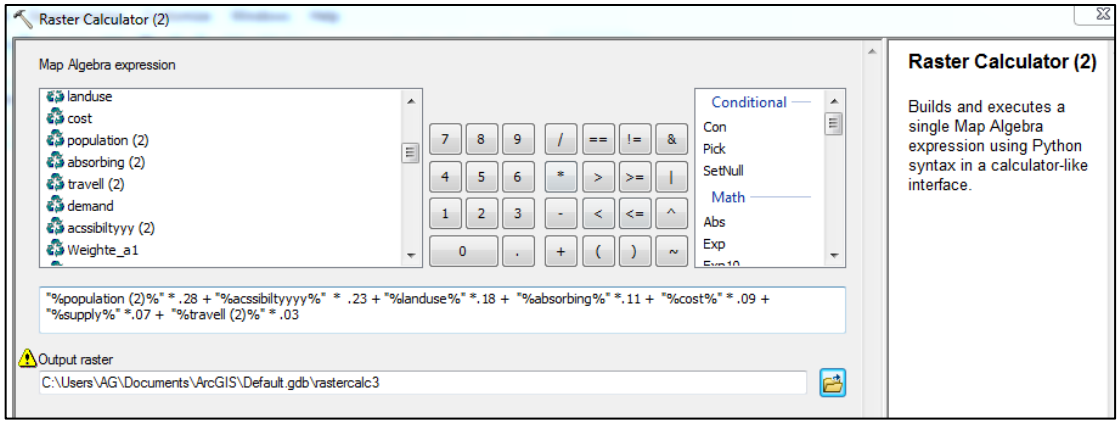

Figure 4-42 Inserting weight for each criteria in Raster calculation tool

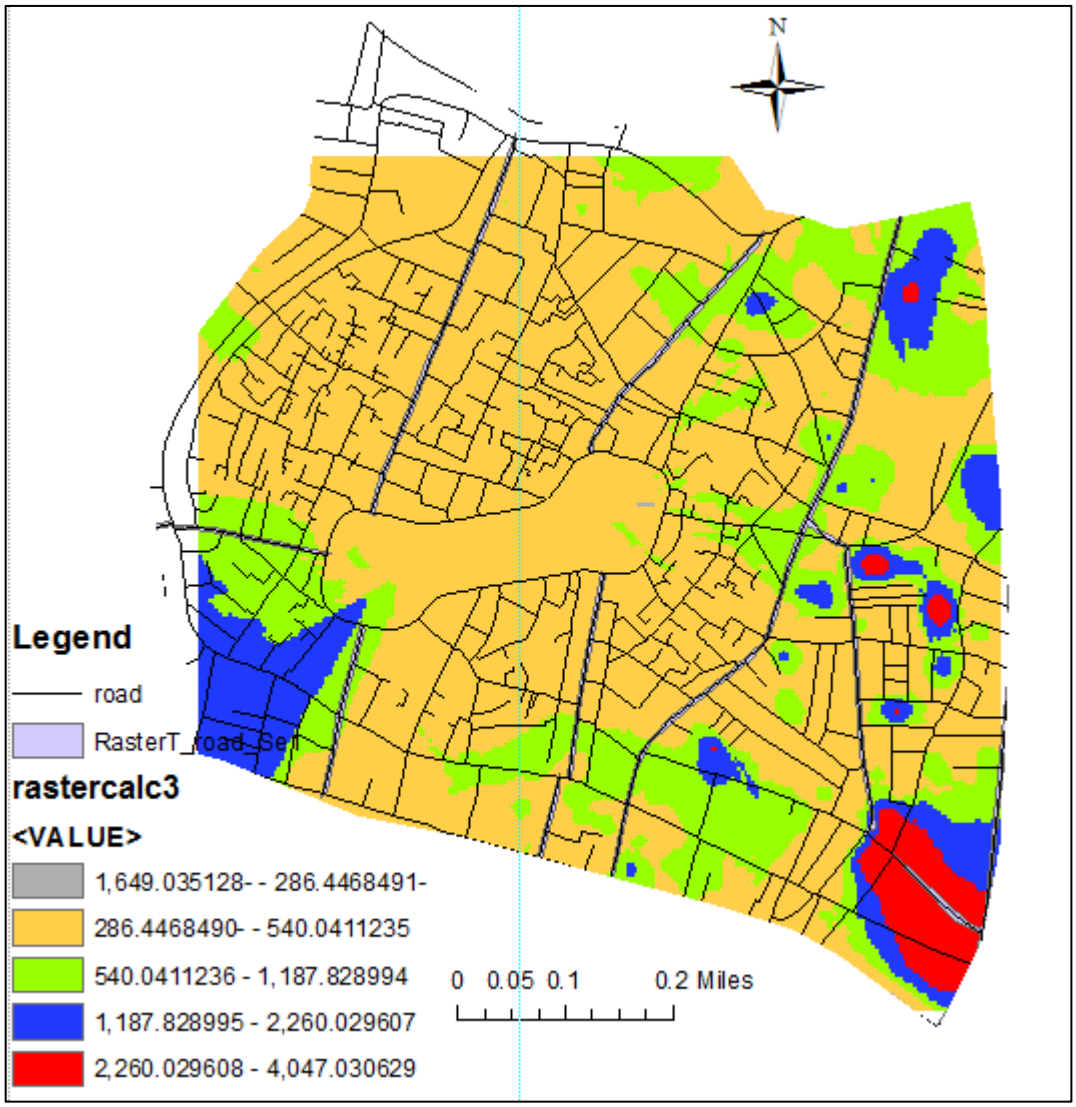

Figure 4-43 Final result of best position for car parking location

4.5 Using multi story car parking

The equation of each type of land use had been gotten from questionnaire as is explained in Table 4-14, therefore, these equations is used for determination the total demand for each type of land use in GIS program. From Fig. 4-44 the total demand for all land use is found to be 26529 spaces, consequently, the total demand had been divided such as in Fig. 4-45. In Fig. 4-45 the total demand had been divided for 4 part; land use near from Abbas Street, land use near from Al-Shuhadaa Street, land use near from Bab Tourij, and land use near from Bab Bagdad, subsequently, The demand car parking for Husseinia shrine is 1990; demand car parking for Abbasia shrine is 1689. The percentage of visitor from each main street had been calculated is explained in Table 4-7, consequently, the total demand for Husseinia shrine and Abbasia shrine is collected, therefore their demands were multiplied by percentage for each main street. The demand from land use and demand from two shrines were collected to get total demand for each main street as explained below.

Abbas Street =40.32% (1990+1689) +7471 = 8954 space

Al-Shuhadaa =9.24% (1990+1689) +4868 = 5252 space

Bab Tourij = 29.68% (1990+1689) +3717 = 4951space

Bab Bagdad =20.76% (1990+1689) +9943 = 10806 space

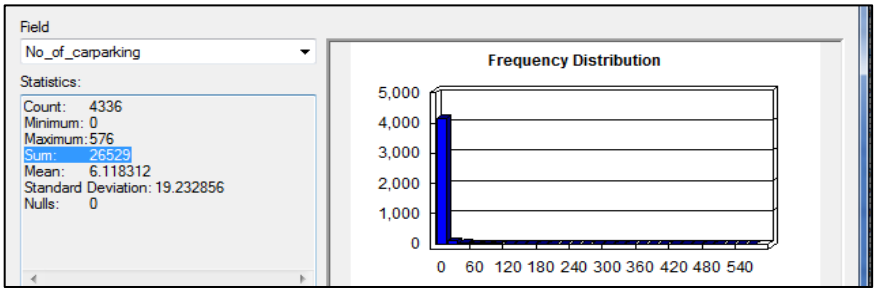

Figure 4-44 Total demand for land use in case study

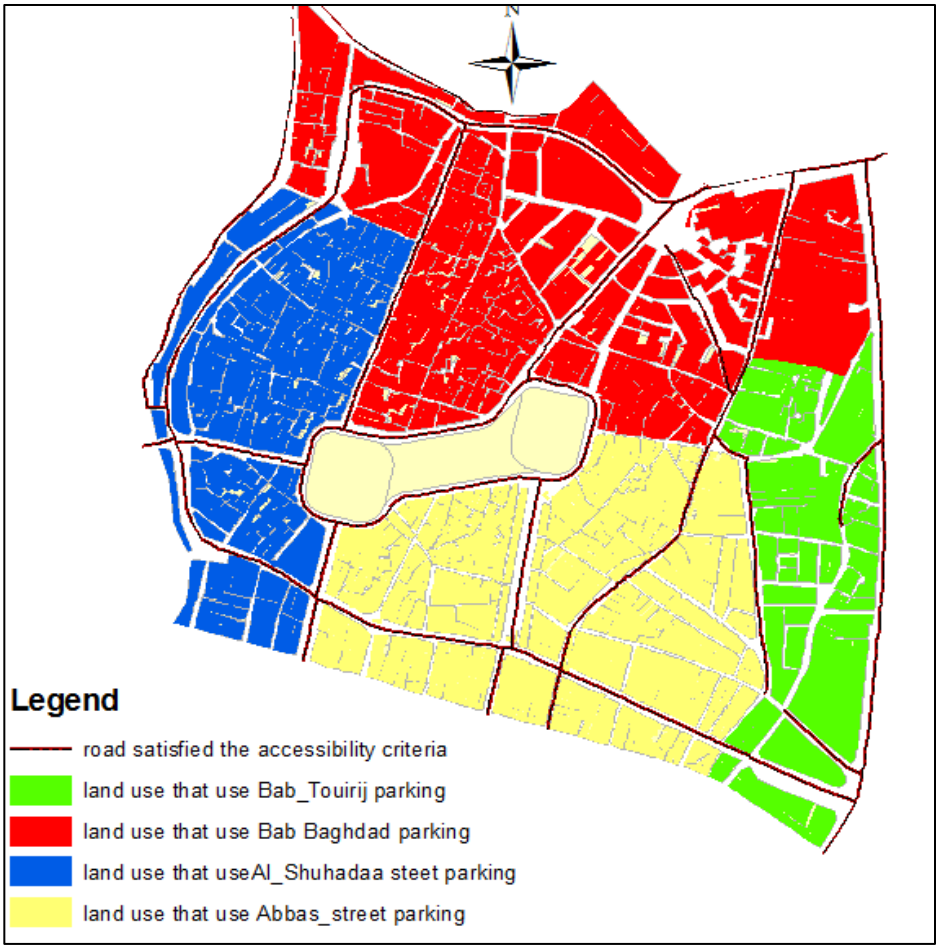

Figure 4-45 Divided land use according to parking that near from land use

The best position of car parking is explained in Fig. 4.43, as sequence, the land use that is applied in Fig. 4.43 is explained in Fig. 4.46. Therefore, the land use in Fig. 4.46 is indicated to land use that is satisfied the all criteria.

In Table 4.22 first step is determined the total area for land use in Fig. 4.46 as in column 2, consequently, second step is determine the supply car parking for each land use by using Equation 4.4 as in column 3. The total demand for each main street is explained in column 4, so the total demand in column 4 more than the supply in column 3, as result, the multi-story car parking had been design for each land use in Fig. 4.46. In column

5 the number of store had been determined from dividing the total demand over the supply car parking for each land use.

$$N.O.Space = 0.0334A \text{ …..4.4 ….}$$

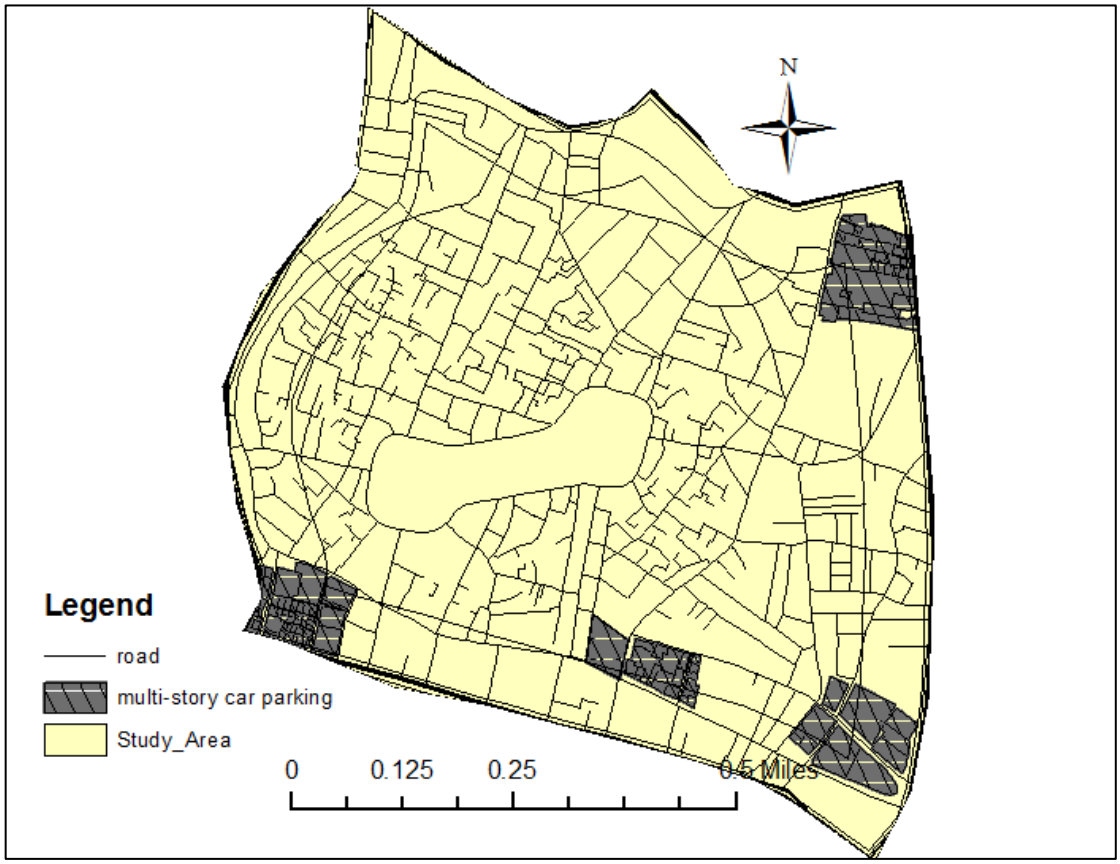

Figure 4-46 Best sit selection for multi- story car parking

Table 4-21 list of parking in HKCC

Name of main street	Total area from Fig 4-46 A	$N.O.Space = 0.0334A$ U	Total demand D	Number of store D/U
Abbas Street	19,373.45	639.32	8954	14
Al-Shuhadaa	26,515.37	875.00	5252	6
Bab Tourij	32,680.19	1078.44	4951	6
Bab Bagdad	32,405.50	1069.38	10806	10

The highest building permissible in the HKCC according to the master plan of the city is fourteen stories, consequently, this criterion has been adhered in determining the number of stories of each car parking

Chapter Five

Conclusions and Recommendations

Chapter 5

Conclusions and Recommendations

5.1 Conclusions

From the conducted surveying, data collection and analysis, the following can be concluded as a summary for this study:

1. After expert had been asked besides previous studies about criteria of car parking, seven criteria had been used to select car parking in the HKCC, consequently, this criteria can be adopted as significant criteria or best site selection for car parking; namely, distance from absorbing excursion space, population density, the relationship between demand and supply, the cost of land to be establish as parking, travel time, accessibility to parking, land use and activities for parking requirement.
2. The four best position of car parking had been gotten from GIS program.
3. Each car parking had been gotten from GIS is satisfied all criteria for best position and criteria of highest allowable of building.
4. The demand of shrines of Husseinia and Abbasia cover about 12.26% for total demand in HKCC, this percentage represents to the number of visitors use car parking.
5. North region(Bab Baghdad) of HKCC contain the biggest number of demand car parking, nearly, 36% of total demand, because of 40.32% of total visitors in shrines hand been came through Bad Baghdad, and 37.47% of total land use in this side.

6. West region of HKCC (Al-Shuhadaa Street) contain lowest number of demand for visitors in the shrines, about 9.24% from total number of visitors, but the percentage of land use higher than the east region about 18.34%. East region (Bab-Tourij) contain 29.68% for visitors and 14% of total demand
7. As a result from above point the east region lowest from west region in total parking demand (shrines demand, land use demand), west region 17.5% from total demand, and east region 16.5% from total demand.
8. Time of stay in the shrine about 3.5hr in Imam Husain and 3.8hr in Imam Abbas, add walking distance, for upload and download, so final result of remain time in parking 4.5hr, and 4.8hr, this time consider short time of stay in parking.

5.2 Recommendations for further work

1. It is highly recommended to continue updating data for this area when re exam for continuing development.
2. Applying such model in the other religious city is possible with accurate examination to the nominated criteria.
3. In this Thesis the model making in GIS program consider there are no any cars in street, so for developing this model making questionnaire for number of car in all street and subtract from the total demand.
4. The total demand of car parking increasing in each year so for important make questionnaire such as questionnaire making in this Thesis, to know the growth become the demand of car parking to make solution for this.

5. So if want design model of select car parking out of HKCC information is needed for land use, and study region if can find other criteria control on this region.
6. The car parking restriction (as it limited now a day) should be rise.
7. No on-street parking is allow in the city center, only short parking for up-loading or download is permit, to sustain the efficiency of the local traffic system
8. Up to medium buses is allow to park in the city center.

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Appendix A

Appendix A

Questionnaire paper

A.1 Questionnaire of employee of Husseinia and Abbasia shrine

1- Please state your home address?

2- do you have car

	Yes		No

3- are you come by private car

	Yes		No

4- If you said yes, where put it

5- Have you had put the car in the car park

6- What is the car that came by type?

	Small bus
	Private car
	Taxi
	Walk
	Medium bus
	Large bus
	Motorcycle
	Bicycle

	Private car rent
	car shrine
	Other type

7- How many people came with you in your trip?

A.3 Questionnaire of Car parking for land use in HKCC

Property code:

Date:

Name of survivor:

Please answer by ticking [√] the relevant boxes and following the instructions where appropriate. You may need to tick more than one box for each question.

Q1) is this property your:

	home		Business		Hotel		Residential building		other

Q2) type of the land use and no of car parking

Type of the land use	per	unit	No	No. of. Car parking	Note
Home	Dwelling unit	No			
Residential	Dwelling unit	No			
Hotel	room	No			
	sweet	No			
Hospital	No of bed	No			
	Area of floor	m²			
Heritage	Area	m²			
Commercial	Area	m²			
Educational	Area	m²			
Governmental	Area	m²			
Public	Area	m²			
Vacant	Area	m²			
Agriculture	Area	m²			
Medical clinic	Area	m²			
Religious	Area	m²			
Restraint high quality	area	m²			
Restraint low	area	m²			
Industrial	area	m²			
Work shops	area	m²			
shopping	area	m²			

Q2) how many vehicles are there in the above property?

	None		One		Two		Three

If more please specify	

Q3) How many of these are parked on the street?

	None		One		Two		Three

If more please specify	

Q4) a) Do you have access to off street parking facilities?

	Yes		No

Q4) b) is this facility in the form of a driveway, garage or allocated parking space?

	Drive way		Garage		Allocated parking space

A.4 Questionnaire of visitors in HKCC for Husseinia and Abbasia shrine

Property code:

Date:

1. where are you come from

2. If you come for visit only?

	Yes		No

3. If you said No please explain your destination

Customer for shops, banks etc. ☐ visiting the doctor's surgery ☐

go to work ☐ Park and commute ☐

Resident or visiting a resident ☐

Other ☐ Please Specify: _____

4. do you have car

	Yes		No

5. are you come by private car

	Yes		No

6. If you said yes, where put it

7. Have you had put the car in the car park

	Yes		No

8. what is the car that came by type

	Small bus
	Private car
	Taxi
	Walk
	Medium bus
	Large bus
	Motorcycle
	Bicycle
	Private car rent
	Other type

9. what is the duration of visit

10. how many people came with you in your trip

Appendix B

Appendix B

Data of questionnaire

B.1 Data of Questionnaire of visitors in HKCC for Husseinia shrine

Table B-1Data collect from questionnare

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mines	time in hr.
1	B	1	0	0	0	A	2	45	0.75
2	BG	1	1	1	1	A	4	120	2
3	N	1	0	0	0	C	3	60	1
4	BG	1	1	1	0	B	4	120	2
5	BB	1	0	0	0	E	2	150	2.5
6	N	1	1	1	1	B	4	120	2
7	BG	1	0	0	0	E	2	60	1
8	B	1	1	1	1	E	11	120	2
9	B	1	1	1	0	F	28	180	3
10	K	1	0	0	0	E	5	120	2
11	BB	1	0	0	0	F	11	360	6
12	B	0	0	0	0	F	50	360	6
13	K	1	1	1	0	B	4	360	6
14	BB	1	0	0	0	E	3	180	3
15	K	1	0	0	0	E	1	120	2
16	BB	1	0	0	0	A	1	360	6
17	KW	1	0	0	0	E	11	180	3
18	BG	1	1	1	0	E	14	240	4
19	K	1	1	1	0	E	2	120	2
20	K	1	0	0	0	E	4	120	2
21	BB	1	0	0	0	E	12	240	4
22	K	1	0	0	0	E	12	360	6
23	BB	1	1	1	0	B	2	240	4
24	BB	1	0	0	0	F	2	120	2
25	KW	1	0	0	0	E	11	360	6
26	BG	0	0	0	0	F	4	360	6
27	M	1	0	0	0	E	5	120	2
28	B	1	0	0	0	F	50	240	4
29	N	1	0	0	0	E	5	120	2
30	BB	1	0	0	0	E	11	150	2.5
31	N	1	1	1	0	B	3	120	2

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mines	time in hr.
32	BB	1	1	1	0	B	5	120	2
33	K	1	0	0	0	E	2	120	2
34	KW	1	0	0	0	E	11	180	3
35	BB	1	1	1	1	B	6	180	3
36	N	1	0	0	0	E	1	240	4
37	DW	1	1	1	1	A	4	120	2
38	DW	1	1	1	1	A	4	120	2
39	DW	1	0	0	0	E	10	240	4
40	N	1	0	0	0	E	2	240	4
41	N	1	0	0	0	E	2	240	4
42	DW	1	0	0	0	E	14	210	3.5
43	BG	1	1	1	0	B	7	90	1.5
44	BB	1	1	1	0	B	3	120	2
45	N	1	1	1	1	B	5	30	0.5
46	BB	1	0	0	0	E	5	240	4
47	K	0	0	0	0	I	30	240	4
48	BG	1	1	1	0	B	7	60	1
49	BG	1	1	1	0	B	7	180	3
50	N	1	0	0	0	E	1	60	1
51	N	1	1	1	0	B	5	180	3
52	K	1	0	0	0	C	4	30	0.5
53	N	1	1	1	0	B	7	60	1
54	K	1	1	0	0	D	3	30	0.5
55	BG	1	1	1	0	E	14	240	4
56	KW	1	0	0	0	E	4	120	2
57	K	1	1	1	0	E	2	120	2
58	KW	1	1	1	1	B	4	120	2
59	K	1	0	0	0	E	4	120	2
60	KW	1	0	0	0	E	4	120	2
61	BB	1	0	0	0	E	12	240	4
62	N	1	1	1	0	B	3	180	3
63	K	1	0	0	0	E	12	360	6
64	BB	1	1	1	0	B	2	240	4
65	N	1	0	0	0	E	3	180	3
66	BB	1	0	0	0	F	2	120	2
67	BG	1	1	0	1	B	8	180	3
68	KW	1	0	0	0	E	11	240	4
69	KW	1	0	0	0	E	11	240	4
70	BG	0	0	0	0	F	4	240	4
71	M	1	0	0	0	E	5	120	2
72	KW	1	0	0	0	F	1	120	2

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mines	time in hr.
73	B	1	0	0	0	F	50	240	4
74	N	1	1	1	0	B	2	60	1
75	N	1	0	0	0	E	5	120	2
76	BB	1	0	0	0	E	11	150	2.5
77	BB	1	1	1	0	B	1	180	3
78	K	1	0	0	0	C	4	30	0.5
79	N	1	0	0	0	E	3	60	1
80	N	1	1	1	0	B	3	240	4
81	NS	1	0	0	0	B	4	240	4
82	B	1	1	1	0	B	4	240	4
83	K	1	0	0	0	E	3	60	1
84	DY	1	1	1	0	B	3	240	4
85	N	1	1	1	0	E	8	180	3
86	DW	1	1	1	0	B	6	120	2
87	BG	1	0	0	0	E	5	120	2
88	BB	1	1	1	0	B	4	360	6
89	BB	1	1	1	0	B	4	300	5
90	DW	1	1	1	0	B	3	90	1.5
91	BG	0	1	1	0	B	2	60	1
92	K	1	0	0	0	E	2	120	2
93	K	1	1	0	0	C	2	120	2
94	K	1	0	0	0	C	2	60	1
95	K	1	0	0	0	E	2	180	3
96	B	1	0	0	0	E	25	120	2
97	K	1	0	0	0	C	3	120	2
98	DW	1	0	0	0	E	11	360	6
99	K	1	0	0	0	E	4	180	3
100	K	1	0	0	0	E	3	120	2
101	N	1	0	0	0	E	5	300	5
102	K	1	0	0	0	C	1	90	1.5
103	K	1	0	0	0	E	5	90	1.5
104	BB	1	0	0	0	E	1	30	0.5
105	N	1	1	1	0	B	1	90	1.5
106	B	1	0	0	0	F	3	300	5
107	K	0	0	0	0	C	1	30	0.5
108	K	1	0	0	0	E	4	180	3
109	N	1	1	1	0	B	2	90	1.5
110	K	1	0	0	0	G	1	20	0.3
111	N	1	0	0	0	E	2	180	3.0
112	BG	1	0	0	0	E	2	360	6.0
113	BB	1	0	0	0	E	2	360	6.0

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mines	time in hr.
114	BG	1	0	0	0	E	3	120	2.0
115	K	1	0	0	0	E	3	180	3
116	BG	1	1	1	0	E	12	120	2
117	BG	1	1	1	0	E	20	60	1
118	BG	1	0	0	0	E	18	120	2
119	N	1	1	1	0	E	13	60	1
120	B	1	0	0	0	F	28	300	5
121	B	0	0	0	0	C	1	30	0.5
122	K	1	0	0	0	C	1	60	1
123	K	1	0	0	0	E	1	60	1
124	K	1	0	0	0	E	2	60	1
125	N	1	1	1	0	A	5	60	1
126	BB	1	1	0	1	E	10	180	3
127	BG	1	1	1	0	E	5	240	4
128	B	1	1	1	0	B	8	360	6
129	N	1	0	0	0	C	4	180	3
130	DY	1	0	0	0	F	19	180	3
131	DY	1	0	0	0	F	19	240	4
132	DY	1	0	0	0	F	19	120	2
133	DY	1	0	0	0	F	19	180	3
134	DW	1	0	0	0	E	11	240	4
135	N	1	0	0	1	E	7	30	0.5
136	BB	1	0	0	0	E	14	120	2
137	BG	1	1	1	0	A	4	120	2
138	K	1	0	0	0	B	5	240	4
139	BG	1	0	0	0	E	17	240	4
140	BB	1	1	1	0	E	1	60	1
141	N	1	0	0	0	E	3	60	1
142	BB	1	1	1	0	B	1	180	3
143	N	1	1	1	0	B	2	60	1
144	KW	1	0	0	0	E	1	120	2
145	KW	1	0	0	0	E	11	240	4
146	N	1	0	0	0	E	3	180	3
147	N	1	1	1	0	B	3	180	3
148	KW	1	0	0	0	E	4	120	2
149	KW	1	1	1	1	B	4	120	2
150	KW	1	0	0	0	E	4	120	2
151	K	1	1	0	0	D	3	30	0.5
152	N	1	1	1	0	B	7	60	1
153	BB	1	0	0	0	E	7	60	1
154	BB	1	1	1	0	A	1	120	2

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mines	time in hr.
155	N	1	0	0	0	E	2	180	3
156	N	1	0	0	0	E	1	60	1
157	K	1	0	0	0	C	1	60	1
158	BG	1	1	1	0	E	2	90	1.5
159	BB	1	1	1	0	B	7	240	4
160	N	1	0	0	0	C	4	120	2
161	BG	1	1	1	0	E	3	150	2.5
162	K	1	0	0	0	F	2	120	2
163	BB	1	0	0	0	E	2	90	1.5
164	KW	1	1	1	0	B	9	180	3
165	K	0	0	0	0	C	5	120	2
166	K	1	0	0	0	E	6	360	6
167	BG	1	1	1	0	E	14	300	5
168	BG	1	1	1	0	B	7	180	3
169	BB	0	0	0	0	E	240	360	6
170	K	0	0	0	0	C	1	180	3
171	K	1	0	0	0	E	1	180	3
172	N	1	0	0	0	E	5	180	3
173	BB	1	0	0	0	E	5	60	1
174	N	1	1	1	0	B	3	15	0.25
175	B	1	0	0	0	F	45	60	1
176	K	1	0	0	0	F	8	180	3
177	K	1	0	0	0	C	5	60	1
178	N	1	1	1	1	B	5	360	6
179	BG	1	1	1	1	B	2	240	4
180	BG	1	1	1	0	B	5	300	5
181	KK	1	1	1	0	B	3	120	2
182	K	1	0	0	0	E	3	30	0.5
183	DW	1	1	1	0	B	4	90	1.5
184	K	1	0	0	0	E	4	90	1.5
185	K	1	1	1	0	F	30	240	4
186	BG	1	0	0	0	F	25	360	6
187	K	1	0	0	0	C	2	30	0.5
188	BG	1	0	0	0	F	24	120	2
189	B	1	0	0	0	F	50	240	4
190	K	1	1	1	0	B	14	30	0.5
191	K	1	0	0	0	E	1	60	1
192	K	1	0	0	0	F	30	120	2
193	K	1	0	0	0	C	12	60	1
194	N	1	0	0	0	E	18	120	2
195	BB	1	0	0	0	E	7	60	1

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mines	time in hr.
196	K	1	0	0	0	E	2	60	1
197	K	1	1	0	0	D	3	30	0.5
198	N	1	1	1	0	B	7	60	1
199	NS	1	0	0	0	B	4	240	4
200	K	1	0	0	0	E	3	60	1
201	BG	1	1	0	1	B	8	180	3
202	DY	1	1	1	0	B	3	240	4
203	N	1	1	1	0	E	8	180	3
204	DW	1	1	1	0	B	6	120	2
205	BG	1	0	0	0	E	5	120	2
206	BB	1	1	1	0	B	4	360	6
207	BB	1	1	1	0	B	4	300	5
208	DY	1	1	1	0	B	3	90	1.5
209	BG	0	1	1	0	B	2	60	1
210	K	1	0	0	0	E	2	120	2
211	K	1	1	0	0	C	2	120	2
212	K	1	0	0	0	C	2	60	1
213	K	1	0	0	0	E	2	180	3
214	B	1	0	0	0	E	25	120	2
215	K	1	0	0	0	C	3	120	2
216	DW	1	0	0	0	E	11	360	6
217	K	1	0	0	0	E	4	180	3
218	K	1	0	0	0	E	3	120	2
219	N	1	0	0	0	E	5	300	5
220	K	1	0	0	0	E	5	90	1.5
221	B	1	0	0	0	F	3	300	5
222	K	1	0	0	0	E	4	180	3
223	N	1	1	1	0	B	2	90	1.5
224	N	1	0	0	0	E	2	180	3
225	BG	1	0	0	0	E	2	360	6
226	BG	1	0	0	0	E	2	360	6
227	BG	1	0	0	0	E	3	120	2
228	K	1	0	0	0	E	3	180	3
229	BG	1	1	1	0	E	12	120	2
230	BG	1	1	1	0	E	20	60	1
231	BG	1	0	0	0	E	18	120	2
232	N	1	1	1	0	E	13	60	1
233	B	1	0	0	0	F	28	300	5
234	K	1	0	0	0	E	1	180	3
235	BG	1	1	1	0	E	5	240	4
236	N	1	0	0	0	E	1	180	3

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mines	time in hr.
237	K	1	0	0	0	E	2	60	1
238	N	1	1	1	0	A	5	60	1
239	BB	1	1	0	1	E	10	180	3
240	BG	1	1	1	0	F	3	60	1
241	K	1	0	0	0	E	3	30	0.5
242	BB	1	0	0	0	E	5	60	1
243	BG	1	0	0	0	F	24	120	2
244	K	1	1	1	0	B	14	30	0.5
245	DW	1	1	1	0	B	4	90	1.5
246	K	1	1	1	0	F	30	240	4
247	BG	1	0	0	0	F	25	360	6
248	K	1	0	0	0	C	2	30	0.5
249	B	1	0	0	0	F	50	240	4
250	K	1	0	0	0	E	4	90	1.5
251	K	1	0	0	0	F	30	120	2
252	K	1	0	0	0	C	12	60	1
253	N	1	0	0	0	E	18	120	2
254	K	1	0	0	0	E	1	60	1
255	K	1	0	0	0	C	5	60	1
256	N	1	1	1	0	B	3	15	0.25
257	B	1	0	0	0	F	45	60	1
258	B	1	1	1	0	B	8	360	6
259	K	0	0	0	0	C	1	180	3
260	N	1	0	0	0	C	4	180	3
261	DY	1	0	0	0	F	19	180	3
262	BB	0	0	0	0	E	4	360	6
263	BG	1	1	1	0	B	7	180	3
264	DW	1	0	0	0	E	11	240	4
265	BG	1	1	1	0	E	14	300	5
266	N	1	0	0	1	E	7	30	0.5
267	K	1	0	0	0	E	6	300	5
268	BB	1	0	0	0	E	14	120	2
269	K	0	0	0	0	C	5	120	2
270	BG	1	1	1	0	A	4	120	2
271	K	1	0	0	0	B	5	240	4
272	DW	1	1	1	0	B	9	180	3
273	BG	1	0	0	0	E	17	240	4
274	BB	1	0	0	0	E	2	90	1.5
275	B	1	0	0	0	A	2	45	0.75
276	BG	1	1	1	1	A	14	120	2
277	BG	1	1	1	0	E	3	150	2.5

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mines	time in hr.
278	N	1	0	0	0	C	3	60	1
279	N	1	0	0	0	C	4	120	2
280	BB	1	1	1	0	B	7	240	4
281	BG	1	1	1	0	B	4	120	2
282	BG	1	1	1	0	E	2	90	1.5
283	BB	1	0	0	0	E	2	150	2.5
284	K	1	0	0	0	C	1	60	1
285	N	1	1	1	1	B	4	120	2
286	N	1	0	0	0	E	1	90	1.5
287	BG	1	0	0	0	E	2	60	1
288	B	1	1	1	1	E	11	120	2
289	B	1	1	1	0	F	28	180	3
290	K	1	0	0	0	E	5	120	2
291	BB	1	0	0	0	F	11	360	6
292	B	0	0	0	0	F	50	360	6
293	N	1	0	0	0	E	2	180	3
294	BB	1	1	1	0	A	1	120	2
295	K	1	1	1	0	B	4	360	6
296	BB	1	0	0	0	E	3	180	3
297	BB	1	0	0	0	E	7	60	1
298	DW	1	0	0	0	E	11	180	3
299	N	1	0	0	0	E	1	60	1
300	N	1	1	1	0	B	5	180	3
301	K	1	0	0	0	C	4	30	0.5
302	N	1	1	1	0	B	7	60	1
303	K	1	1	0	0	D	3	30	0.5
304	BG	1	1	1	0	E	14	240	4
305	KW	1	0	0	0	E	4	120	2
306	K	1	1	1	0	E	2	120	2
307	KW	1	1	1	1	B	4	120	2
308	K	1	0	0	0	E	4	120	2
309	KW	1	0	0	0	E	4	120	2
310	BB	1	0	0	0	E	12	240	4
311	N	1	1	1	0	B	3	180	3
312	K	1	0	0	0	E	12	360	6
313	BB	1	1	1	0	B	2	240	4
314	N	1	0	0	0	E	3	180	3
315	BB	1	0	0	0	F	2	120	2
316	BG	1	1	0	1	B	8	180	3
317	KW	1	0	0	0	E	11	240	4
318	KW	1	0	0	0	E	11	240	4

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mines	time in hr.
319	BG	0	0	0	0	F	4	240	4
320	M	1	0	0	0	E	5	120	2
321	KW	1	0	0	0	F	1	120	2
322	B	1	0	0	0	F	50	240	4
323	N	1	1	1	0	B	2	60	1
324	N	1	0	0	0	E	5	120	2
325	BB	1	0	0	0	E	11	150	2.5
326	BB	1	1	1	0	B	1	180	3
327	K	1	0	0	0	C	4	30	0.5
328	N	1	0	0	0	E	3	60	1
329	N	1	1	1	0	B	3	240	4
330	NS	1	0	0	0	B	4	240	4
331	B	1	1	1	0	B	4	240	4
332	K	1	0	0	0	E	3	60	1
333	DY	1	1	1	0	B	3	240	4
334	N	1	1	1	0	E	8	180	3
335	DW	1	1	1	0	B	6	120	2
336	BG	1	0	0	0	E	5	120	2
337	BB	1	1	1	0	B	4	360	6
338	BB	1	1	1	0	B	4	300	5
339	DW	1	1	1	0	B	3	90	1.5
340	BG	0	1	1	0	B	2	60	1
341	K	1	0	0	0	E	2	120	2
342	K	1	1	0	0	C	2	120	2
343	K	1	0	0	0	C	2	60	1
344	K	1	0	0	0	E	2	180	3
345	B	1	0	0	0	E	25	120	2
346	K	1	0	0	0	C	3	120	2
347	DW	1	0	0	0	E	11	360	6
348	K	1	0	0	0	E	4	180	3
349	K	1	0	0	0	E	3	120	2
350	B	1	0	0	0	A	2	45	0.75
351	BG	1	1	1	1	A	4	120	2
352	N	1	0	0	0	C	3	60	1
353	BG	1	1	1	0	B	4	120	2
354	BB	1	0	0	0	E	2	150	2.5
355	N	1	1	1	1	B	4	120	2
356	BG	1	0	0	0	E	2	60	1
357	B	1	1	1	1	E	11	120	2
358	B	1	1	1	0	F	28	180	3
359	K	1	0	0	0	E	5	120	2

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mines	time in hr.
360	BB	1	0	0	0	F	11	360	6
361	B	0	0	0	0	F	50	360	6
362	K	1	1	1	0	B	4	360	6
363	BB	1	0	0	0	E	3	180	3
364	K	1	0	0	0	E	1	120	2
365	BB	1	0	0	0	A	1	360	6
366	KW	1	0	0	0	E	11	180	3
367	BG	1	1	1	0	E	14	240	4
368	K	1	1	1	0	E	2	120	2
369	K	1	0	0	0	E	4	120	2
370	BB	1	0	0	0	E	12	240	4
371	K	1	0	0	0	E	12	360	6
372	BB	1	1	1	0	B	2	240	4
373	BB	1	0	0	0	F	2	120	2
374	KW	1	0	0	0	E	11	360	6
375	BG	0	0	0	0	F	4	360	6
376	M	1	0	0	0	E	5	120	2
377	B	1	0	0	0	F	50	240	4
378	N	1	0	0	0	E	5	120	2
379	BB	1	0	0	0	E	11	150	2.5
380	N	1	1	1	0	B	3	120	2
381	BB	1	1	1	0	B	5	120	2
382	K	1	0	0	0	E	2	120	2
383	KW	1	0	0	0	E	11	180	3
384	BB	1	1	1	1	B	6	180	3
385	N	1	0	0	0	E	1	240	4
386	DW	1	1	1	1	A	4	120	2
387	DW	1	1	1	1	A	4	120	2
388	DW	1	0	0	0	E	10	240	4
389	N	1	0	0	0	E	2	240	4
390	N	1	0	0	0	E	2	240	4
391	DW	1	0	0	0	E	14	210	3.5
392	BG	1	1	1	0	B	7	90	1.5
393	BB	1	1	1	0	B	3	120	2
394	N	1	1	1	1	B	5	30	0.5
395	BB	1	0	0	0	E	5	240	4
396	K	0	0	0	0	I	30	240	4
397	BG	1	1	1	0	B	7	60	1
398	BG	1	1	1	0	B	7	180	3
399	N	1	0	0	0	E	1	60	1
400	K	1	0	0	0	E	3	120	2

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mines	time in hr.
401	N	1	0	0	0	E	5	300	5
402	K	1	0	0	0	C	1	90	1.5
403	K	1	0	0	0	E	5	90	1.5
404	BB	1	0	0	0	E	1	30	0.5
405	N	1	1	1	0	B	1	90	1.5
406	B	1	0	0	0	F	3	300	5
407	K	0	0	0	0	C	1	30	0.5
408	K	1	0	0	0	E	4	180	3
409	N	1	1	1	0	B	2	90	1.5
410	K	1	0	0	0	G	1	20	0.3
411	N	1	0	0	0	E	2	180	3.0
412	BG	1	0	0	0	E	2	360	6.0
413	BB	1	0	0	0	E	2	360	6.0
414	BG	1	0	0	0	E	3	120	2.0
415	K	1	0	0	0	E	3	180	3
416	BG	1	1	1	0	E	12	120	2
417	BG	1	1	1	0	E	20	60	1
418	BG	1	0	0	0	E	18	120	2
419	N	1	1	1	0	E	13	60	1
420	B	1	0	0	0	F	28	300	5
421	B	0	0	0	0	C	1	30	0.5
422	K	1	0	0	0	C	1	60	1
423	K	1	0	0	0	E	1	60	1
424	K	1	0	0	0	E	2	60	1
425	N	1	1	1	0	A	5	60	1
426	BB	1	1	0	1	E	10	180	3
427	BG	1	1	1	0	E	5	240	4
428	B	1	1	1	0	B	8	360	6
429	N	1	0	0	0	C	4	180	3
430	DY	1	0	0	0	F	19	180	3
431	DY	1	0	0	0	F	19	240	4
432	DY	1	0	0	0	F	19	120	2
433	DY	1	0	0	0	F	19	180	3
434	DW	1	0	0	0	E	11	240	4
435	N	1	0	0	1	E	7	30	0.5
436	BB	1	0	0	0	E	14	120	2
437	BG	1	1	1	0	A	4	120	2
438	K	1	0	0	0	B	5	240	4
439	BG	1	0	0	0	E	17	240	4
440	BB	1	1	1	0	E	1	60	1
441	N	1	0	0	0	E	3	60	1

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mines	time in hr.
442	BB	1	1	1	0	B	1	180	3
443	N	1	1	1	0	B	2	60	1
444	KW	1	0	0	0	E	1	120	2
445	KW	1	0	0	0	E	11	240	4
446	N	1	0	0	0	E	3	180	3
447	N	1	1	1	0	B	3	180	3
448	KW	1	0	0	0	E	4	120	2
449	KW	1	1	1	1	B	4	120	2
450	KW	1	0	0	0	E	4	120	2

Table B-2 symbol of city and symbol of car

Name of governorate	symbol	Type of car	symbol
Basra	B	Small bus	A
Maisan	M	Private car	B
Karbala	K	Taxi	C
Karkok	KK	Walk	D
Babel	BB	Medium bus	E
Baghdad	BG	Large bus	F
Kwot	KW	Motorcycle	G
Dewania	DW	Bicycle	H
Nasria	NS	Private car rent	I
Deyala	DY	Other type	J
Najaf	N		

B.3 Data of Questionnaire of visitors in HKCC for Husseinia shrine

Table 0B-3 Data collect from questionnaire

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mint	time in hr.
1	BB	1	1	1	0	B	12	60	1
2	BB	1	1	1	0	E	12	150	2.5
3	K	1	1	1	0	E	15	60	1
4	BG	1	0	0	0	F	1	120	2
5	BG	1	1	1	0	E	15	60	1
6	K	1	0	0	0	D	12	120	2
7	K	1	0	0	0	F	17	60	1
8	DW	1	1	1	0	B	15	300	5
9	BB	1	1	1	0	F	18	300	5
10	BB	0	1	1	0	B	5	120	2
11	DW	1	1	1	0	B	4	90	1.5
12	M	1	1	1	0	B	4	180	3
13	DW	1	1	1	0	B	3	180	3

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mint	time in hr.
14	K	1	0	0	0	E	4	30	0.5
15	BB	1	0	0	0	E	1	360	6
16	K	1	0	0	0	E	5	60	1
17	K	1	1	1	0	B	12	120	2
18	N	1	0	0	0	E	1	120	2
19	B	1	0	0	0	E	15	120	2
20	K	1	0	0	0	E	14	120	2
21	K	1	0	0	0	E	1	120	2
22	BG	1	1	1	0	B	14	120	2
23	N	1	0	0	0	E	1	180	3
24	K	1	1	1	0	B	1	60	1
25	NS	1	1	1	0	B	1	180	3
26	BB	1	0	0	0	E	12	240	4
27	NS	1	0	0	0	C	13	60	1
28	BB	1	0	0	0	C	1	30	0.5
29	N	1	1	1	0	B	4	60	1
30	K	1	0	0	0	E	4	60	1
31	DW	1	0	0	0	A	4	120	2
32	K	1	1	1	0	B	1	60	1
33	KW	1	0	0	0	F	8	30	0.5
34	K	1	0	0	0	E	1	30	0.5
35	BB	1	0	0	0	E	1	60	1
36	BG	1	1	1	1	B	1	90	1.5
37	K	1	0	0	0	J	1	120	2
38	DW	1	0	0	0	F	30	240	4
39	K	1	0	0	0	E	1	60	1
40	B	1	0	0	0	E	2	240	4
41	B	1	0	0	0	E	12	240	4
42	N	1	0	0	0	E	11	60	1
43	K	1	0	0	0	D	1	30	0.5
44	DW	1	0	0	0	F	30	120	2
45	K	1	0	0	0	E	1	90	1.5
46	NS	1	0	0	0	E	3	180	3
47	K	1	0	0	0	F	1	600	10
48	B	1	0	0	0	A	2	180	3
49	K	1	0	0	0	E	1	60	1
50	K	1	0	0	0	E	1	60	1
51	N	1	1	1	0	B	4	60	1
52	K	1	0	0	0	E	1	30	0.5
53	N	1	1	1	0	B	6	30	0.5
54	BB	1	1	1	0	B	2	120	2

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mint	time in hr.
55	MT	1	0	0	0	E	1	180	3
56	K	1	1	0	0	F	1	30	0.5
57	N	1	1	1	0	B	1	120	2
58	BG	1	0	0	0	E	2	180	3
59	BB	1	1	1	0	B	1	120	2
60	BB	1	1	1	0	B	3	120	2
61	K	1	0	0	0	E	1	120	2
62	K	0	0	0	0	G	1	480	8
63	BB	1	1	0	0	E	21	60	1
64	K	1	0	0	0	F	1	120	2
65	MT	1	0	0	0	E	2	240	4
66	K	1	1	0	0	E	1	60	1
67	M	1	0	0	0	E	4	480	8
68	N	1	0	0	0	E	3	180	3
69	BG	1	1	1	0	B	15	240	4
70	K	1	1	1	0	B	2	120	2
71	K	1	0	0	0	E	1	180	3
72	K	1	1	0	0	D	2	240	4
73	BG	1	0	0	0	E	2	480	8
74	K	1	0	0	0	E	2	600	10
75	K	1	0	0	0	F	2	15	0.25
76	N	1	1	1	0	B	3	120	2
77	DY	1	1	1	0	B	11	30	0.5
78	BG	1	1	1	0	B	4	120	2
79	K	1	1	1	0	B	1	45	0.75
80	N	1	0	0	0	E	1	60	1
81	N	1	0	0	0	E	2	60	1
82	DW	1	1	0	0	A	5	60	1
83	M	1	0	0	0	C	1	60	1
84	K	1	1	0	0	E	2	30	0.5
85	BG	1	1	1	0	B	10	120	2
86	BB	1	0	0	0	E	1	90	1.5
87	BB	1	1	1	0	B	2	60	1
88	BG	1	0	0	0	E	1	15	0.25
89	MT	0	0	0	0	E	1	120	2
90	DW	1	0	0	0	E	1	120	2
91	K	1	0	0	0	E	1	20	0.333333
92	NS	0	0	0	0	C	1	30	0.5
93	K	1	0	1	0	B	1	30	0.5
94	B	1	1	1	0	B	4	120	2
95	KW	1	0	0	0	E	1	120	2

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mint	time in hr.
96	K	1	0	0	0	C	1	60	1
97	K	1	0	0	0	E	3	60	1
98	MT	1	0	0	0	E	1	30	0.5
99	NS	1	0	0	0	C	4	180	3
100	NS	1	1	0	0	J	6	420	7
101	BG	1	0	0	0	B	5	180	3
102	KW	1	1	1	0	B	4	120	2
103	BB	1	0	0	0	E	3	120	2
104	BB	1	0	0	0	E	1	120	2
105	N	1	0	0	0	E	1	120	2
106	MT	1	1	1	0	B	4	120	2
107	B	1	1	1	0	B	2	60	1
108	K	1	0	0	0	C	2	60	1
109	K	1	0	0	0	J	1	60	1
110	DW	1	1	1	0	B	9	240	4
111	BB	1	1	1	0	B	3	60	1
112	B	1	0	0	0	F	4	240	4
113	B	1	0	0	0	E	7	180	3
114	K	1	0	0	0	C	1	60	1
115	NS	1	0	0	0	E	3	60	1
116	MT	1	0	0	0	E	2	120	2
117	DW	1	0	0	0	C	4	120	2
118	MT	1	0	0	0	E	1	90	1.5
119	BB	1	0	0	0	E	1	60	1
120	NS	1	0	0	0	E	2	60	1
121	BG	1	1	1	0	B	5	120	2
122	BG	1	0	0	0	E	14	180	3
123	B	1	1	1	0	B	2	300	5
124	DW	1	1	1	0	B	10	60	1
125	BG	1	1	0	0	C	5	120	2
126	K	1	0	0	0	J	5	240	4
127	K	1	0	0	0	D	1	30	0.5
128	DW	1	0	0	0	E	11	60	1
129	DW	1	1	1	0	B	15	210	3.5
130	BB	1	0	0	0	E	1	120	2
131	BG	1	1	1	0	B	4	90	1.5
132	N	1	0	0	0	E	1	90	1.5
133	BG	1	0	0	0	F	1	90	1.5
134	DW	1	1	1	0	B	1	90	1.5
135	K	1	0	0	0		1	60	1
136	KW	1	0	0	0	E	1	90	1.5

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mint	time in hr.
137	MT	1	0	0	0	E	2	15	0.25
138	BB	1	0	0	0	E	2	60	1
139	BB	1	1	1	0	B	4	60	1
140	DW	1	1	1	0	B	5	120	2
141	BG	1	0	0	0	E	4	120	2
142	BG	1	0	0	0	E	9	120	2
143	NS	1	0	0	0	B	5	120	2
144	K	1	0	0	0	D	1	15	0.25
145	DW	1	0	0	0	E	24	45	0.75
146	BG	1	0	0	0	E	2	15	0.25
147	NS	1	1	1	0	B	5	30	0.5
148	N	1	1	1	0	E	6	30	0.5
149	N	1	1	1	0	B	4	30	0.5
150	N	1	0	0	0	E	5	30	0.5
151	BB	1	0	0	0	E	2	30	0.5
152	NS	0	0	0	0	E	1	15	0.25
153	N	1	1	1	0	B	3	60	1
154	BG	1	1	1	0	B	7	30	0.5
155	NS	1	1	1	0	B	4	90	1.5
156	K	1	0	0	0	E	1	45	0.75
157	DW	1	0	0	0	E	4	120	2
158	K	1	0	0	0	D	2	90	1.5
159	K	1	0	0	0	C	3	15	0.25
160	K	1	0	0	0	E	3	60	1
161	K	1	0	0	0	D	7	30	0.5
162	N	1	0	0	0	C	4	15	0.25
163	K	1	0	0	0	F	53	60	1
164	N	1	1	1	0	B	3	60	1
165	K	1	0	0	0	E	4	60	1
166	K	0	0	0	0	E	1	60	1
167	NS	0	0	0	0	E	1	60	1
168	BG	1	0	0	0	E	4	90	1.5
169	BB	1	0	0	0	E	2	120	2
170	K	1	0	0	0	C	2	30	0.5
171	K	1	0	0	0	E	2	60	1
172	K	1	0	0	0	C	1	60	1
173	K	1	0	0	0	E	2	60	1
174	K	1	0	0	0	E	2	30	0.5
175	K	1	0	0	0	C	3	90	1.5
176	K	1	0	0	0	E	3	150	2.5
177	N	1	0	0	0	C	4	60	1

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mint	time in hr.
178	N	1	0	0	0	C	4	150	2.5
179	K	1	0	0	0	C	2	120	2
180	BB	1	0	0	0	F	2	240	4
181	BG	1	0	0	0	E	7	150	2.5
182	K	1	0	0	0	E	3	120	2
183	K	1	0	0	0	D	3	60	1
184	BG	1	0	0	0	E	2	120	2
185	BB	1	0	0	0	F	7	120	2
186	BB	1	0	0	0	F	2	120	2
187	K	0	0	0	0	E	2	120	2
188	K	1	0	0	0	F	16	180	3
189	BB	1	0	0	0	E	4	60	1
190	N	1	0	0	0	F	5	60	1
191	N	1	1	1	1	B	3	120	2
192	KW	0	0	0	0	F	21	60	1
193	K	1	0	0	0	E	1	60	1
194	N	1	0	0	0	F	2	60	1
195	K	1	0	0	0	C	1	60	1
196	BG	1	0	0	0	F	2	120	2
197	BB	1	1	1	0	B	5	180	3
198	MT	1	0	0	0	E	1	120	2
199	NS	0	1	1	0	B	5	60	1
200	BG	1	0	0	0	B	5	180	3
201	KW	1	1	1	0	B	4	120	2
202	BB	1	0	0	0	E	3	120	2
203	BB	1	0	0	0	E	1	120	2
204	N	1	0	0	0	E	1	120	2
205	MT	1	1	1	0	B	4	120	2
206	B	1	1	1	0	B	2	60	1
207	K	1	0	0	0	C	2	60	1
208	K	1	0	0	0	J	1	60	1
209	DW	1	1	1	0	B	9	240	4
210	BB	1	1	1	0	B	3	60	1
211	B	1	0	0	0	F	4	240	4
212	B	1	0	0	0	E	7	180	3
213	K	1	0	0	0	C	1	60	1
214	NS	1	0	0	0	E	3	60	1
215	MT	1	0	0	0	E	2	120	2
216	DW	1	0	0	0	C	4	120	2
217	MT	1	0	0	0	E	1	90	1.5
218	BB	1	0	0	0	E	1	60	1

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mint	time in hr.
219	NS	1	0	0	0	E	2	60	1
220	BG	1	1	1	0	B	5	120	2
221	BG	1	0	0	0	E	14	180	3
222	B	1	1	1	0	B	2	300	5
223	DW	1	1	1	0	B	10	60	1
224	B	1	0	0	0	F	4	240	4
225	B	1	0	0	0	E	7	180	3
226	K	1	0	0	0	C	1	60	1
227	NS	1	0	0	0	E	3	60	1
228	K	1	0	0	0	E	1	60	1
229	N	1	1	1	0	B	4	60	1
230	K	1	0	0	0	E	1	30	0.5
231	N	1	1	1	0	B	6	30	0.5
232	BB	1	1	1	0	B	2	120	2
233	MT	1	0	0	0	E	1	180	3
234	K	1	1	0	0	F	1	30	0.5
235	N	1	1	1	0	B	1	120	2
236	BG	1	0	0	0	E	2	180	3
237	BB	1	1	1	0	B	1	120	2
238	BB	1	1	1	0	B	3	120	2
239	K	1	0	0	0	E	1	120	2
240	K	0	0	0	0	G	1	480	8
241	BB	1	1	0	0	E	21	60	1
242	K	1	0	0	0	F	1	120	2
243	MT	1	0	0	0	E	2	240	4
244	K	1	1	0	0	E	1	60	1
245	M	1	0	0	0	E	4	480	8
246	N	1	0	0	0	E	3	180	3
247	BG	1	1	1	0	B	15	240	4
248	K	1	1	1	0	B	2	120	2
249	K	1	0	0	0	E	1	180	3
250	K	1	1	0	0	D	2	240	4
251	BG	1	0	0	0	E	2	480	8
252	K	1	0	0	0	E	2	600	10
253	K	1	0	0	0	F	2	15	0.25
254	B	1	0	0	0	F	4	240	4
255	B	1	0	0	0	E	7	180	3
256	K	1	0	0	0	C	1	60	1
257	NS	1	0	0	0	E	3	60	1
258	N	1	0	0	0	C	4	60	1
259	N	1	0	0	0	C	4	150	2.5

No.of. Sheet	provi nce	purpose of visit	have car	come by private car	difficult by put car	type car	No.of person	time for visit in mint	time in hr.
260	K	1	0	0	0	C	2	120	2
261	BB	1	0	0	0	F	2	240	4
262	BG	1	0	0	0	E	7	150	2.5
263	K	1	0	0	0	E	3	120	2
264	K	1	0	0	0	D	3	60	1
265	BG	1	0	0	0	E	2	120	2
266	N	1	1	1	0	B	3	60	1
267	K	1	0	0	0	E	4	60	1
268	K	0	0	0	0	E	1	60	1
269	NS	0	0	0	0	E	1	60	1
270	BG	1	0	0	0	E	4	90	1.5
271	BB	1	0	0	0	E	2	120	2
272	K	1	0	0	0	C	2	30	0.5
273	K	1	0	0	0	E	2	60	1
274	K	1	0	0	0	C	1	60	1
275	K	1	0	0	0	E	2	60	1
276	K	1	0	0	0	E	2	30	0.5
277	K	1	1	1	0	E	15	60	1
278	BG	1	0	0	0	F	1	120	2
279	BG	1	1	1	0	E	15	60	1
280	K	1	0	0	0	D	12	120	2
281	K	1	0	0	0	F	17	60	1
282	DW	1	1	1	0	B	15	300	5
283	BB	1	1	1	0	F	18	300	5
284	BB	0	1	1	0	B	5	120	2
285	DW	1	1	1	0	B	4	90	1.5
286	M	1	1	1	0	B	4	180	3
287	DW	1	1	1	0	B	3	180	3
288	K	1	0	0	0	E	4	30	0.5
289	BB	1	0	0	0	E	1	360	6
290	K	1	0	0	0	E	5	60	1
291	K	1	1	1	0	B	12	120	2
292	N	1	0	0	0	E	1	120	2
293	B	1	0	0	0	E	15	120	2
294	K	1	0	0	0	E	14	120	2
295	K	1	0	0	0	E	1	120	2
296	BG	1	1	1	0	B	14	120	2
297	N	1	0	0	0	E	1	180	3
298	K	1	1	1	0	B	1	60	1
299	NS	1	1	1	0	B	1	180	3

B.3 Data of Questionnaire of employment in HKCC for Husseinia shrine

AA: parking on street

BB: parking off street

Table 0B-4Data of Questionnaire of employment inHKCCholy city for Husseinia shrine

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group
1	Al-Ghadeer	0	0	0	0	J	1
2	Al-Abbas neighborhood	0	0	0	0	J	1
3	Al-Chair	1	1	AA	1	A	1
4	Al-Hindiya	0	0	0	0	E	1
5	Amn-Aldakhili	0	0	0	0	G	1
6	Al-Ghadeer	1	1	BB	1	A	1
7	Romdhan	0	0	0	0	G	1
8	Al-Amel neighborhood	0	0	0	0	G	1
9	Bab-Alkhan	0	0	0	0	G	1
10	Bab-Alkhan	0	0	0	0	H	1
11	Al-Naser neighborhood	0	0	0	0	G	1
12	Al-Husseinia	0	0	0	0	G	1
13	Al-Naser neighborhood	0	0	0	0	G	1
14	Maitham	1	1	BB	1	B	1
16	Al-Hindiya	0	0	0	0	E	1
17	Al-Hur neighborhood	0	0	0	0	C	1
18	Al-Hur neighborhood	0	0	0	0	G	1
19	Al-Amel neighborhood	0	0	0	0	G	1
20	Al-Hindiya	0	0	0	0	E	1
21	Al-Hindiya	0	0	0	0	F	7
22	Al-Hur neighborhood	0	0	0	0	A	1
24	Tourij	0	0	0	0	D	1
25	Al-Hur neighborhood	0	0	0	0	E	1
26	Al-Ghadeer	0	0	0	0	G	1
27	Al-Chair	0	0	0	0	G	1
29	Bab-Baghdad	0	0	0	0	D	1
30	Bab-Alkhan	1	0	0	0	D	1
31	Bab-Alkhan	0	0	0	0	G	1
32	Al-Hur neighborhood	0	0	0	0	F	1
33	Al-Naser neighborhood	0	0	0	0	G	1
34	Al-Askari neighborhood	1	1	AA	1	B	1
35	Al-Gadisai	1	0	0	0	J	1

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group
36	Al-Gamai	0	0	0	0	J	1
37	Al-Rawdhaten neighborhood	1	1	AA	1	B	1
38	Amn-Aldakhili	1	1	AA	1	E	3
39	Al-Baladai neighborhood	0	0	0	0	J	1
40	Al-Selam neighborhood	0	0	0	0	J	1
41	Al-Gamai	1	1	BB	0	B	1
42	Al-Amel neighborhood	0	0	0	0	E	1
43	Al-Abbas neighborhood	0	0	0	0	H	1
44	Al-Ghadeer	0	0	0	0	E	1
45	Al-Rawdhaten neighborhood	0	0	0	0	J	1
46	Al-Askari neighborhood	0	0	0	0	G	1
47	Ahmad-Alwaeli	0	0	0	0	H	1
48	Al-Tehadi neighborhood	0	0	0	0	G	1
49	Al-Tehadi neighborhood	1	1	AA	1	A	1
50	Al-Gamai	0	0	0	0	G	1
51	Al-Selam neighborhood	0	0	0	0	G	1
52	Al-Moalemen neighborhood	1	0	0	0	I	2
53	Al-Atebaa	0	0	0	0	H	2
54	Bab-Alsalima	0	0	0	0	G	1
55	Al-Ghadeer	0	0	0	0	E	7
56	Al-Naser neighborhood	1	1	AA	0	E	1
57	Bab-Alsalima	0	0	0	0	G	1
58	Al-Chair	0	0	0	0	G	1
59	Safe saad	0	0	0	1	G	1
60	Bab-Baghdad	1	1	BB	0	B	3
61	Safe saad	0	0	0	0	G	1
62	Al-Gamai	0	0	0	0	G	1
63	Ahmad-Alwaeli	0	0	0	0	G	1
64	Al-Husseiniya	0	0	0	0	I	1
65	Al-Hur neighborhood	0	0	0	0	E	1
66	Tourij	0	0	0	0	G	1
67	Al-Gamai	0	0	0	0	H	1
68	Al-Ameen	0	0	0	0	G	1
69	Al-Hur neighborhood	0	0	0	0	G	1
70	Al-Hur neighborhood	0	0	0	0	G	1
71	Al-Teawen	1	1	AA	1	B	1
72	Al-Mowedhafen	0	0	0	0	I	15
73	Al-Abbas neighborhood	0	0	0	0	G	1
74	Tourij	0	0	0	0	D	1
75	Al-Hur neighborhood	0	0	0	0	I	1
76	Al-Amel neighborhood	0	0	0	0	G	1

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group
77	Al-Gamai	0	0	0	0	G	1
78	Al-Gamai	0	0	0	0	G	1
79	Al-Teawen	0	0	0	0	G	1
80	Al-Tehadi neighborhood	0	0	0	0	G	1
81	Al-Hur neighborhood	0	0	0	0	I	1
82	Al-Hur neighborhood	0	0	0	0	G	1
84	Al-Gamai	0	0	0	0	G	1
85	Safe saad	0	0	0	0	G	1
86	Al-Bobeyat	1	1	AA	1	G	1
87	Al-Gamai	0	0	0	0	J	1
88	Al-Moalemen neighborhood	1	0	0	0	E	1
89	Benat-Alhasan	0	0	0	0	I	70
90	Tourij	0	0	0	0	C	70
91	Bab-Alsalima	0	0	0	0	C	1
92	Al-Hur neighborhood	0	0	0	0	G	12
93	Ahmad-Alwaeli	1	1	AA	0	A	1
94	Al-Shurta neighborhood	0	0	0	0	G	1
95	Al-Hindiya	0	0	0	0	I	70
96	Al-Ghadeer	0	0	0	0	I	30
98	Al-Mowedhafen	0	0	0	0	G	1
99	Al-Abbas neighborhood	0	0	0	0	G	1
100	Gahez	0	0	0	0	G	1
101	Al-Ghadeer	0	0	0	0	J	1
102	Al-Husseiniya	0	0	0	0	I	40
103	Al-Abbas neighborhood	0	0	0	0	H	1
104	Ahmad-Alwaeli	0	0	0	0	I	21
105	Al-Naqeeb neighborhood	0	0	0	0	G	1
106	Romdhan	1	1	AA	1	B	1
107	Ebrahemai	0	0	0	0	I	15
108	Al-Abbasia	0	0	0	0	G	1
109	Al-Gadisai	0	0	0	0	H	2
110	Bab-Alkhan	0	0	0	0	G	1
111	Ahmad-Alwaeli	0	0	0	0	G	1
112	Al-Askari neighborhood	0	0	0	0	I	40
113	Al-Atebaa	0	0	0	0	I	15
114	Tourij	0	0	0	0	I	50
115	Tourij	0	0	0	0	I	50
116	Al- Husseiniya	0	0	0	0	G	1
117	Al-Selam neighborhood	0	0	0	0	G	1
118	Al-Zahraa neighborhood	0	0	0	0	G	1
119	Al-Rawdhaten neighborhood	0	0	0	0	H	1

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group
120	Al-Husseiniya	0	0	0	0	I	55
121	Al-Khayrat	0	0	0	0	I	70
122	Al-Hindiya	0	0	0	0	I	70
123	Ahmad-Alwaeli	0	0	0	0	G	1
124	Romdhan	0	0	0	0	I	1
126	Al-Zahraa neighborhood	0	0	0	0	G	1
127	Al-Husseiniya	0	0	0	0	A	1
128	Al-Naser neighborhood	0	0	0	0	G	1
129	Tourij	0	0	0	0	G	1
130	Al-Sadiya	0	0	0	0	H	1
131	Al-Hur neighborhood	0	0	0	0	I	10
132	Al-Abbas neighborhood	0	0	0	0	G	1
133	Al-Naqeeb neighborhood	0	0	0	0	G	1
134	Al-Rawdhaten	0	0	0	0	G	1
135	Al-Gamai	0	0	0	0	H	1
136	Al-Amel neighborhood	0	0	0	0	C	1
137	Al-Abbas neighborhood	1	1	AA	0	B	1
138	Al-Zahraa neighborhood	0	0	0	0	G	1
139	Safe saad	0	0	0	0	I	15
140	Al-Bobeyat	0	0	0	0	G	1
141	Al-Bobeyat	0	0	0	0	D	1
142	Bab-Alsalima	0	0	0	0	D	1
143	Al-Naqeeb neighborhood	0	0	0	0	D	1
144	Al-Mukhaim	1	1	AA	1	B	1
145	Al-Teawen	1	1	AA	1	A	1
146	Al-Hur neighborhood	1	0	0	0	I	20
147	Al-Abbas neighborhood	0	0	0	0	E	8
148	Al-Husseiniya	0	0	0	0	I	1
149	Safe saad	0	0	0	0	I	1
150	Al-Hur neighborhood	0	0	0	0	G	1
151	Al-Husseiniya	0	0	0	0	E	1
152	Ahmad-Alwaeli	0	0	0	0	I	30
153	Bab-Alsalima	0	0	0	0	D	1
154	Al-Mamalchi	0	0	0	0	G	1
155	Al-Amel neighborhood	0	0	0	0	I	25
156	Al-Mamalchi	1	1	AA	1	B	1
157	Al-Hur neighborhood	1	1	كراج احمد الوائلي	1	B	1
158	Al-Husseiniya	0	0	0	0	I	25
159	Al-Gamai	0	0	0	0	H	1
160	Al-Amel neighborhood	0	0	0	0	E	1

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group
161	Al-Bahadlai	1	0	0	0	I	14
162	Al-Askari neighborhood	0	0	0	0	E	4
163	Al-Bobeyat	0	0	0	0	J	1
164	Gahez	1	1	AA	0	A	1
165	Al-Gamai	0	0	0	0	D	1
166	Al-Husseiniya	0	0	0	0	I	10
167	Al-Chair	0	0	0	0	D	1
168	Oun	0	0	0	0	I	1
169	Al-Amel neighborhood	1	1	AA	1	G	1
170	Ahmad-Alwaeli	1	1	AA	1	G	1
171	Al-Entesar	1	1	AA	1	G	1
172	Al-Abbas neighborhood	0	0	AA	1	G	1
173	Safe saad	0	0	0	0	I	20
174	Al-Hur neighborhood	1	1	AA	1	G	1
175	Al-Baladai neighborhood	1	1	AA	1	G	1
176	Al-Abbas neighborhood	1	1	AA	1	B	3
177	Al-Zahraa neighborhood	1	1	AA	1	B	1
178	Al-Bobeyat	1	1	AA	1	G	1
179	Al-Gamai	0	0	0	0	C	1
180	Ahmad-Alwaeli	0	0	0	0	I	8
181	Al-Amel neighborhood	0	0	0	0	I	8
182	Al-Naqeeb neighborhood	0	0	0	0	I	8
183	Al-Bobeyat	0	0	0	0	E	8
184	Al-Qezween	0	0	0	0	D	1
185	Al-Mowedhafen	0	0	0	0	I	8
186	Al-Abbas neighborhood	0	0	0	0	I	8
187	Al-Naqeeb neighborhood	0	0	0	0	E	8
188	Bab-Baghdad	0	0	0	0	I	8
189	Ahmad-Alwaeli	0	0	0	0	E	1
190	Bab-Alsalima	0	0	0	0	D	1
191	Amn-Aldakhili	0	0	0	0	I	20
192	Al-Husseiniya	1	0	0	0	I	20
193	Al-Abbas neighborhood	1	0	0	0	D	1
194	Al-Mowedhafen	1	1	AA	1	B	1
195	Al-Rawdhaten neighborhood	0	0	0	0	J	1
196	Tourij	0	0	0	0	D	1
197	Ahmad-Alwaeli	0	0	0	0	G	1
198	Al-Hur neighborhood	0	0	0	0	E	14
199	Al-Ghadeer	0	0	0	0	E	14
200	Al-Mamalchi	1	0	0	0	G	2
201	Al-Husseiniya	0	0	0	0	E	14

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group
202	Al-Amel neighborhood	0	0	0	0	E	14
203	Al-Amel neighborhood	0	0	0	0	G	1
204	Al-Mowedhafen	0	0	0	0	I	8
205	Al-Abbas neighborhood	0	0	0	0	I	8
206	Al-Naqeeb neighborhood	0	0	0	0	E	8
207	Bab-Baghdad	0	0	0	0	I	8
208	Al-Abbas neighborhood	1	0	0	0	G	1
209	Al-Husseiniya	0	0	0	0	G	1
210	Al-Tehadi neighborhood	0	0	0	0	D	1
211	Al-Hindiya	0	0	0	0	D	1
212	Al-Husseiniya	0	0	0	0	D	1
213	Al-Abbas neighborhood	0	0	0	0	G	1
214	Al-Hur neighborhood	0	0	0	0	G	1
215	Al-Hindiya	0	0	0	0	E	1
216	Al-Husseiniya	0	0	0	0	D	1
217	Al-Ghadeer	0	0	0	0	J	2
218	Al-Hur neighborhood	0	0	0	0	G	1
219	Al-Amel neighborhood	0	0	0	0	G	1
220	Al-Amel neighborhood	0	0	0	0	J	1
221	Al-Hur neighborhood	1	0	0	0	E	14
222	Safe saad	1	0	0	0	G	1
223	Al-Husseiniya	0	0	0	0	G	1
224	Al-Husseiniya	0	0	0	0	E	1
225	Al-Gamai	0	0	0	0	G	1
226	Ahmad-Alwaeli	0	0	0	0	G	1
227	Al-Hur neighborhood	0	0	0	0	E	14
228	Bab-Baghdad	0	0	0	0	G	1
229	Al-Hur neighborhood	0	0	0	0	E	14
230	Al-Husseiniya	0	0	0	0	G	1
231	Al-Husseiniya	0	0	0	0	G	1
232	Safe saad	1	0	0	0	A	1
233	Gahez	0	0	0	0	G	1
234	Al-Rawdhaten	1	0	0	0	A	1
235	Al-Ghadeer	0	0	0	0	G	1
236	Ahmad-Alwaeli	0	0	0	0	G	1
237	Al-Husseiniya	1	1	AA	1	A	1
238	Al-Abbasia	0	0	0	0	G	1
239	Al-Osra	0	0	0	0	G	1
240	Al-Gamai	0	0	0	0	G	1
241	Al-Hur neighborhood	1	0	0	0	A	1
242	Al-Hindiya	0	0	0	0	C	2

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group
243	Al-Baladai neighborhood	0	0	0	0	D	1
244	Al-Bobeyat	0	0	0	0	D	1
245	Bab-Alkhan	0	0	0	0	D	1
246	Al-Abbas neighborhood	1	0	0	0	G	1
247	Al-Hur neighborhood	0	0	0	0	G	1
248	Bab-Altak	0	0	0	0	D	1
249	Al-Ghadeer	0	0	0	0	J	1
250	Al-Abbas neighborhood	0	0	0	0	J	1
251	Al-Chair	1	1	AA	1	A	1
252	Al-Hindiya	0	0	0	0	E	1
253	Amn-Aldakhili	0	0	0	0	G	1
254	Al-Husseiniya	1	1	BB	1	A	1
255	Romdhan	0	0	0	0	G	1
256	Al-Amel neighborhood	0	0	0	0	G	1
257	Bab-Alkhan	0	0	0	0	G	1
258	Bab-Alkhan	0	0	0	0	H	1
259	Al-Naser neighborhood	0	0	0	0	G	1
260	Al-Husseiniya	0	0	0	0	G	1
261	Al-Naser neighborhood	0	0	0	0	G	1
262	Maitham	1	1	BB	1	B	1
263	Al-Hur neighborhood	0	0	0	0	E	1
264	Al-Hindiya	0	0	0	0	E	1
265	Al-Hur neighborhood	0	0	0	0	C	1
266	Al-Hur neighborhood	0	0	0	0	G	1
267	Al-Amel neighborhood	0	0	0	0	G	1
268	Al-Hindiya	0	0	0	0	E	1
269	Al-Hindiya	0	0	0	0	F	7
270	Al-Hur neighborhood	0	0	0	0	A	1
271	Bobeyat	0	0	0	0	G	1
272	Bab-Altak	0	0	0	0	D	1
273	Al-Hur neighborhood	0	0	0	0	E	1
274	Al-Ghadeer	0	0	0	0	G	1
275	Al-Chair	0	0	0	0	G	1
276	Al-Entesar	0	0	0	0	G	1
277	Bab-Baghdad	0	0	0	0	D	1
278	Bab-Alkhan	1	0	0	0	D	1
279	Bab-Alkhan	0	0	0	0	G	1
280	Al-Hur neighborhood	0	0	0	0	F	1
281	Al-Naser neighborhood	0	0	0	0	G	1
282	Al-Askari neighborhood	1	1	AA	1	B	1
283	Al-Gadisai	1	0	0	0	J	1

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group
284	Al-Gamai	0	0	0	0	J	1
285	Al-Rawdhaten neighborhood	1	1	AA	1	B	1
286	Amn-Aldakhili	1	1	AA	1	E	3
287	Al-Baladai neighborhood	0	0	0	0	J	1
288	Zaytona neighborhood	0	0	0	0	J	1
289	Al-Gamai	1	1	BB	0	B	1
290	Al-Amel neighborhood	0	0	0	0	E	1
291	Al-Abbas neighborhood	0	0	0	0	H	1
292	Al-Ghadeer	0	0	0	0	E	1
293	Al-Rawdhaten neighborhood	0	0	0	0	J	1
294	Al-Askari neighborhood	0	0	0	0	G	1
295	Ahmad-Alwaeli	0	0	0	0	H	1
296	Al-Tehadi neighborhood	0	0	0	0	G	1
297	Al-Tehadi neighborhood	1	1	AA	1	A	1
298	Al-Gamai	0	0	0	0	G	1
299	Al-Selam neighborhood	0	0	0	0	G	1
300	Al-Moalemen neighborhood	1	0	0	0	I	2
301	Al-Askari	0	0	0	0	H	2
302	Bab-Alsalima	0	0	0	0	G	1
303	Al-Ghadeer	0	0	0	0	E	7
304	Al-Naser neighborhood	1	1	AA	0	E	1
305	Bab-Alsalima	0	0	0	0	G	1
306	Al-Chair	0	0	0	0	G	1
307	Al-Naqeeb neighborhood	0	0	0	1	G	1
308	Bab-Baghdad	1	1	BB	0	B	3
309	Safe saad	0	0	0	0	G	1
310	Al-Gamai	0	0	0	0	G	1
311	Ahmad-Alwaeli	0	0	0	0	G	1
312	Husseiniya	0	0	0	0	I	1
313	Al-Hur neighborhood	0	0	0	0	E	1
314	Tourij	0	0	0	0	G	1
315	Al-Gamai	0	0	0	0	H	1
316	Al-Ameen	0	0	0	0	G	1
317	Al-Hur neighborhood	0	0	0	0	G	1
318	Al-Hur neighborhood	0	0	0	0	G	1
319	Al-Teawen	1	1	AA	1	B	1
320	Al-Mulhak	0	0	0	0	I	15
321	Al-Abbas neighborhood	0	0	0	0	G	1
322	Tourij	0	0	0	0	D	1
323	Al-Hur neighborhood	0	0	0	0	I	1
324	Al-Amel neighborhood	0	0	0	0	G	1

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group
325	Al-Gamai	0	0	0	0	G	1
326	Al-Gamai	0	0	0	0	G	1
327	Al-Teawen	0	0	0	0	G	1
328	Al-Tehadi neighborhood	0	0	0	0	G	1
329	Al-Hur neighborhood	0	0	0	0	I	1
330	Al-Hur neighborhood	0	0	0	0	G	1
331	Al-Bobeyat	0	0	0	0	G	1
332	Al-Gamai	0	0	0	0	G	1
333	Safe saad	0	0	0	0	G	1
334	Al-Bobeyat	1	1	AA	1	G	1
335	Al-Gamai	0	0	0	0	J	1
336	Al-Moalemen neighborhood	1	0	0	0	E	1
337	Benat-Alhasan	0	0	0	0	I	70
338	Tourij	0	0	0	0	C	70
339	Bab-Alsalima	0	0	0	0	C	1
340	Al-Hur neighborhood	0	0	0	0	G	12
341	Ahmad-Alwaeli	1	1	AA	0	A	1
342	Al-Shurta neighborhood	0	0	0	0	G	1
343	Al-Hindiya	0	0	0	0	I	70
344	Al-Ghadeer	0	0	0	0	I	30
345	Al-Mukhaim	0	0	0	0	D	1
346	Al-Mowedhafen	0	0	0	0	G	1
347	Al-Abbas neighborhood	0	0	0	0	G	1
348	Gahez	0	0	0	0	G	1
349	Al-Ghadeer	0	0	0	0	J	1

B.4 Data of Questionnaire of employment in HKCC for Abbasia shrine

Table B-5Data of Questionnaire of employment in HKCC for Abbasia shrine

No.of. Sheet	**address home**	**have car**	**come by private car**	**where put car**	**difficult in put car**	**type car**	**No.of group**	
1	Al-Naqeeb neighborhood	0	0	0	0	G	1	0.1296
2	Safe Saad	0	0	0	0	G	1	0.1296
3	Husain	0	0	0	0	C	1	0.1296
4	Amel	0	0	0	0	I	1	0.1296
5	Alaboubiat	0	0	0	0	H	1	0.1296
6	Mowedhafen	0	0	0	0	E	1	0.1296
7	Al-Husseiniya	0	0	0	0	F	5	13.2496
8	Moalemen	0	0	0	0	G	1	0.1296

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group	
9	Naser	0	0	0	0	G	1	0.1296
10	Salam	0	0	0	0	G	1	0.1296
11	Hur neighborhood	0	0	0	0	G	1	0.1296
12	Hur neighborhood	0	0	0	0	J	1	0.1296
13	Hur neighborhood	0	0	0	0	J	1	0.1296
14	Mowedhafen	0	0	0	0	G	1	0.1296
15	Kantara	0	0	0	0	G	1	0.1296
16	Zahraa	0	0	0	0	J	1	0.1296
17	Mowedhafen	0	0	0	0	G	1	0.1296
18	Gamai	0	0	0	0	G	1	0.1296
19	Hur neighborhood	0	0	0	0	G	1	0.1296
20	Gamai	0	0	0	0	G	1	0.1296
21	Husain	0	0	0	0	H	1	0.1296
22	Baath neighborhood	1	1	AA	0	A	1	0.1296
23	Amel	0	0	0	0	G	1	0.1296
24	Hur neighborhood	0	0	0	0	G	1	0.1296
25	Naser	0	0	0	0	G	1	0.1296
26	Husain	0	0	0	0	G	1	0.1296
27	Baath neighborhood	0	0	0	0	G	1	0.1296
28	Hur neighborhood	0	0	0	0	G	1	0.1296
29	Naser	0	0	0	0	G	1	0.1296
30	Hur neighborhood	0	0	0	0	C	1	0.1296
31	Khayrat	0	0	0	0	F	10	74.6496
32	Mowedhafen	1	1	BB	0	B	1	0.1296
33	Al-Naqeeb	0	0	0	0	D	1	0.1296
34	Mudaraa	1	1	AA	1	A	1	0.1296
35	Amel	0	0	0	0	G	1	0.1296
36	Hur neighborhood	1	1	AA	1	E	5	13.2496
37	Hur neighborhood	0	0	0	0	H	1	0.1296
38	Ghadeer	0	0	0	0	G	1	0.1296
39	Amel	0	0	0	0	G	1	0.1296
40	Shuhadaa	1	1	BB	1	B	3	2.6896
41	Husseiniya	0	0	0	0	E	3	2.6896
42	Ramadan neighborhood	1	1	BB	1	B	1	0.1296
43	Sadia	0	0	0	0	D	1	0.1296
44	Moalemen	0	0	0	0	I	4	6.9696
45	Gamai	1	1	AA	1	B	1	0.1296
46	Naser	0	0	0	0	G	1	0.1296
47	Chemalai	0	0	0	0	G	1	0.1296
48	Gadisai	0	0	0	0	G	1	0.1296

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group	
49	Wefaa	0	0	0	0	G	1	0.1296
50	Neighborhood Housing	0	0	0	0	G	1	0.1296
51	Moalemen	1	1	BB	0	B	1	0.1296
52	Farris	1	1	BB	0	I	1	0.1296
53	Neighborhood canning	0	0	0	0	G	1	0.1296
54	Muhariben	1	1	BB	1	I	4	6.9696
55	Mu	0	0	0	0	G	1	0.1296
56	Naser	0	0	0	0	G	1	0.1296
57	Mamalgy	0	0	0	0	I	3	2.6896
58	Neighborhood challenge	1	1	AA	0	I	2	0.4096
59	Mowedhafen	0	0	0	0	I	1	0.1296
60	Tires neighborhood	0	0	0	0	G	1	0.1296
61	Shuhadaa	0	0	0	0	G	1	0.1296
62	Shuhadaa	0	0	0	0	G	1	0.1296
63	Imam Ali district (p)	0	0	0	0	I	4	6.9696
64	Safe Saad	0	0	0	0	G	1	0.1296
65	Safe Saad	0	0	0	0	G	1	0.1296
66	Safe Saad	0	0	0	0	G	1	0.1296
67	Safe Saad	1	1	BB	0	B	1	0.1296
68	Husain	1	1	AA	0	B	1	0.1296
69	Husain	1	1	AA	1	B	1	0.1296
70	Abbas	0	0	0	0	G	1	0.1296
71	Abbas	0	0	0	0	G	1	0.1296
72	Abbas	0	0	0	0	G	1	0.1296
73	Abbas	0	0	0	0	G	1	0.1296
74	Abbas	1	1	BB	0	B	2	0.4096
75	Hur neighborhood	0	0	0	0	F	6	21.5296
76	Alaboubiat	0	0	0	0	H	1	0.1296
77	Hindiya	0	0	0	0	E	8	44.0896
78	Hindiya	0	0	0	0	F	1	0.1296
79	Bab Al Khan	0	0	0	0	H	1	0.1296
80	Mulhak	0	0	0	0	I	12	113.2096
81	Kantara	0	0	0	0	G	1	0.1296
82	Imam Ali district (p)	0	0	0	0	G	1	0.1296
83	Naser	0	0	0	0	G	1	0.1296
84	Askari	1	1	BB	0	B	1	0.1296
85	Amel	0	0	0	0	G	1	0.1296
86	Amel	0	0	0	0	G	1	0.1296
87	Mowedhafen	0	0	0	0	C	1	0.1296
88	Husain	0	0	0	0	G	1	0.1296

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group	
90	Neighborhood Al-Mamalchi	1	1	BB	0	A	2	0.4096
91	Neighborhood family	1	1	BB	0	B	1	0.1296
92	Naser	0	0	0	0	G	1	0.1296
93	Amel	0	0	0	0	G	1	0.1296
94	Naser	0	0	0	0	G	1	0.1296
95	Amel	0	0	0	0	G	1	0.1296
96	Husain	0	0	0	0	G	1	0.1296
97	Al-Chaer	0	0	0	0	G	1	0.1296
98	Al-Chaer	0	0	0	0	G	1	0.1296
99	Hur neighborhood	0	0	0	0	G	1	0.1296
100	Moalemen	0	0	0	0	G	1	0.1296
101	Ahmed al-Waeli Street	0	0	0	0	G	1	0.1296
102	Amel	0	0	0	0	G	1	0.1296
103	Naser	0	0	0	0	G	1	0.1296
104	Abbas	0	0	0	0	G	1	0.1296
105	Safe Saad	0	0	0	0	G	1	0.1296
106	Ghadeer	0	0	0	0	G	1	0.1296
107	Amel	0	0	0	0	G	1	0.1296
108	Hur neighborhood	0	0	0	0	G	1	0.1296
109	Amel	0	0	0	0	G	1	0.1296
110	Husain	0	0	0	0	G	1	0.1296
111	Amel	0	0	0	0	G	1	0.1296
112	Neighborhood Al-Mamalchi	0	0	0	0	G	1	0.1296
113	Gahez	0	0	0	0	G	1	0.1296
114	Hur neighborhood	0	0	0	0	G	1	0.1296
115	Amel	0	0	0	0	G	1	0.1296
116	Salam	0	0	0	0	G	1	0.1296
117	Alaboubiat	0	0	0	0	G	1	0.1296
118	Alaboubiat	0	0	0	0	G	1	0.1296
119	Alaboubiat	0	0	0	0	G	1	0.1296
120	Alaboubiat	0	0	0	0	G	1	0.1296
121	Alaboubiat	0	0	0	0	G	1	0.1296
122	Abbasia Sharqia	0	0	0	0	H	1	0.1296
123	Neighborhood Housing	0	0	0	0	G	1	0.1296
124	Hur neighborhood	0	0	0	0	G	1	0.1296
125	Amel	0	0	0	0	G	1	0.1296
126	Naser	0	0	0	0	G	1	0.1296
127	Amel	0	0	0	0	G	1	0.1296
128	Amel	0	0	0	0	G	1	0.1296
129	Mukhaim	0	0	0	0	G	1	0.1296

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group	
130	Abbasia Algarbia	0	0	0	0	G	1	0.1296
131	Salam	0	0	0	0	G	1	0.1296
132	Naser	0	0	0	0	G	1	0.1296
133	Salam	0	0	0	0	G	1	0.1296
134	Naser	0	0	0	0	G	1	0.1296
135	Zahraa	0	0	0	0	I	1	0.1296
136	Hur neighborhood	0	0	0	0	G	1	0.1296
137	Amel	0	0	0	0	G	1	0.1296
138	Abbasia Algarbia	0	0	0	0	D	1	0.1296
139	Mukhaim	0	0	0	0	D	1	0.1296
140	Abbasia Sharqia	0	0	0	0	D	1	0.1296
141	Al-Naqeeb	0	0	0	0	G	1	0.1296
142	Gahez	0	0	0	0	G	1	0.1296
143	Ghadeer	0	0	0	0	G	1	0.1296
144	Abbas	0	0	0	0	G	1	0.1296
145	Husain	0	0	0	0	C	1	0.1296
146	Abbas	0	0	0	0	H	1	0.1296
147	Imam Mahdi neighborhood	0	0	0	0	G	1	0.1296
148	Ramadan neighborhood	0	0	0	0	D	1	0.1296
149	Naser	0	0	0	0	G	1	0.1296
150	Ramadan neighborhood	0	0	0	0	G	1	0.1296
151	Hadad street	0	0	0	0	G	1	0.1296
152	Ahmed al-Waeli Street	0	0	0	0	G	1	0.1296
153	Ahmed al-Waeli Street	0	0	0	0	G	1	0.1296
154	Al-Wend	0	0	0	0	B	4	6.9696
155	Tourij	0	0	0	0	B	7	31.8096
156	Hur neighborhood	0	0	0	0	G	1	0.1296
157	Ghadeer	0	0	0	0	G	1	0.1296
158	Naser	0	0	0	0	G	1	0.1296
159	Mowedhafen	0	0	0	0	G	1	0.1296
160	Amel	0	0	0	0	G	1	0.1296
161	Hur neighborhood	0	0	0	0	G	1	0.1296
162	Neighborhood family	0	0	0	0	A	1	0.1296
163	Moalemen	0	0	0	0	G	1	0.1296
164	Abbas	0	0	0	0	A	1	0.1296
165	Moalemen	0	0	0	0	G	1	0.1296
166	Mamalgy	0	0	0	0	G	1	0.1296
167	Mowedhafen	0	0	0	0	I	1	0.1296
168	Shuhadaa	1	1	BB	1	A	1	0.1296
169	Wefaa	1	0	0	0	I	3	2.6896

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group	
170	Neighborhood Al-Mamalchi	0	0	0	0	I	3	2.6896
171	Naser	0	0	0	0	G	1	0.1296
172	Safe Saad	0	0	0	0	H	1	0.1296
173	Al-Naqeeb	0	0	0	0	G	1	0.1296
174	Mowedhafen	0	0	0	0	G	1	0.1296
175	Amel	0	0	0	0	G	1	0.1296
176	Taka	0	0	0	0	C	1	0.1296
177	Abbas	0	0	0	0	I	1	0.1296
178	Imams neighborhood	0	0	0	0	G	1	0.1296
179	Ramadan neighborhood	0	0	0	0	G	1	0.1296
180	Gamai	0	0	0	0	G	1	0.1296
181	Municipal district	1	1	BB	0	B	4	6.9696
182	Neighborhood canning	0	0	0	0	G	1	0.1296
183	Husain	1	1	BB	0	B	2	0.4096
184	Ramadan neighborhood	0	0	0	0	H	1	0.1296
185	Amel	0	0	0	0	H	1	0.1296
186	Hur neighborhood	0	0	0	0	G	1	0.1296
187	Husseiniya	0	0	0	0	G	1	0.1296
188	Naser	0	0	0	0	G	1	0.1296
189	Neighborhood Housing	1	1	BB	0	A	1	0.1296
190	Salam	0	0	0	0	G	1	0.1296
191	Hur neighborhood	0	0	0	0	G	1	0.1296
192	Naser	0	0	0	0	G	1	0.1296
193	Moalemen	0	0	0	0	G	1	0.1296
194	Neighborhood Housing	0	0	0	0	G	1	0.1296
195	Taka	0	0	0	0	G	1	0.1296
196	Hur neighborhood	0	0	0	0	G	1	0.1296
197	Salam	0	0	0	0	G	1	0.1296
198	Safe Saad	0	0	0	0	G	1	0.1296
199	Askari	0	0	0	0	G	1	0.1296
200	Moalemen	0	0	0	0	G	1	0.1296
201	Neighborhood Al-Mamalchi	0	0	0	0	G	1	0.1296
202	Naser	0	0	0	0	G	1	0.1296
203	Amel	0	0	0	0	G	1	0.1296
204	Amel	0	0	0	0	G	1	0.1296
205	Hur neighborhood	0	0	0	0	G	1	0.1296
206	Imams neighborhood	0	0	0	0	G	1	0.1296
207	Mulhak	0	0	0	0	G	1	0.1296
208	Neighborhood challenge	0	0	0	0	G	1	0.1296

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group	
209	Hur neighborhood	0	0	0	0	G	1	0.1296
210	Mowedhafen	0	0	0	0	G	1	0.1296
211	Husain	0	0	0	0	G	1	0.1296
212	Ramadan neighborhood	1	1	BB	1	A	2	0.4096
213	Husain	0	0	0	0	G	1	0.1296
214	Al-Naqeeb	0	0	0	0	G	1	0.1296
215	Al-Naqeeb neighborhood	0	0	0	0	G	1	0.1296
216	Safe Saad	0	0	0	0	G	1	0.1296
217	Husain	0	0	0	0	C	1	0.1296
218	Amel	0	0	0	0	I	1	0.1296
219	Alaboubiat	0	0	0	0	H	1	0.1296
220	Mowedhafen	0	0	0	0	E	1	0.1296
221	Al-Husseiniya	0	0	0	0	F	5	13.2496
222	Moalemen	0	0	0	0	G	1	0.1296
223	Naser	0	0	0	0	G	1	0.1296
224	Salam	0	0	0	0	G	1	0.1296
225	Hur neighborhood	0	0	0	0	G	1	0.1296
226	Hur neighborhood	0	0	0	0	J	1	0.1296
227	Hur neighborhood	0	0	0	0	J	1	0.1296
228	Mowedhafen	0	0	0	0	G	1	0.1296
229	Gadisai	0	0	0	0	G	1	0.1296
230	Ramadan neighborhood	0	0	0	0	J	1	0.1296
231	Mowedhafen	0	0	0	0	G	1	0.1296
232	Gamai	0	0	0	0	G	1	0.1296
233	Hur neighborhood	0	0	0	0	G	1	0.1296
234	Gamai	0	0	0	0	G	1	0.1296
235	Husain	0	0	0	0	H	1	0.1296
236	Baath neighborhood	1	1	AA	0	A	1	0.1296
237	Amel	0	0	0	0	G	1	0.1296
238	Hur neighborhood	0	0	0	0	G	1	0.1296
239	Naser	0	0	0	0	G	1	0.1296
240	Husain	0	0	0	0	G	1	0.1296
241	Baath neighborhood	0	0	0	0	G	1	0.1296
242	Hur neighborhood	0	0	0	0	G	1	0.1296
243	Naser	0	0	0	0	G	1	0.1296
244	Hur neighborhood	0	0	0	0	C	1	0.1296
245	Khayrat	0	0	0	0	F	10	74.6496
246	Mowedhafen	1	1	BB	0	B	1	0.1296
247	Al-Naqeeb	0	0	0	0	D	1	0.1296
248	Mudaraa	1	1	AA	1	A	1	0.1296

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group	
249	Amel	0	0	0	0	G	1	0.1296
250	Hur neighborhood	1	1	AA	1	E	5	13.2496
251	Hur neighborhood	0	0	0	0	H	1	0.1296
252	Ghadeer	0	0	0	0	G	1	0.1296
253	Amel	0	0	0	0	G	1	0.1296
254	Shuhadaa	1	1	BB	1	B	3	2.6896
255	Husseiniya	0	0	0	0	E	3	2.6896
256	Ramadan neighborhood	1	1	BB	1	B	1	0.1296
257	Sadia	0	0	0	0	D	1	0.1296
258	Moalemen	0	0	0	0	I	4	6.9696
259	Gamai	1	1	AA	1	B	1	0.1296
260	Mowedhafen	0	0	0	0	I	1	0.1296
261	Shuhadaa	1	1	BB	1	A	1	0.1296
262	Wefaa	1	0	0	0	I	3	2.6896
263	Neighborhood Al-Mamalchi	0	0	0	0	I	3	2.6896
264	Naser	0	0	0	0	G	1	0.1296
265	Safe Saad	0	0	0	0	H	1	0.1296
266	Al-Naqeeb	0	0	0	0	G	1	0.1296
267	Mowedhafen	0	0	0	0	G	1	0.1296
268	Amel	0	0	0	0	G	1	0.1296
269	Taka	0	0	0	0	C	1	0.1296
270	Abbas	0	0	0	0	I	1	0.1296
271	Imams neighborhood	0	0	0	0	G	1	0.1296
272	Ramadan neighborhood	0	0	0	0	G	1	0.1296
273	Gamai	0	0	0	0	G	1	0.1296
274	Municipal district	1	1	BB	0	B	4	6.9696
275	Neighborhood canning	0	0	0	0	G	1	0.1296
276	Husain	1	1	BB	0	B	2	0.4096
277	Ramadan neighborhood	0	0	0	0	H	1	0.1296
278	Amel	0	0	0	0	H	1	0.1296
279	Hur neighborhood	0	0	0	0	G	1	0.1296
280	Husseiniya	0	0	0	0	G	1	0.1296
281	Naser	0	0	0	0	G	1	0.1296
282	Neighborhood Housing	1	1	BB	0	A	1	0.1296
283	Salam	0	0	0	0	G	1	0.1296
284	Hur neighborhood	0	0	0	0	G	1	0.1296
285	Naser	0	0	0	0	G	1	0.1296
286	Moalemen	0	0	0	0	G	1	0.1296
287	Neighborhood Housing	0	0	0	0	G	1	0.1296

No.of. Sheet	address home	have car	come by private car	where put car	difficult in put car	type car	No.of group	
288	Taka	0	0	0	0	G	1	0.1296
289	Hur neighborhood	0	0	0	0	G	1	0.1296
290	Salam	0	0	0	0	G	1	0.1296
291	Safe Saad	0	0	0	0	G	1	0.1296
292	Askari	0	0	0	0	G	1	0.1296
293	Moalemen	0	0	0	0	G	1	0.1296
294	Neighborhood Al-Mamalchi	0	0	0	0	G	1	0.1296
295	Naser	0	0	0	0	G	1	0.1296
296	Amel	0	0	0	0	G	1	0.1296
297	Amel	0	0	0	0	G	1	0.1296
298	Hur neighborhood	0	0	0	0	G	1	0.1296
299	Imams neighborhood	0	0	0	0	G	1	0.1296
300	Mulhak	0	0	0	0	G	1	0.1296

B.5 questionnaire of land use in HKCC

Table B-6 Data collected from questionnaire

Type of land use	Length around area	Area	Demand car
Heritage	73	297	24
Heritage	106	661	53
Heritage	249	2957	237
Heritage	55	111	9
Heritage	43	85	7
Heritage	46	130	10
Heritage	45	125	10
Heritage	77	324	26
Heritage	86	297	24
Heritage	52	165	13
Heritage	84	341	27
Heritage	248	1963	157
Heritage	106	672	54
Heritage	75	256	20
Heritage	94	334	27
Heritage	51	126	10
Heritage	41	45	4
Heritage	40	81	6
Heritage	94	499	40
Heritage	69	301	24

Type of land use	Length around area	Area	Demand car
Heritage	107	556	44
Heritage	41	104	8
Heritage	179	1647	132
Residential	163	1464	15
Residential	58	194	2
Residential	43	116	1
Residential	62	225	2
Residential	34	72	1
Residential	54	172	2
Residential	57	190	2
Residential	49	149	1
Residential	33	69	1
Residential	52	168	2
Residential	36	78	1
Residential	37	75	1
Residential	35	65	1
Residential	34	62	1
Residential	47	139	1
Residential	39	94	1
Residential	51	155	2
Residential	54	147	1
Residential	32	62	1
Residential	30	55	1
Residential	55	164	2
Residential	34	72	1
Residential	53	161	2
Residential	44	116	1
Residential	58	161	2
Residential	57	200	2
Residential	63	246	2
Commercial	110	628	13
Commercial	56	177	4
Commercial	61	225	4
Commercial	49	150	3
Commercial	66	260	5
Commercial	76	318	6
Commercial	83	412	8
Commercial	63	222	4

Type of land use	Length around area	Area	Demand car
Commercial	47	117	2
Commercial	121	879	18
Commercial	58	195	4
Commercial	63	181	4
Commercial	69	275	5
Commercial	30	42	1
Commercial	47	128	3
Commercial	61	199	4
Commercial	46	124	2
Commercial	30	53	1
Commercial	48	129	3
Commercial	143	757	15
Commercial	63	156	3
Commercial	53	152	3
Commercial	79	364	7
Commercial	29	44	1
Commercial	54	136	3
Commercial	112	517	10
Commercial	51	125	2
Commercial	58	191	4
Commercial	56	189	4
Commercial	58	190	4
Commercial	59	159	3
Commercial	71	293	6
Commercial	39	93	2
Commercial	67	227	5
Educational	121	855	26
Educational	375	6193	186
Educational	285	5060	152
Educational	156	1500	45
Educational	185	2090	63
Educational	154	1380	41
Educational	167	1657	50
Educational	313	5108	153
Educational	231	2541	76
Educational	63	221	7
Educational	250	3009	90
Educational	192	2379	71

Type of land use	Length around area	Area	Demand car
Educational	270	4039	121
Educational	268	4516	135
Educational	188	2126	64
Educational	182	2057	62
Educational	198	2349	70
Educational	260	4216	126
Educational	186	1710	51
Educational	48	137	4
Educational	137	1076	32
Governmental	142	732	22
Governmental	82	374	11
Governmental	46	130	4
Governmental	101	641	19
Governmental	98	596	18
Governmental	96	515	15
Governmental	55	107	3
Governmental	106	560	17
Governmental	159	714	21
Governmental	334	7286	219
Governmental	128	979	29
Governmental	179	1506	45
Governmental	44	79	2
Governmental	186	1075	32
Governmental	143	1036	31
Governmental	39	85	3
Religious	64	197	20
Religious	484	16892	1689
Religious	516	19904	1990
Religious	43	113	11
Religious	84	418	42
Religious	37	74	7
Religious	68	273	27
Religious	42	99	10
Religious	51	135	14
Religious	48	133	13
Religious	53	163	16
Religious	72	225	22
Religious	52	140	14

Type of land use	Length around area	Area	Demand car
Religious	53	119	12
Religious	48	142	14
Religious	61	196	20
Religious	35	68	7
Religious	192	1607	161
Religious	30	48	5
Religious	30	53	5
Religious	41	100	10
Religious	63	226	23
Religious	51	157	16
Religious	65	184	18
Religious	61	190	19
Religious	59	216	22
Religious	47	136	14
Religious	138	1135	114
Religious	32	64	6
Religious	33	50	5
Agricultural	312	5343	11
Agricultural	363	4965	10
Residential-Commercial	58	192	4
Residential-Commercial	49	113	2
Residential-Commercial	48	146	3
Residential-Commercial	63	237	5
Residential-Commercial	58	184	4
Residential-Commercial	26	39	1
Residential-Commercial	46	129	3
Residential-Commercial	39	93	2
Residential-Commercial	78	292	6
Residential-Commercial	33	67	1
Residential-Commercial	21	27	1
Residential-Commercial	49	100	2
Residential-Commercial	57	120	2
Residential-Commercial	64	216	4
Residential-Commercial	61	239	5
Residential-Commercial	66	222	4
Residential-Commercial	79	355	7
Residential-Commercial	48	142	3
Residential-Commercial	70	241	5

Type of land use	Length around area	Area	Demand car
Residential-Commercial	50	144	3
Residential-Commercial	51	149	3
Residential-Commercial	83	341	7
Residential-Commercial	64	177	4
Residential-Commercial	58	201	4
Residential-Commercial	82	426	9
Residential-Commercial	66	260	5
Residential-Commercial	69	291	6
Residential-Commercial	63	237	5
Residential-Commercial	52	155	3
Residential-Commercial	54	157	3
Residential-Commercial	49	101	2
Residential-Commercial	47	136	3
Residential-Commercial	58	158	3
Residential-Commercial	59	192	4
Health	106	616	1
Health	141	1069	2
Health	68	182	3
Health	114	680	4
Health	27	39	5
Public	190	1564	47
Public	45	132	4
Public	135	1064	32
Public	100	391	12
Public	141	746	22
Public	62	218	7
Public	171	1230	37
Public	108	682	20
Public	90	313	9
Public	90	491	15
Public	28	44	1
Public	50	142	4
Public	91	477	14
Public	71	298	9
Public	60	214	6
Public	43	98	3
Public	65	242	7
Public	163	1330	40

Type of land use	Length around area	Area	Demand car
Public	78	341	10
Public	46	138	4
Public	120	868	26
Public	140	1165	35
Vacant	64	226	7
Vacant	93	349	10
Vacant	40	97	3
Vacant	42	112	3
Vacant	132	697	21
Vacant	296	2397	72
Vacant	49	131	4
Vacant	40	102	3
Vacant	41	88	3
Vacant	35	75	2
Vacant	56	189	6
Vacant	98	404	12
Vacant	58	215	6
Vacant	32	61	2
Vacant	79	371	11
Vacant	32	59	2
Vacant	71	299	9
Vacant	97	577	17
Vacant	31	52	2
Vacant	35	48	1
Vacant	79	222	7
Vacant	43	100	3
Vacant	42	79	2
Vacant	45	109	3

وزارة التعليم العالي و البحث العلمي
جامعة كربلاء
كلية الهندسة
قسم الهندسة المدنية

استخدام برنامج نظم المعلومات الجغرافية في تحديد افضل موقع لمواقف السيارات:منطقة الدراسة مركز مدينة كربلاء المقدسة

الأطروحة مقدمة إلى قسم الهندسة المدنية، جامعة كربلاء كجزء من متطلبات نيل شهادة الماجستير في العلوم الهندسية للبنى التحتية

الرساله مقدمة من قبل

زهراء كاظم نعمة

بكالوريوس في الهندسة المدنية

تحت اشراف

الاستاذ زهير الجواهري

الاستاذ المساعد الدكتور شاكر البو سلطان

2017

الخلاصة

مواقف السيارات هي قضية هامة في مدينة كربلاء المقدسة بشكل عام وفي وسط المدينة على وجه الخصوص، و ذلك لان هذه المنطقة هي منطقة حيوية تتوافد اليها اعداد هائلة من الزوار ، وانه ليس من الصعب انشاء مواقف للسيارات خارج حدود المدينة . ترتبط زيادة عدد السيارات مع زيادة في نمو عدد السكان و بالتالي زيادة الملكية للسيارات وذلك يودي الى زيادة الطلب على مواقف السيارات. في مركز مدينة كربلاء المقدسة. اصبح من الصعب البحث عن موقف جيد للسيارات يحقق جميع المعايير المطلوبة، حيث ان كل المواقف المتوفرة في هذه المدينه هية مواقف لاتنطبق عليها المعايير و المواصفات المكانية و الهندسية التي تلبي غرض الرحلة لكل سائق سيارة. كذلك، فإن مدينة كربلاء المقدسة هي منطقة مزدحمة نتيجة توافد اليها اعداد هائلة من السياح وهذا يؤدي إلى ظهور مشكلة كبيرة الا وهي مشكلة الازدحامات في حركة المرور. بالإضافة إلى ذلك، فإن عدد مواقف السيارات المتواجدة في مدينة كربلاء المقدسة لا يكفي لتلبية الطلب في هذه المناطق.

وتركز هذه الرسالة على دراسة المدينة بشكل كامل من حيث الطلب على عدد السيارات و من خلال دراسة تم اجراءها على مركز المدينه كربلاء تخص توليد الرحلات و من خلالها تم التعرف على مقدار الحاجة للسيارات للوحدات السكنية، و ايضا تم اجراء دراسة استقصائية أعدت لجميع مركز المدينة من ألاضرحة و المواقف السيارات القائمة، واستخدام ألراضي، والشوارع . ونتيجة لذلك، تم اكتساب جميع المعلومات المتعلقة بمركز مدينة كربلاء المقدسة من أجل تحديد حجم مشكلة وقوف السيارات. وبعد ذلك، تم وضع اوزان للمعايير باستخدام التحليل الهرمي للبيانات، و من ثم تم وضع نموذج لموديل اختيار افضل موقع لمواقف السيارات باستخدام برنامج نظم المعلومات الجغرافي بعد ان تم ادخال كافة المعلومات و المعايير الهندسية المتعلقة بموقع موقف السيارات. وتشير النتائج إلى أن الموديل نظم المعلومات الجغرافية سوف تساعد في تسهيل و توفير الوقت و الجهد و الكلفة في البحث عن موقع وقوف السيارات.