

ISTANBUL TECHNICAL UNIVERSITY
GRADUATE SCHOOL OF SCIENCE ENGINEERING AND TECHNOLOGY

**DETERMINING APPROPRIATE PUBLIC LOCATIONS FOR
AUTOMATED EXTERNAL DEFIBRILLATOR (AED) DEPLOYMENT:
A CASE STUDY IN CITY OF VALENCIA**

M.Sc. THESIS

Tuğba Esin EKMEKÇİ

Department of Industrial Engineering

Engineering Management Programme

JANUARY 2015

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JANUARY 2015

İSTANBUL TEKNİK ÜNİVERSİTESİ
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**OTOMATİK EKSTERNAL DEFİBRİLATÖR (OED) YERLEŞTİRİLMESİ İÇİN
UYGUN HALKA AÇIK MEKANLARIN BELİRLENMESİ:
VALENCIA ŞEHRİNDE BİR VAKA ÇALIŞMASI**

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*To all first aiders:
Anonymous heroes without whom all the technology would be meaningless,*

FOREWORD

Confucius said “Choose a job you love, and you will never have to work a day in your life”. This study was the combination of the things I love: I chose a subject I love, for six months I lived in a city I love, and I was guided by people who are impossible not to love. In this sense, I might say I did not have to work even a day...

I would like to start with thanking my advisor, Prof. Dr. Y. İlker Topcu, who was nothing but the best guide, and continue with Dr. Pablo Aragonés-Beltrán and Dr. Rafael Rodríguez de Sanabria Gil, without whom the case study in Valencia would not be as successful or as enjoyable. I should also thank T. Oya Ekmekci for the graphics design of the map of alternatives. Last but not least, I wish to thank my mother, my father, and my precious little sister for all that I have and all that I am. I will always be grateful for having them as my family.

I could not be happy enough if the slightest contribution was made by this study to save a life; and hope many studies would follow...

December 2014

Tuğba Esin EKMEKÇİ
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TABLE OF CONTENTS

FOREWORD	ix
TABLE OF CONTENTS	xi
ABBREVIATIONS	xiii
LIST OF TABLES	xv
LIST OF FIGURES	xvii
SUMMARY	xix
ÖZET	xxi
1. INTRODUCTION	1
2. BACKGROUND	3
3. METHODOLOGY	7
4. THE DECISION MODEL	11
4.1 Problem Definition	11
4.2 Objective	11
4.3 Determination of Criteria	11
4.3.1 Criteria suggested by previous studies	11
4.3.2 Determining criteria for the decision model	14
4.4 Determination of Alternatives	16
4.4.1 Suitable locations suggested by previous studies	16
4.4.2 Determining location alternatives in Valencia	20
4.7 Analysis	31
4.7.1 Importance of criteria	31
4.7.2 Preferences for alternatives	33
4.8 Results	35
4.8.1 Weights of criteria	35
4.8.2 Ranking of Alternatives	37
4.9 Sensitivity Analysis	42
5. CONCLUSIONS AND FURTHER SUGGESTIONS	47
REFERENCES	49
APPENDICES	55
CURRICULUM VITAE	115

ABBREVIATIONS

AED	: Automated External Defibrillator
AHP	: Analytic Hierarchy Process
CPR	: Cardiopulmonary Resuscitation
PAD	: Public Access Defibrillation
SCA	: Sudden Cardiac Arrest
Scn	: Scenario

LIST OF TABLES

	<u>Page</u>
Table 3.1 : Fundamental scale for pairwise comparisons	8
Table 4.1 : Criteria mentioned in previous studies.....	14
Table 4.2 : Location types mentioned in previous studies	19
Table 4.3 : Performance levels of criteria	29
Table 4.4 : Points assigned to performance levels by the decision maker	30
Table 4.5 : Pairwise comparison matrix for criteria.....	32
Table 4.6 : Pairwise comparison matrix for sub-criteria of “coverage capacity”	33
Table 4.7 : Pairwise comparison matrix for sub-criteria of “SCA risk”	33
Table 4.8 : Pairwise comparison matrix for sub-criteria of “response time”	33
Table 4.9 : Alternatives in first-priority group	39
Table 4.10 : Alternatives in second-priority group	40
Table 4.11 : Alternatives in third-priority group	41
Table 4.12 : Alternatives in fourth-priority group	42
Table 4.13 : Number of alternatives in groups for each scenario	44
Table 4.14 : Ranking of first-priority group for each scenario	45
Table A.1 : Summary of literature review (1).....	57
Table A.2 : Summary of literature review (2).....	58
Table C.1 : Performance levels and global scores of alternatives	93
Table D.1 : Ranking of alternatives under scenario 1	95
Table D.2 : Ranking of alternatives under scenario 2	97
Table D.3 : Ranking of alternatives under scenario 3	99
Table D.4 : Ranking of alternatives under scenario 4	101
Table D.5 : Ranking of alternatives under scenario 5	103
Table D.6 : Ranking of alternatives under scenario 6	105
Table D.7 : Ranking of alternatives under scenario 7	107
Table D.8 : Ranking of alternatives under scenario 8	109
Table D.9 : Comparison of rankings under different scenarios	111

LIST OF FIGURES

	<u>Page</u>
Figure 4.1 : A view from the map of alternatives	25
Figure 4.2 : The AHP model of the decision problem	27
Figure 4.3 : The model constructed using Super Decisions software	31
Figure 4.4 : Initial pairwise comparisons of the decision maker	32
Figure 4.5 : Modified pairwise comparisons of the decision maker	32
Figure 4.6 : Ratings screen of Super Decisions software	34
Figure 4.7 : Weights of criteria according to the goal	35
Figure 4.8 : Weights of its sub-criteria according to criteria C1.....	35
Figure 4.9 : Weights of its sub-criteria according to criteria C2.....	36
Figure 4.10 : Weights of its sub-criteria according to criteria C3.....	36
Figure 4.11 : Grouping alternatives according to their global scores.	37
Figure 4.12 : Groups of alternatives marked on the map.....	38

DETERMINING APPROPRIATE PUBLIC LOCATIONS FOR AUTOMATED EXTERNAL DEFIBRILLATOR (AED) DEPLOYMENT: A CASE STUDY IN CITY OF VALENCIA

SUMMARY

Cardiovascular diseases is reported by World Health Organisation to be the leading cause of death globally, more than 50% of these deaths being caused by sudden cardiac arrest. Sudden cardiac arrest may be defined as unexpected loss of heart function, breathing and consciousness caused by an electrical disturbance in heart, which disrupts its pumping action and stopping blood flow to the rest of the body. The only effective treatment is immediate defibrillation supported by cardiopulmonary resuscitation (CPR). The unpredictable and fatal nature of sudden cardiac arrest puts emphasis on the necessity of an immediate treatment for any chance of survival. It is agreed by all authorities that the chances of survival decrease by about 10% with each minute without defibrillation. Automated external defibrillators were designed to make the earliest defibrillation possible. An automated external defibrillator (AED) is a portable device which delivers an electric shock through the chest to the heart, which can restore the normal heart rhythm of a sudden cardiac arrest. An AED does not require the user to be a medical professional since the device decides whether an electroshock is necessary or not. Additionally, it guides the user with visual and verbal instructions throughout the process. AEDs are proven to be safe and effective to be used by not only healthcare professionals but also laypeople. AEDs created a whole different perspective to the concept of resuscitation and first-aid by enabling any first-responder to be able to deliver the life-saving defibrillation treatment within moments of any incident, long before the ambulance arrives. This led the question to be “where to place AEDs?”, searching for a solution to the unpredictability of SCA and the cost of AEDs. This has been a popular topic among researchers in resuscitation domain. Yet, the problem has not been studied under decision making domain sufficiently. The aim of this study was to provide a novel approach to the problem by using Analytical Hierarchy Process (AHP) and offer a solution in terms of a case study in City of Valencia, Spain.

After reviewing the previous studies on the subject, criteria and potential categories for alternatives were determined. The decision problem is constructed of four main criteria, three of them having two sub-criteria each. The location alternatives were discussed by local experts and a final list of 80 alternatives were agreed on. The pairwise comparisons were made by a decision maker who is an expert of AED programmes under supervision of a professor who is an expert on AHP.

Criterion response time was the most important criterion with a weight of 65.07%, followed by SCA risk (23.13%). The weight of coverage capacity was 7.65% and that of availability of assigned user was 4.14%. This showed that the most critical criterion for selecting the suitability of a location for AED deployment is the response time.

A rigid ranking of the alternatives would not be of perfect meaning since the AED placement project will probably not be done as one AED at a time, and also the main purpose of this study was to serve as a general guideline for projects in the near future. For this reason, the alternatives were grouped according to their global scores with respect to the goal. The global scores of all alternatives were analysed and four groups with descending priorities were formed. These groups were aimed to serve as a guideline or a road map for future projects for AED deployment.

Additionally, a sensitivity analysis was performed to test the robustness of the model with regard to the changes in weights of criteria. It was observed that especially the first-priority alternatives are not highly sensitive to the changes in weights of criteria, showing the importance of selecting these locations if a pilot study is intended. However, it should be noted that a pilot study might fail as a determinant of success of an AED deployment project and it might be a better choice to use the results of this study as a road map which will lead a project that will cover all locations throughout a time period.

OTOMATİK EKSTERNAL DEFİBRİLATÖR (OED) YERLEŞTİRİLMESİ İÇİN UYGUN HALKA AÇIK MEKANLARIN BELİRLENMESİ: VALENCIA ŞEHRİNDE BİR VAKA ÇALIŞMASI

ÖZET

Dünya Sağlık Örgütü verilerine göre kalp ve damar hastalıkları, ölüm nedenleri içinde dünya çapında birinci sırada yer almaktadır. Bu ölümlerin yarısından fazlası ile ani kalp durması şeklinde gerçekleşmektedir. Ani kalp durması, kalpte meydana gelen elektriksel bir düzensizlik sonucu vücudun ihtiyacı olan kanın pompalanamaması olarak tanımlanmaktadır. Bu durumda kalp durmuş değildir, ancak düzenli şekilde kasılamadığından kan pompalanamamaktadır. Ani kalp durması her yaş ve cinsiyette kişide görülebilmekte ve çoğu zaman önceden belirti göstermemektedir.

Ani kalp durması geçiren bir kişinin yaşama dönmesi için tek etkili tedavi derhal uygulanacak defibrilasyon (elektroşok) ve temel yaşam desteği, yani kalp masajı ve suni solunumdur (kardiyopulmoner resusitasyon). Hızlı tedavi, hastanın yaşama dönmesinde hayati önem taşır, çünkü defibrilasyon uygulanmadan geçen her dakika ile hastanın yaşama dönme şansı yaklaşık %10 azalmaktadır. Otomatik eksternal defibrilatörler (OED) bu kritik dakikalarda müdahaleyi mümkün kılmak için geliştirilmiştir.

OED, kalp ritmini normale döndürecek elektroşokun olay yerinde ve ilk birkaç dakika içinde uygulanabilmesini mümkün kılan taşınabilir cihazlardır. Taşınabilir kalp şok cihazı olarak da adlandırılmaktadırlar. Kullanıcıyı hem sesli komutlarla, hem de üzerindeki resim ve ışıklı göstergelerle yönlendiren OED’ler doktor ya da hemşire olmayan kişiler tarafından da kullanılabilir. Çünkü cihaz otomatiktir ve hastanın elektroşoka ihtiyacı olup olmadığına kendi karar verir. Elektroşok gerekmiyorsa kullanıcı şoku uygulayamaz. Bu şekilde, kullanıcı hatası riski ortadan kalkmış olur. OED’lerin kullanımının etkili ve güvenli olduğu bir çok çalışma tarafından kanıtlanmıştır.

OED’ler, ilk yardım kavramını başka bir boyuta taşımışlardır. Bu cihazlar sayesinde ambulans olay yerine gelmeden çok önce hastaya oradaki kişiler tarafından müdahale edilip hasta hayata döndürülebilmektedir. Bu durumda asıl önemli soru OED’lerin nerelerde bulundurulması gerektiğidir. Ani kalp durması vakalarının öngörülemezliği ve bir mekanda OED bulundurmanın maliyeti, bu sorunun cevabının kolay olmayacağını göstermektedir. Bu konu, resusitasyon (yeniden canlandırma) ve ilk yardım alanlarında ilgi gören bir konu olmasına rağmen, karar verme alanında üzerine eğilinen bir konu olmamıştır. Bu çalışmanın amacı, bu probleme Analitik Hiyerarşi Süreci (Analytical Hierarchy Process – AHP) kullanılarak daha önce uygulanmamış bir yaklaşım sunmak ve İspanya’nın Valencia şehrinde yapılan bir vaka çalışması ile yöntemin uygulanabilirliğini göstermektir.

Çalışmanın en başında, konu hakkında yapılmış çalışmalar incelenmiş ve OED yerleştirilmesi için bu çalışmaların kullanmış olduğu kriterler ile OED yerleştirilmesi uygun olan mekan türleri belirlenmiştir. Sonuç olarak, bu çalışmada kullanılacak dört ana kriter belirlenmiştir. Bu ana kriterlerden üç tanesi, ikişer adet alt kritere sahiptir. Ana kriterler kapsama kapasitesi, ani kalp durması riski, müdahale süresi ve potansiyel kullanıcının bulunurluğu olarak tanımlanmıştır. Kapsama kapasitesinin alt kriterleri nüfus kapsama kapasitesi ve fiziksel alan kapsama kapasitesi olurken ani kalp durması riskinin alt kriterleri mekandaki insanların risk seviyesi ve mekandaki aktivitelerin risk seviyesi olarak belirlenmiştir. Mekana ulaşım süresi ile mekandaki en uzak noktaya ulaşma süresi de müdahale süresi kriterinin alt kriterleri olmuştur. Ayrıca, Valencia şehrinde önceki çalışmalarla belirlenmiş türlere ait mekanlar saptanmış ve uzmanlarla da görüşülerek 80 adet alternatif belirlenmiştir.

İkili karşılaştırmaların kolay yapılabilmesi için bir anket hazırlanmış ve bu anket, OED yerleştirme programlarında uzman karar verici tarafından, AHP konusunda uzman öğretim görevlisi gözetiminde yanıtlanmıştır. Karar vericinin yanıtlarından Super Decisions yazılımı kullanılarak sonuçlar elde edilmiştir. Bu sonuçlara göre müdahale süresi %65.07 ağırlıkla en önemli kriter olmuştur. Bunu %23.13 ağırlıkla ani kalp durması riski ve %7.65 ağırlıkla kapsama kapasitesi izlemektedir. En az ağırlığa sahip kriter ise %4.14 ile potansiyel kullanıcının bulunurluğu olmuştur. Buna göre, bir mekanın OED yerleştirilmesi için uygunluğuna karar verilirken en önemli kriterin o mekandaki bir acil duruma müdahale süresi olduğu görülmektedir.

Kriterlerin karşılaştırılmasına ek olarak karar vericiden her alternatifi bu kriterler için performans düzeyine göre değerlendirmesi istenmiştir. Bu verilere göre alternatifler tercih sırasına göre sıralanmıştır. Ancak, OED yerleştirilmesi projesi her seferinde bir cihaz için yapılmayacağı ve bu çalışmanın ilerideki projeler için genel bir rehber niteliğinde olması hedeflenmiş olduğundan, alternatiflere ait basit bir sıralamanın fazla anlam ifade etmeyeceği düşünülmüştür. Bu nedenle, alternatifler tercih düzeylerine göre dört öncelik grubuna ayrılmıştır. Alternatifleri, eşit sayıda mekan içerecek şekilde dört gruba ayırmann doğru bir yaklaşım olmayacağı görülmüştür. Çünkü bu şekilde aynı ya da birbirine çok yakın puana sahip alternatiflerin farklı gruplara dahil olma riski bulunmaktadır. Bu nedenle, alternatiflerin puanları bir grafik üzerinde incelenmiş ve gruplanmalar gözlemlenerek öncelik grupları arasındaki sınırlar belirlenmiş ve öncelik grupları bu şekilde oluşturulmuştur. Bu gruplandırmanın, OED yerleştirilmesi projesi için bir yol haritası olarak hizmet vermesi hedeflenmektedir. Diğer bir deyişle, proje birden fazla adımda gerçekleştirilecekse bu gruplar her bir adımda OED yerleştirilecek mekanları belirlemek için bir öncelik sırası sunmaktadır.

Sonuçlar elde edildikten sonra, modelin kriterlerdeki değişimlere karşı sağlamlığını test etmek amacıyla duyarlılık analizi yapılmıştır. Bu analizde, dört ana kriterden her birine %100 ve %0 ağırlıklar atanarak sekiz farklı senaryo oluşturularak, karar sürecinde sadece o kritere göre sıralama yapılması ve o kriterin model dışında tutularak sıralama yapılması durumunda alternatiflerin tercih sıralarının nasıl değiştiği gözlemlenmiştir. Öncelik gruplarındaki alternatif sayılarının aynı tutulması doğru sonuç vermeyeceğinden, her senaryo için ayrıca orijinal modelde olduğu gibi dört öncelik grubu belirlenmiştir. Karşılaştırmalar hem sıralama, hem de öncelik grupları üzerinden yapılmıştır. Özellikle, birinci öncelik grubuna dahil olan alternatiflerdeki değişimler incelenmiştir, çünkü bu alternatifler projeye ilk olarak dahil edilecek mekanlar olacaktır ve bu gruba dahil bir alternatifi farklı senaryolarda grup değiştirip

değiřtirmedięi nemlidir. Sonu olarak, ilk gruptaki alternatiflerin kriter ağırlıklarındaki deęişimlere yüksek hassasiyet göstermedięi gözlemlenmiştir. Gruptaki alternatiflerin neredeyse tamamı, tüm senaryolarda birinci öncelik grubunda görölmektedir. Bu da bu alternatiflerin bir pilot alışma için uygun olduęu görüşünü destekler niteliktedir. Ancak, belirtilmelidir ki OED yerleřtirilmesi için yapılacak bir pilot alışma, tam ölekli projenin başarı oranını göstermekte yetersiz kalabilir ve bu nedenle bu alışmanın sonuçlarını, zamana yayılacak bir projenin adımlarını belirlenmek için kullanılması daha iyi bir tercih olacaktır.

1. INTRODUCTION

According to a report of World Health Organization, cardiovascular diseases are and will continue to be the leading cause of death globally: 17.3 million in 2008 (30% of all deaths globally) and an estimation of 23.3 million in 2030 (Alwan et al., 2010). In all cardiovascular diseases, sudden cardiac arrest (SCA) is the leading cause of death; causing more than 50% of all cardiac deaths (Zheng, 2001).

Sudden cardiac arrest is defined by Mayo Clinic as the sudden, unexpected loss of heart function, breathing and consciousness usually resulting from an electrical disturbance in heart, which disrupts its pumping action and stopping blood flow to the rest of the body (2012). Although it is mostly seen at people with coronary artery disease, SCA affects people of all ages and gender, and mostly without prior symptoms (American Heart Association, 2008).

Early defibrillation with cardiopulmonary resuscitation (CPR) is agreed to be the only effective treatment for a patient having SCA (Weisfeldt et al., 1996). Early treatment is the key success factor for resuscitation since survival chances decrease by about 10% with every minute without defibrillation (American Heart Association, 2005). Automated external defibrillators were designed to make the earliest defibrillation possible.

An automated external defibrillator (AED) is a portable device which delivers an electric shock through the chest to the heart, which can restore the normal heart rhythm of a sudden cardiac arrest patient (American Heart Association, 2012). An AED does not require the user to be a medical professional since the device decides whether an electroshock is necessary or not. Additionally, it guides the user with visual and verbal instructions throughout the process. AEDs are proven to be safe and effective to be used by not only healthcare professionals but also laypeople (Nolan et al., 2010). A study made in 2005 resulted that “the speed of response by the lay first responders in relation to AED use was similar to that reported for healthcare professionals” (Whitfield et al.). Thanks to this, it can be used in the very critical first minutes and a life can be saved even before the ambulance arrives to the scene. The concept “public-

access defibrillation”, which may be defined briefly as the “strategic placement of publicly available AEDs” (Folke et al., 2009), emerged from this idea. Public-access defibrillation is considered a very important method for improving the survival rates of out-of-hospital SCA (Folke et al., 2009) and the use of an AED before the emergency medical professionals arrive has positive affect on public health (Weisfeldt et al., 2010). Appropriate placement of the AEDs is the key to improving the effectiveness of the public-access defibrillation programmes (Nielsen et al., 2013a).

Determining the most suitable locations for AEDs has been an important topic among researches in emergency medicine field. However, nearly all the studies seem to be on retrospective basis and the topic has not been studied deeply under decision making domain. In this study, it is aimed to provide a basis by using Analytic Hierarchy Process (AHP) for the problem of locating AEDs in public places, to show that the researchers should study this topic also under decision making domain. The AHP decision model will be used to rank the locations which were found to be suitable candidates to place AEDs in the city of Valencia in Spain. Following Section 2 offers a literature review on the subject and Section 3 includes information about Analytic Hierarchy Process, its steps, use in previous researches, and its critique. Section 4 introduces and elaborates the decision model with its components and concludes with the analysis and results. Section 5 commentates the results and provides suggestions for future studies.

2. BACKGROUND

Within the scope of this study, literature regarding AEDs were reviewed. The researches were categorized according to their subject, type and scope. Main subject categories were observed to be as follows:

- Safety of AED Use
- Current Situation of AEDs
- Public Attitude Towards AEDs
- Cost-effectiveness of AEDs
- SCA Incident History
- Allocation of AEDs
- Sociological Aspect of AED Use
- Effectiveness of AEDs

Studies are observed to mainly belong to these research types:

- Controlled Trial
- Retrospective Study
- Survey
- Interview
- Report / Guideline / Recommendation

The scope of the studies were categorized as follows:

- Multi countries
- A Country / State
- A City
- Smaller Community
- Specific Type of Location

Also, it was noted if a specific method was adopted such as the following:

- Mathematical Optimization
- Voronoi Diagrams

- GIS
- Integer Programming
- Crocco Method
- Genetic Algorithm
- Temporally & Spatially Weighted Model
- Markov Decision Model
- Economic Model

The summary of literature review is shown in Table A.1 and Table A.2 in Appendix A together with the categories of each study.

Researches including AEDs mainly focus on determining the cost effectiveness of the units or equitable allocations of the AEDs (Myers & Mohite, 2009). As an example, Cram et al. (2003) studied the cost-effectiveness of AED deployment in selected public locations using Markov Decision Model. Rauner & Bajmoczy, on the other hand, used integer programming model to analyse the cost-effectiveness of the AEDs for the Austrian Red Cross (2003). The studies focusing on the cost-effectiveness of AED deployment mostly study the cost per QALY (quality-adjusted life-year) gained (Cram et al., 2005; Folke et al., 2009; Folke et al., 2010; Forrer et al., 2002; Nichol et al., 2009; Walker et al., 2003). There is a mostly cited threshold for an AED deployment to be cost-effective: \$50,000 to \$100,000 per QALY gained (Folke et al., 2010).

Literature review suggests that the subject of determining the most suitable locations for AEDs has not been studied deeply under decision making domain. Our search did not result in any research using AHP to introduce a model for determining suitable locations for AED deployment. Most of the studies aiming to locate AEDs focus on historical data of SCA incidents and propose these high-risk locations for AED deployment. As an example, Folke et al. (2009) intend to determine the locations with highest risk of cardiac arrest benefiting from retrospective data of cardiac arrest cases in Copenhagen, Denmark. Also, the researchers assess the cost-effectiveness of the AEDs by calculating the cost per quality-adjusted life year. Nielsen et al. (2013) make a 28-month observation and both determine the locations of SCA incidents and assess the use of the already deployed AEDs. Page et al. examine indoor SCA incidents between 1996 and 2008 and categorize the incidents according to the type of location, activity performed, demographics and survival. Different from other studies, this study

categorizes locations of incidents according to being traditional exercise facility, alternative exercise facility and public indoor location not used for exercise as the main focus of the study is exercise facilities (2013). In another study published by Muraoka et al. in 2006, out-of-hospital cardiac arrest (OHCA) incidents were focused per site; and as proposed by a previous study, the sites with annual incidence rate more than 0.03 are considered as high-risk locations which are suggested to be suitable for AED deployment. From another perspective, Gilchrist et al. focus on the legal situation by year 2010 concerning AED deployment in U.S.A. and see that fitness facilities, schools or school-sponsored sports events, public buildings, state parks, and law enforcement vehicles are the places in which it is required or encouraged to have AED (2012).

In the study published by Chan et al. in 2013, mathematical modelling is utilized to identify clusters of historic SCA incidents in Toronto, Canada between 2005 and 2010 to prioritize public locations for AED deployment. The researchers also compare their technique to conventional population-guided deployment method and result that this technique based on mathematical optimization is superior in terms of incident coverage.

The research of Tsai et al. (2012) intends to locate the AEDs considering the spatial and temporal characteristics of out-of-hospital cardiac arrest occurrence and assessed the location of the shops of a well-known retail chain for their suitability for AED installation. The first stage of the study involves the development of two weighting schemes, a temporally weighted model and a spatially weighted model, to capture the temporal and spatial variations in selecting AED locations. In the second stage, the researchers propose a stirring genetic algorithm (SGA) to select the limited subset of the shops covering the most weighted out-of-hospital cardiac arrest occurrences from the first stage. A more recent study (Siddiq et al., 2013) introduces the term “effective range” of an AED, which they define as “the maximum straight-line distance between the AED and the cardiac arrest such as there is a reasonable probability of retrieval and use prior to EMS arrival”, and runs a mathematical model to achieve the highest coverage based on retrospective incident data and pre-defined AED effective range values. This study also emphasizes the importance of the location of the AED inside a building as a key indicator of high “effective range” and high probability of utilization.

There are also studies focusing on specific communities such as university campuses or schools. The study conducted by Myers & Mohite (2009) focuses on determining

the most suitable locations for AEDs within a university campus to provide maximum coverage and within the budget constraints. This study uses coverage model to determine the appropriate locations within a specific university. Additionally, Motyka et al. (2005) conducted a study for verifying a previously developed model for determining the most suitable locations for AEDs within a basketball arena. This calculation merely focuses on the possible response time for a cardiac arrest case and determines the locations according to this criterion. In another study published in 2008, Imai et al. use Voronoi diagram with obstacles to determine suitable locations for AED deployment in Ueno Park in Tokyo, Japan. This study differs by taking into account the obstacles while reaching the patient such as the pond and fences.

3. METHODOLOGY

For this study, Analytic Hierarchy Process is used for the decision making process. The Analytic Hierarchy Process (AHP) is a multi-criteria decision making method developed by Saaty (1977). It structures the decision problem as a hierarchy consisting of three levels: the goal, criteria and alternatives. Saaty and Vargas explain the rationale of using the hierarchical structure as the hierarchical decomposition of complex systems being a basic device which is already used by the human mind to cope with diversity (2012, p.1).

AHP is based on relative assessment and prioritization through comparing items of the same hierarchical level in pairs. Saaty refers to the study of Miller published in 1950s about the fact that people could process seven plus or minus two facts at a time, states that “the most effective way to concentrate judgement is to take a pair of elements and compare them on a single property without concern for other properties or other elements” and concludes that this is the reason why pairwise comparison combined with hierarchical structure is an effective measure for decision making (1990).

Saaty (1990) developed the “fundamental scale” to be used for the pairwise comparisons. Table 3 shows the fundamental scale and explanations as included in the study of Saaty in 1990.

Table 3.1: Fundamental scale for pairwise comparisons.

Intensity of Importance on an Absolute Scale	Definition	Explanation
1	Equal Importance	Two activities contribute equally to the objective.
3	Moderate Importance of One over Another	Experience and judgements strongly favor one activity over another.
5	Essential or Strong Importance	Experience and judgements strongly favor one activity over another.
7	Very Strong Importance	An activity is strongly favored and its dominance demonstrated in practice.
9	Extreme Importance	The evidence favoring one activity over another is of the highest possible order of affirmation.
2, 4, 6, 8	Intermediate Values Between The Two Adjacent Judgements	When compromise is needed.

Steps of implementing AHP are described by Saaty (1990) as follows:

- First step is structuring the problem as a hierarchy. The goal of the decision should be at the top level of the hierarchy, followed by criteria. A criterion may be detailed into sub-criteria if necessary. The bottom level is consisted of alternatives.
- Second step is obtaining the pairwise comparison judgements and forming the pairwise comparison matrix for each level. Each item is compared with other items in the same level according to their importance for the items in the upper level, i.e. the criteria are compared according to their importance for the goal; sub-criteria are compared according to their importance for (or contribution to) the main criteria; and the alternatives are compared according to their performance level for each criterion (or sub-criterion). In the comparison matrix, the vector of priorities are obtained by calculating principal eigenvector of the matrix. It gives the relative priority of the criteria measured on a ratio scale.

- Third step is obtaining the global priorities of the alternatives by laying out the local priorities of the alternatives with respect to each criterion in a matrix and multiplying each column of vectors by the priority of the corresponding criterion and add across each row which results in the desired vector of the alternatives.

Saaty states that AHP may also be used to rank a number of alternatives according to an “ideal”. In this case, each criterion should have degrees such as “excellent”, “above average”, “average”, “below average” and “poor” which have contribution degrees to the criterion, “excellent” being 1.00 and the rest changing between 0 and 1.00. In this case, alternatives are assessed according to performance level and receive the priority level which is obtained by multiplying the priority level of the criterion and the degree to which the alternative is assessed to be (2006).

The main strong point of AHP is that it makes it possible handling not only tangible but also intangible criteria (Sinuany-Stern et al., 1996). Aragonés-Beltrán et al. states that AHP is preferred mainly because it allows decision makers to analyse complex problems with a systematic approach that breaks down the problem into levels which make it simpler and more affordable (2014). On the other hand, AHP has been also subject to criticism, mainly because of the time it requires for a respondent to make pairwise comparisons especially for models containing many levels (Wu et al., 2007).

AHP is considered as an easy-to-use tool by many researchers and is used in various domains such as marketing, finance, education, public policy, economics, medicine, and sports (Wu et al., 2007). AHP is also widely used in project management domain. As an example, the study of Aragonés-Beltrán et al., uses AHP to select solar-thermal power plant investment projects: firstly the project alternatives were accepted or rejected according to a set of criteria; then they were prioritized (2014). In another study, Vidal et al. uses AHP to measure the project complexity (2011).

Wu et al. used AHP to assess and prioritize the accessibility criteria which are based on British regulations and standards. The main goal of the study is to use the findings to assist both consultants and building designers (2007). The study of Aragonés-Beltrán et al. compares AHP and preference ranking organization method for enrichment evaluations (PROMETHEEs) for the problem of selecting coagulant and its concentration in the physical-chemical wastewater treatment (2009).

One of the most used areas of AHP is location problems. The study of Sayyadi and Awasthi (2013) integrates Analytic Hierarchy Process (AHP) and Multi-Choice Goal Programming (MCGP) for the location planning of the pedestrian zones in Montréal, Canada. The study utilizes AHP to obtain the weights and implements them to each goal utilizing MCGP. The study of Badri, AHP and goal programming are combined for a global facility location-allocation problem (1999). Ammarapala et al. aims to determine suitable locations for weight stations in Thailand in order to minimize the road damages caused by overloaded trucks (2013). García et al. uses AHP for selection of the sites for agricultural product warehouses (2014).

Sinuany-Stern et al. uses AHP for determining the hospital location in the case of a rural region (1996) while Honga & Xiaohua's study aims location selection of multi-objective emergency logistics centre using AHP (2011). Wu et al. focuses on the location selection problem for a hospital in Taiwan using Porter's diamond model for competitiveness, modified Delphi method and AHP. The study's main aim is described as to provide a standardized means for selecting the correct location for a new healthcare facility (2007).

4. THE DECISION MODEL

4.1 Problem Definition

The problem observed may be defined briefly as “the lack of a comprehensive method for determining the most suitable locations for AED deployment in a community”.

4.2 Objective

The objective of this study is to determine the most suitable locations for AED deployment using AHP method among alternatives in city of Valencia in order to decrease the delay in treatment and help increase the survival rate of out-of-hospital cardiac arrest (OHCA) cases.

4.3 Determination of Criteria

4.3.1 Criteria suggested by previous studies

Literature review resulted in the most common criteria used by researchers for selecting suitable locations for AEDs. Some studies suggest broader perspective for important criteria to be considered for AED deployment. The study of Becker et al. (1998) suggests that all public locations with high population density or high rate of previous SCA incidents should be considered as alternatives for AED deployment. Gilchrist et al. states high population density, emergency medical services (EMS) response time being longer than 5 minutes and the expectance of at least one SCA incident in 5 years are criteria to be observed while selecting locations for AEDs (2012). According to American Heart Association (2005), the criteria for selecting the locations of AEDs are the response time, incident rate, volume and risk of visitors, the existence of high risk activities, and vertical response time. The study of Colquhoun et al. (2008), which provides early results for the national PAD programme in England and Wales, mentions high population, SCA risk and availability of user being considered for selecting correct locations for AEDs.

It is observed that the high probability of SCA is the most common criteria in literature. Most studies aiming to locate AEDs link this probability with historical data of SCA incidents in that location to propose these high-risk locations for AED deployment. Folke et al. (2009) focuses on the risk of sudden cardiac arrest at locations retrospective data of cardiac arrest cases in Copenhagen, Denmark. In the same way, Brooks et al. (2013) aims to determine the SCA risk in certain location types in Canada and Muraoka et al. (2006) in Takatsuki City. In another study made by Nielsen et al. (2013), reported cases of SCA were collected for a period of 28 months in order to indicate the locations with higher risk. This study also assesses the use rate of already-deployed AEDs. The study published by Tsai et al. determines not only the location, but also the time of SCA incidents throughout the city to match the high-risk locations with the locations of a market chain and aims to find which shops are suitable for AED deployment (2012).

In a study focusing on fitness industry, the main criterion is identified as the “high probability of SCA” which is more or less equivalent to the likelihood of one case per year. This study uses a formula to identify the probability of SCA. This formula represents the population density and risk level of activities but does not consider the demographics of the gym members (Norton & Norton, 2008). Reinier et al. suggest that low socioeconomic status is linked to higher incidence of SCA (2006) while Folke et al. discusses that “no single demographic characteristic (population density, average age, average income, or proportion of those with low education) could identify areas with a sufficiently high arrest incidence to merit AED deployment” (2010). Another study suggests that population density, risk level of people and response time should be considered for placing AEDs in fitness facilities (Balady et al., 2002).

The study conducted by Myers & Mohite (2009) focuses on determining the most suitable locations for AEDs within a university campus to provide maximum coverage and within the budget constraints. In this study, the main selection criterion is the coverage capability of the location. Motyka et al. (2005) conducted a study for verifying a previously developed model for determining the most suitable locations for AEDs within a basketball arena. Their method focuses merely on the possible response time for a cardiac arrest case and determines the locations according to this criterion. In another study focusing on a university community, population coverage, risk level

of people and response time are stated to be the criteria considered for AED deployment in the campus (Whitney-Cashio et al., 2012).

Some studies focus on the first-aid responders (i.e. potential users of the AED in case of an emergency). The study of Lubin et al. (2004) is consisted of surveys aiming to assess the public attitude towards AEDs and determine which measures to take in order to increase awareness and willingness to use an AED. There are other studies (Schober et al., 2011; Siddiq et al., 2013) focusing on the perception towards AEDs and agree on the important role of the responder. In their study, Connaughton et al. focuses on the perceived constraints to AEDs in athletic departments of high schools (2011). In another research, it is stated that AEDs should be located in public places “in addition to trained responders among the staff at each” (Myerburg et al., 2005) while the study of Schneider et al. questions the effectiveness of CPR courses and AEDs and emphasizes the importance of the availability of a trained user (2004).

Table 4.1 shows the common criteria in literature together with the studies which mention them.

Table 4.1 : Criteria mentioned in previous studies.

ARTICLE	CRITERIA									
	Coverage Capacity	Population Coverage	Physical Coverage	SCA Risk	Risk Level of People	Risk Level of Activities	Response Time	Time to Place	Time to Furthest Point	Availability of Assigned User
American Heart Assc., 2005		X		X	X	X	X	X	X	
Balady et al., 2002		X			X		X			
Becker et al., 1998		X		X						
Brooks et al., 2013				X						
Colquhoun et al., 2008		X		X						X
Connaughton et al., 2011										X
Folke et al., 2009				X						
Gilchrist et al., 2012		X		X			X			
Lubin et al., 2004										X
Motyka et. al., 2005	X		X							
Muraoka et al., 2006				X						
Myerburg et al., 2005										X
Myers & Mohite, 2009	X		X							
Nielsen et al., 2013				X						
Norton & Norton, 2008		X		X		X	X			
Schneider et al., 2004										X
Schober et al., 2011										X
Siddiq et al., 2013			X							X
Tsai et al., 2012	X	X	X	X			X			X
Whitney-Cashio et al., 2012		X			X		X			

4.3.2 Determining criteria for the decision model

This study aims to develop a model which covers and combines all important criteria which were mentioned in literature and were utilized in previous researches. After reviewing previous studies, meetings were held with two experts from Polytechnic University of Valencia (UPV): Dr. Pablo Aragonés-Beltrán, Senior Lecturer of Project Management in the Department of Engineering Projects, and Dr. D. Rafael Rodríguez de Sanabria Gil, Cardiologist and Professor in Healthcare Technology and Biomedical Engineering programs in Faculty of Business Administration and Management. During the meetings, the proposed criteria were discussed and their opinions were obtained.

As a result, the following criteria are proposed:

1. Coverage Capacity: It may be defined as the combination of the population coverage capacity, i.e. the number of visitors / students / residents of a place on a daily basis; and the physical coverage capacity, i.e. the width of the area which may benefit from the AED deployment at the specified spot. In other words, it reflects the number of people and the width of the area which the AED may cover. For example, an AED located in the library could also be used for an SCA incident which occurred on the street in front of the library. This criterion may be divided into two sub-criteria:
 - a. Population Coverage: It represents the number of people the AED will serve.
 - b. Physical Coverage: It represents the physical area the AED will serve.
2. SCA Risk: This criterion represents the likelihood of witnessing SCA in the premises. It may be divided into two sub-criteria:
 - a. Risk Level of People: It represents the connection between the demographics of people at the location and the probability of witnessing an SCA incident. As an example, locations where mostly people over 50 years of age or with a history of heart disease present would have higher level of risk.
 - b. Risk Level of Activities: It represents the connection between the activities performed at the location and the probability of witnessing an SCA incident. As an example, places where certain activities are performed (such as excessive physical activity) would have higher level of risk.
3. Response Time: This criterion represents the time necessary to arrive to the victim. It may be divided into two sub-criteria:
 - a. Time to the Place: It may be defined as the approximate time it takes for an ambulance to arrive to the place from the moment it is called.
 - b. Time to the Furthest Point: It is the time it takes for the medical professionals to reach from the parking spot of the premises to the furthest point in the building. In other words, this criteria reflects the “vertical response time” mentioned in previous studies.

4. Availability of an assigned user: This criterion represents the possibility of the presence of a pre-trained person who is able to recognize the incident and assure the AED is used without delay.

4.4 Determination of Alternatives

4.4.1 Suitable locations suggested by previous studies

According to the American Heart Association (2005), crowded places like large office complexes, shopping malls and airports are the first places to consider placing an AED together with the places where high-risk activities are performed. Folke et al. (2009) states that placing AEDs in places like airports, airplanes and casinos were proven to be effective by prior studies. In a retrospective study; it was observed that the airport, an airline overhaul facility, a casino, a nursing home and two hotels were the highest-risk-locations, each with two cardiac arrests in one year (Gratton et al., 1999), showing that these places should be amongst first alternatives.

The study of Folke et al. (2009) points out that areas with major train stations (1.8 arrests every 5 years per area) together with large public squares and pedestrianized areas (0.6 arrests every 5 years per area) are places of frequent cardiac arrests. In another research, sports facilities, transportation facilities and other public locations are the three locations with most SCA incidents observed during a 28-month period (Nielsen et al., 2013). In another retrospective study performed by Brooks et al. in 2013, locations with SCA incident were observed as retail stores, offices, shopping centres, industrial areas, race tracks/casinos, jails, hotels, hostels/shelters, and convention centres, and railway stations, campuses, sports arenas, swimming pools, and golf courses. In this study, schools were stated to be among mostly covered places with AEDs although having lower risk of many other location categories.

Muraoka et al. recommend railway stations, hospitals, elderly homes, playgrounds and golf courses as the most appropriate locations for AED deployment, as these locations have annual SCA incident rate of more than 0.03 (2006). Schober et al. states in their study which aims to assess the public awareness for AEDs that the main train station of Amsterdam is already equipped with 8 AEDs, 5 of these being in visible cabinets and accessible to the public (2011).

In a research analysing the public access defibrillation program in Helsinki, it is stated that “all public sites with a cardiac arrest incidence of at least one per year were equipped with automated external defibrillators” including three passenger harbour terminals, two shopping malls, one passenger ship, and the central train station (Kuisma et al., 2003). A retrospective study focusing on both SCA incidents and AED uses over a 5-year period results that railway stations, nursing homes, medical facilities and fitness facilities are the places where AED use was most frequent (Sasaki et al., 2011). Another study states that it would be reasonable to deploy AEDs in schools, fitness centres, sports arenas, stadiums, and locations of temporary sports events (Myerburg et al., 2005). In the On-site AED Placement Guide of National Centre for Early Defibrillation in U.S.A., the certain locations with higher risk are stated as airports, community/senior citizen centres, dialysis centres, railway terminals, golf courses, fitness centres, clinics of cardiology and family medicine, urgent care centres, large industrial sites, shopping malls, nursing homes, private businesses, and sports/events complexes (2001). Another study focusing on the public locations of cardiac arrest concludes that shopping malls, work places, exhibition halls, airports, harbour terminals, railway stations, sports arenas, fitness centres, golf courses, community centres, elderly homes, and jails are locations of relatively frequent SCA incidents and would benefit AED deployment (Becker et al., 1998). Jorgenson et al. studies the use of AEDs in homes, businesses and other public locations by minimally trained people and concludes that deployment of AEDs in these places are safe and beneficial (2003) while Folke et al. supports their findings in their study published in 2010. An early study even suggests that AEDs are suitable for use inside the hospitals as well (Destro et al., 1996), supported by another study suggesting that AEDs provide faster response than manual defibrillators in the public areas inside a hospital (Adams et al., 2006).

Gilchrist et al. (2012) review the state laws as of 2010 to summarize the situation of public access defibrillation programs, where it is stated that fitness facilities, schools, school-related sports events, public buildings, state parks are places that are recommended or required by law for AED deployment. Haskell et al. assess the compliance of the public sites with the recommendations of American Heart Association and state that shopping malls, schools, campuses, community centres and churches are among these public locations (2009). Study of Eckstein reviews the 10-

year period of the Los Angeles Public Access Defibrillation programme where informs the AED deployment in public locations, airports, sports arenas and golf courses (2012). A similar study reviewing the early results of the national defibrillator programme in UK and Wales states that the places which have AED are busy public places such as airports and major railway stations, sports facilities, workplaces, shopping centres, exhibition halls and major sporting venues (Colquhoun et al., 2008).

There are also studies focusing on a particular location type and assess risks and benefits of AED deployment in these locations. For example, Balady et al. (2002), Norton & Norton (2008), and Page et al. (2013) focus on fitness facilities while a number of studies such as Berger (2009), Connaughton et al. (2011), Swor et al. (2013), and Watson et al. (2013) focus on the risks and benefits of AED deployment in schools. Some studies also focus on the assessment of AED deployment at homes of high-risk patients (Bardy et al., 2008); specific sports venues (Motyka et al., 2005) and even in jails (Roessler et al., 2007). University campuses are also among locations claimed to benefit from AED deployment (Myers & Mohite, 2009; Cho et al., 2012; Whitney-Cashio et al., 2012).

The researches and covered location types are shown in Table 4.2.

Table 4.2 : Location types mentioned in previous studies.

ARTICLE	Public Locations	Shopping Malls	Large Squares / Pedestrianized Areas	Large Industrial Sites / Office Complexes / Workplaces	Schools	University Campuses	Convention Centres / Exhibition Halls	Airports	Harbour Terminals	Railway Stations	Sports Facilities	Sports Arenas / Playgrounds	Swimming Pools / Marinas / Beaches	Locations of Sports Events	Stadiums	Fitness Centres / Gyms	Golf Courses	Community Centres	Casinos	Elderly Homes	Homes	Hotels	Libraries	Churches	Jails	Hospitals	Medical Facilities / Clinics (Cardiology, family medicine etc.)	Dialysis Centres
Adams et al., 2006																										X		
American Heart Assc., 2005		X		X				X			X	X	X															
Balady et al., 2002																X												
Bardy et al., 2008																					X							
Becker et al., 1998		X		X				X	X	X		X				X	X	X		X					X			
Berger, 2009					X																							
Brooks et al., 2013		X		X	X	X	X			X		X	X				X	X	X			X			X			
Cho et al., 2012						X																						
Colquhoun et al., 2008	X	X		X			X	X		X	X	X																
Connaughton et al., 2011					X																							
Destro et al., 1996																										X		
Eckstein, 2012	X							X					X				X											
Folke et al., 2009			X					X		X									X									
Folke et al., 2010	X		X																		X							
Gilchrist et al., 2012	X		X		X									X		X												
Gratton et al., 1999								X											X	X		X						
Haskell et al., 2009		X			X	X												X						X				
Jorgenson et al., 2003	X			X																	X							
Kuisma et al., 2003	X	X							X	X																		
Motyka et al., 2005							X					X																
Muraoka et al., 2006										X		X					X			X							X	
Myerburg et al., 2005					X							X		X	X													
Myers & Mohite, 2009						X																						
National Centre for Early Defibr., 2001		X		X				X		X		X				X	X	X		X							X	X
Nielsen et al., 2013	X							X	X	X	X																	
Norton & Norton, 2008																X												
Page et al., 2013											X	X	X			X												
Roessler et al., 2007																									X			
Sasaki et al., 2011										X						X				X								X
Schober et al., 2011										X																		
Swor et al., 2013					X																							
Watson et al., 2013					X																							
Whitney-Cashio et al., 2012						X																						

4.4.2 Determining location alternatives in Valencia

4.4.2.1 Determining location types

For this study, alternatives were determined from the location types suggested by previous researches as follows: First, the location types were determined. The location types selected initially were categorized broadly as follows:

- a. Locations with high population: Locations with high population density such as residential centres, large office complexes, industrial sites; and locations with high population flow such as airports, concert halls, theatres, cinemas, event halls, entertainment centres, government buildings, large public squares, major train and bus stations, shopping malls, stadiums, schools, museums and touristic attraction spots.
- b. Locations with high risk: Locations where high risk activities are performed such as football pitches, basketball courts, volleyball courts, tennis courts, fitness centres, swimming pools, beaches, sports complexes, golf courses; and locations where people with higher risk live, work or spend time such as nursing homes, cardiology clinics, family medicine clinics, dental clinics, outpatient clinics, dialysis centres, and senior citizen centres.
- c. Remote locations: Locations where it would be impossible for the ambulance to reach to the location or to the patient in time such as pedestrianized areas, public gardens, buildings with large surface area or high number of storeys.

It should be noted these categories were used to generate location types suitable for AED deployment and it is possible that a location belongs to more than one category. For example, an airport may be considered both as a location with high population flow and a remote location as it would be difficult to reach to the patient because of the large surface area of an airport.

4.4.2.2 Preliminary evaluation with experts

Once the suitable location types were determined as candidates, meetings were held with two experts from Polytechnic University of Valencia (UPV): Dr. Pablo Aragón-Beltrán, Senior Lecturer of Project Management in the Department of Engineering Projects, and Dr. D. Rafael Rodríguez de Sanabria Gil, Cardiologist and Professor in Healthcare Technology and Biomedical Engineering programs in Faculty of Business

Administration and Management. In these meetings, the following items were agreed on:

- It was suggested that the locations which are already installed with AEDs for public use should not to be taken into consideration, but they should be determined and included in the model as alternatives. The aim for this was to evaluate if these locations are also supported by the model. If not, relocation of these AEDs may be advised to authorities.
- It was agreed that in this model, selecting the locations would be the main goal. For this reason, the number of AEDs needed for a location was not taken into consideration. It was suggested by the experts that after the locations were selected, the recommended number of AEDs could be determined separately and according to the number of the AEDs which are subject to allocation.
- Some of the location types were eliminated by the experts for the sake of an easier application: It was agreed that having schools as alternatives would significantly increase the number of alternatives and schools should be evaluated separately if authorities decide to implement AEDs to public schools. This decision is also supported by previous studies showing that although schools are among first choices for AED deployment, the SCA risk is lower than many other location alternative (Brooks et al., 2013).

4.4.2.3 Determining the alternatives

After determining location types suitable for AED deployment, alternatives were specified for each type of location. In order to do this, different sources were utilized:

- City map obtained from a tourism office: This map was utilized for listing the tourist attraction spots such as museums, churches, sports centres etc. as well as shopping centres and event halls.
- City map obtained from www.valencia-on-line.com: This map was utilized for listing universities, major hospitals, cementaries, and industrial sites as well as tourist attractions.
- Website of Municipality of Valencia: This source was utilized for listing governmental buildings, museums and other public buildings with their addresses.

- On-line map from Google Maps: This online map was utilized mainly for determining exact locations of alternatives obtained from other sources as well as locating major building types such as shopping centres and public sports centres.

This search through the resources above resulted in a preliminary list of alternatives. These alternatives were also marked on a city map in order to make sure a somewhat even distribution was achieved among the whole city and to prevent any district being without any alternative selected.

4.4.2.4 Evaluation with experts

The list together with the map showing distribution throughout the city were presented to experts for evaluation. In the meetings, the following items were agreed on:

- The geographical scope of the study was discussed and agreed to be limited to the city centre. As a result, the following location alternatives were discarded:
 - Albufera National Park
 - Valencia Racing Circuit
 - Luis Puig Palace Velodrome
 - Fuente de San Luis Sports Pavillion
 - Valencia Airport
 - Valencia Exhibition Centre
 - Saler Beach

However, it was agreed that these locations should be advised to authorities as alternatives if the geographical scope of the study is to be expanded in the future.

- One of the alternatives (Veles e Vents Building) was discarded because it was stated that the building was not currently in use.
- Ane alternative (Blasco Ibáñez Avenue) was suggested by the experts to be added to the list as this is the main avenue of the city with a park in the middle, where many people use for jogging.

4.4.2.5 Final List of Alternatives

After the process of generating candidates and evaluation of experts, the following locations were agreed to be the alternatives for the model:

1. Central Market
2. Market of Colón
3. Basilica of the Virgin
4. The Valencia Cathedral
5. North Train Station
6. Joaquín Sorolla Train Station
7. Valencia Central Bus Station
8. City Hall (Ayuntamiento)
9. City of Arts & Sciences
10. Mestalla Football Stadium
11. Palace of Congresses
12. Palace of Music
13. Government Hall (Generalitat)
14. Oceanographic
15. Malvarrosa Beach
16. UV Blasco Ibáñez Campus
17. UV Tarongers Campus
18. UPV Vera Campus
19. Market of Campanar
20. School of San José
21. Sports Centre (Polideportivo) in Garden Turia
22. Football Pitches Pont de Fusta, Garden Turia
23. Vara de Quart Industrial Zone
24. Alboraya Industrial Zone
25. Cabanyal Sports Centre (Polideportivo)
26. Nazaret Football Pitch
27. Nazaret Sports Centre (Polideportivo)
28. UV Sports Centre (Polideportivo) on Av. Primat Reig
29. Stadium on Av. de les Corts Valencianes
30. Valencia City Stadium

31. Shopping Mall El Corte Inglés-1 (Pintor Sorolla, 26)
32. Shopping Mall El Corte Inglés-2 (Colón, 1)
33. Shopping Mall El Corte Inglés-3 (Av. Francia/Pintor Maella, 37)
34. Shopping Mall El Corte Inglés-4 (Colón, 27)
35. Shopping Mall El Saler
36. Shopping Mall Gran Turia
37. Shopping Mall Arena Multiespacio
38. Shopping Mall Ademuz
39. Shopping Mall Nuevo Centro
40. Shopping Mall Fnac
41. Lladro Museum
42. Valencia Institute of Modern Art (IVAM)
43. Rice Museum
44. San Pio Museum of Fine Arts
45. Ceramics Museum
46. Campus of Valencia Catholic University
47. Reina Square (Plaza de la Reina)
48. Church of Pilar
49. Valencia Museum of Modern Illustration (MUVIM)
50. Presidency Office (Conselleria de Presidencia)
51. Museum of Fallas
52. Cabanyal Train Station
53. Public Garden of Benicalap
54. Public Garden of Marxalenes
55. Royal Gardens
56. Valencia Tennis Club
57. Municipality Cemetery
58. Tennis Club Sporting Tenis Valencia
59. Marina Real Juan Carlos I
60. Real Club Náutico
61. Handcrafts Centre
62. 9 de Octubre Administrative Complex
63. Bullring
64. Bullfight Museum

65. Valencian Parliament (Les Corts)
66. Palace of Arts
67. Virgen del Carmen Betero Sports Centre (Polideportivo)
68. Benimaclet Sports Centre (Polideportivo)
69. Patacona Sports Complex (Complejo Deportivo)
70. Blasco Ibáñez Avenue
71. BioParc
72. Public Garden of Cabecera
73. Public Garden West
74. Football Pitches Pont de les Arts, Garden Turia
75. La Hípica Event Garden
76. Mercavalència Wholesale Centre
77. Barri de la Llum Sports Centre (Polideportivo)
78. Provincial Public Library
79. Octubre Centre of Contemporary Culture
80. UV Library

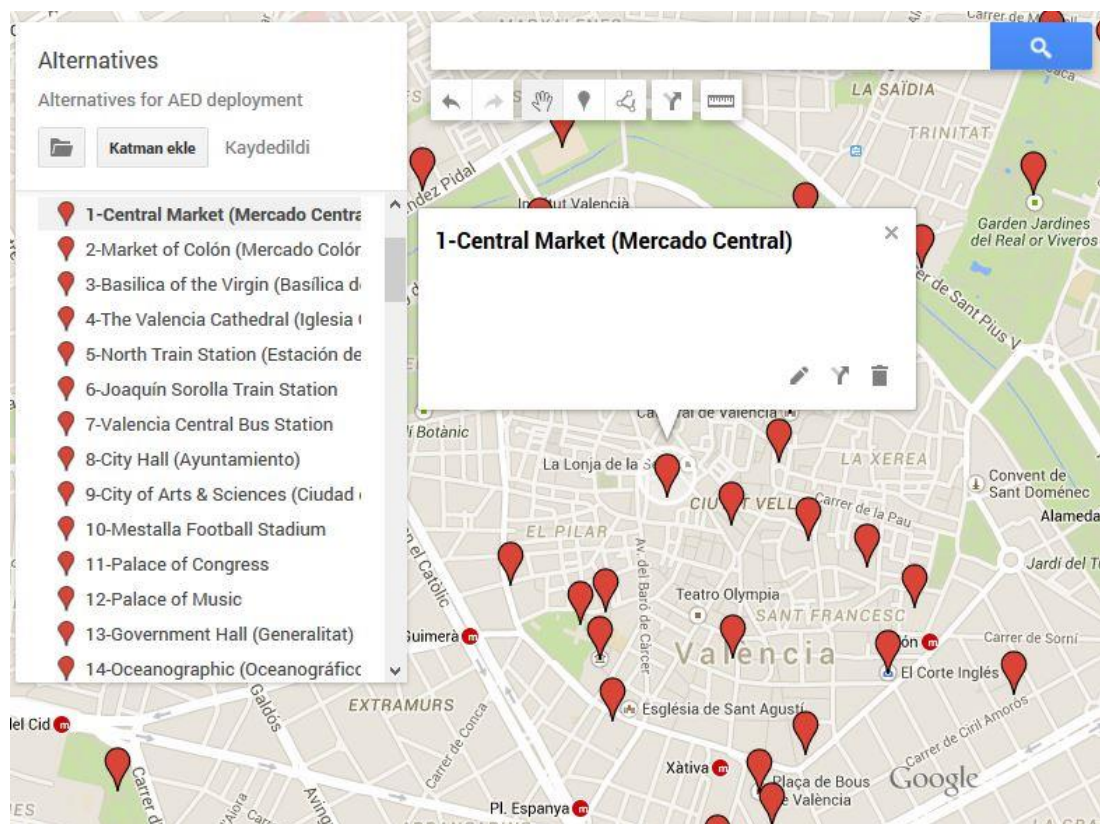


Figure 4.1 : A view from the map of alternatives.

These location alternatives were marked on a map using Google Maps and the map was sent to the decision maker for ensuring full knowledge on each alternative. A view from the map may be seen in Figure 4.1. The complete map is also accessible at <https://www.google.com/maps/d/edit?mid=zCY0EY5RkUmE.kdqoLNSMHK8M>.

4.5 Constructing the Model

4.5.1 The Hierarchic Structure

The AHP model of the decision problem is constructed in four layers:

1. Goal: The goal of the problem constitutes the top layer of the hierarchy and it is defined as “selecting public locations for AEDs”.
2. Criteria: The criteria constitute the second layer of the hierarchy. Four criteria supported by literature review are determined for the problem:
 - a. Coverage Capacity
 - b. SCA Risk
 - c. Response Time
 - d. Availability of Assigned User
3. Sub-criteria: Criteria “coverage capacity”, “SCA risk” and “response time” are consisted of two sub-criteria each. “Population coverage” and “physical coverage” form “coverage capacity” while “risk level of people” and “risk level of activities” form “SCA risk”. These sub-criteria constitute the third layer of the hierarchy.
4. Alternatives: The fourth and bottom layer of the hierarchy is consisted of 80 alternatives.

The hierarchy of the model is shown in Figure 4.2.

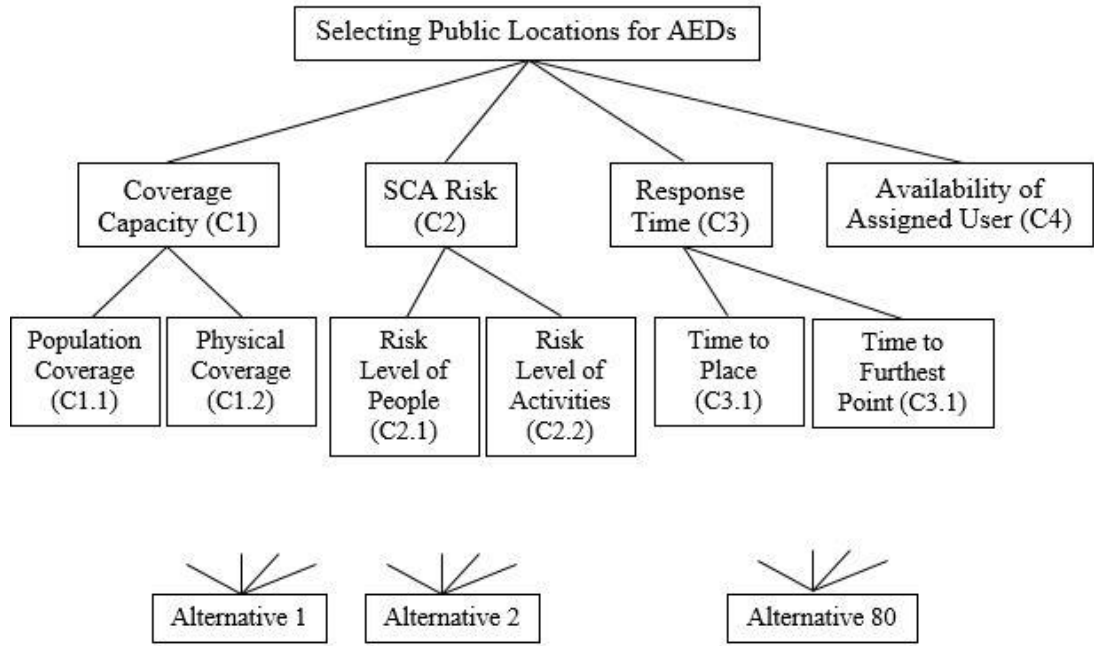


Figure 4.2 : The AHP model of the decision problem.

4.5.2 Nature of criteria

The criteria are grouped into three according to the nature of their attributes according to the goal (Topcu, n.d.):

- **Benefit Attribute:** The preference of an alternative increases when the performance value of the criterion increases.
- **Cost Attribute:** The preference of an alternative decreases when the performance value of the criterion increases.
- **Nonmonotonic Attribute:** The criterion shows nonmonotonic nature. The maximum preference level is located at a point in between the minimum and maximum performance values.

Literature review on criteria affecting selection of locations for AED deployment shows that researches agree on the effect of criteria on the goal:

- An alternative with higher population coverage is a more suitable location for AED deployment (Balady et al., Becker, 1999; Gilchrist et al., 20012; 2002, Whitney-Cashio et al., 2012). “Population coverage” is a benefit attribute.
- An alternative with higher physical coverage is a more suitable location for AED deployment (Motyka et al., 2005; Myers & Mohite, 2008). “Physical coverage” is a benefit attribute.

- People with higher SCA risk make an alternative more preferred for AED deployment (American Heart Association, 2005; Balady et al., 2002; Becker et al., 1999; Brooks et al., 2013; Folke et al., 2009; Muraoka et al., 2006; Nielsen et al., 2013; Tsai et al., 2012). “Risk level of people” is a benefit attribute.
- Locations where high-risk activities are performed are more preferred alternatives for AED deployment (American Heart Association, 2005; Norton & Norton, 2008; Page et al., 2013). “Risk level of activities” is a benefit attribute.
- Longer response time of emergency medical services is linked to higher preference as an alternative for AED deployment (American Heart Association, 2005; Balady et al., 2002; Gilchrist et al., 2012). “Time to place” is a benefit attribute.
- Longer response time within the premises is linked to higher preference as an alternative for AED deployment (American Heart Association, 2005; Whitney-Cashio et al., 2012). “Time to furthest point” is a benefit attribute.
- A location where it is possible to assign a possible user for the AED in case of an emergency is preferred more as an alternative for AED deployment (Lubin et al., 2004; Myerburg et al., 2005; Schneider et al., 2004). “Availability of assigned user” is a benefit attribute.

4.5.3 Performance levels of criteria

In order to make it possible for ranking of the alternatives, suitable performance levels are determined for each criterion. The performance levels of criteria are shown in Table 4.3.

Table 4.3 : Performance levels of criteria.

CRITERIA	PERFORMANCE LEVELS				
Population Coverage (C1.1)	Very Low	Low	Average	High	Very High
Physical Coverage (C1.2)	Very Low	Low	Average	High	Very High
Risk Level of People (C2.1)	Very Low	Low	Average	High	Very High
Risk Level of Activities (C2.2)	Very Low	Low	Average	High	Very High
Time to Place (C3.1)	Very Short	Short	Average	Long	Very Long
Time to Furthest Point (C3.2)	Very Short	Short	Average	Long	Very Long
Availability of Assigned User (C4)	Not available		Possible	Available	

4.6 Pairwise Comparisons

A questionnaire was prepared and sent to the decision maker. This questionnaire may be found in Appendix B. The questionnaire is consisted of seven sections as indicated below:

- a. Introduction: Brief explanation of the model and the survey.
- b. Explanation of Criteria: The definitions of the criteria and sub-criteria.
- c. Explanation of the Survey: Detailed explanation of how to answer the questions.
- d. Explanation of the Scale in Spanish: The Spanish translation of Saaty's fundamental scale to assist the decision maker better.
- e. Part 1: Questions for pairwise comparison of the criteria.
- f. Part 2: Questions for determining rating intensities of the criteria.
- g. Part 3: Questions for determining attributes of alternatives.

In Part 1 of the questionnaire, the decision maker is asked to make pairwise comparisons of criteria according to the goal and also those of the sub-criteria according to the criteria. In this part, the fundamental scale of Saaty is used. In Part 2, the decision maker is asked to assign points to each performance level (i.e. rating intensity) from 0 to 100, according to its compliance degree. For this study, using the rating intensities which were assigned by the decision maker is preferred instead of

assigning equal intervals to the performance levels. In other words, instead of assigning 0, 25, 50, 75, and 100 points automatically for the five levels of the criterion population coverage (C1.1), the assigned points 10, 20, 50, 80, and 100 are used. The points assigned by the decision maker for each criterion is shown in Table 4.4. In Part 3, the decision maker is asked to select performance levels of the criteria for each of 80 alternatives.

Table 4.4 : Points assigned to performance levels by the decision maker.

CRITERIA	PERFORMANCE LEVELS & ASSIGNED POINTS				
Population Coverage (C1.1)	Very Low 10	Low 20	Average 50	High 80	Very High 100
Physical Coverage (C1.2)	Very Low 10	Low 30	Average 60	High 80	Very High 100
Risk Level of People (C2.1)	Very Low 5	Low 30	Average 60	High 80	Very High 100
Risk Level of Activities (C2.2)	Very Low 5	Low 30	Average 70	High 80	Very High 100
Time to Place (C3.1)	Very Short 5	Low 20	Average 60	Long 80	Very Long 100
Time to Furthest Point (C3.2)	Very Short 5	Low 30	Average 50	Long 80	Very Long 100
Availability of Assigned User (C4)	Not available 1		Possible 50	Available 100	

The questionnaire was responded by Dr. D. Rafael Rodríguez de Sanabria Gil, the coordinator of the AED Programme in Polytechnic University of Valencia (UPV), cardiologist and professor in Healthcare Technology and Biomedical Engineering programs in Faculty of Business Administration and Management in UPV.

Before responding to the questions, AHP and the nature of the pairwise comparisons were explained in detail to the decision maker by Dr. Pablo Aragonés-Beltrán, Senior Lecturer of Project Management in the Department of Engineering Projects in UPV; and the decision maker answered the questions under his surveillance.

4.7 Analysis

The analysis of the responses from the decision maker was done using Super Decisions Software version 2.2.6. The model constructed with the software is seen in Figure 4.3.

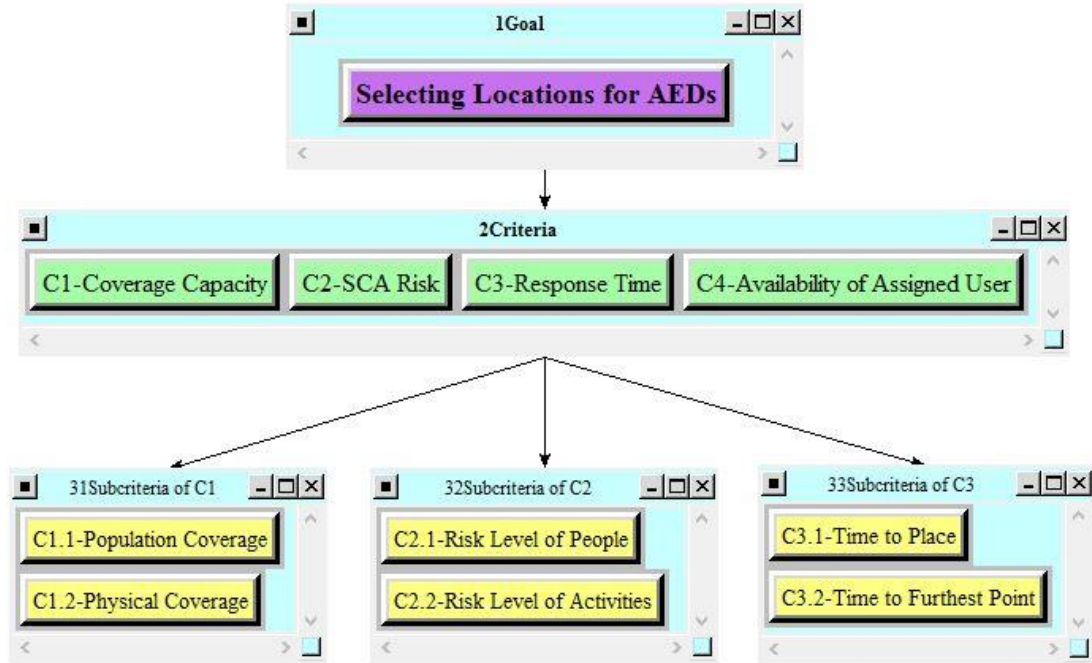


Figure 4.3 : The Model Constructed Using Super Decisions Software.

4.7.1 Importance of criteria

The pairwise comparisons of the decision maker was input to the software as seen in Figure 4.4. After the answers are entered, the consistency of the decision maker was checked. As a generally accepted rule, it is desired that the inconsistency of the decision maker to be less than 10%. It was observed that the inconsistency in this case was 35% and a need for modification is agreed on.

Afterwards, additional explanation on the consistency concept was made to the decision maker and he was asked to consider modifying some of his answers. The modified answers were input to the software as seen in Figure 4.5. The inconsistency

of the modified answers was 10.9% which was agreed to be acceptable and further analyses were made using these data.

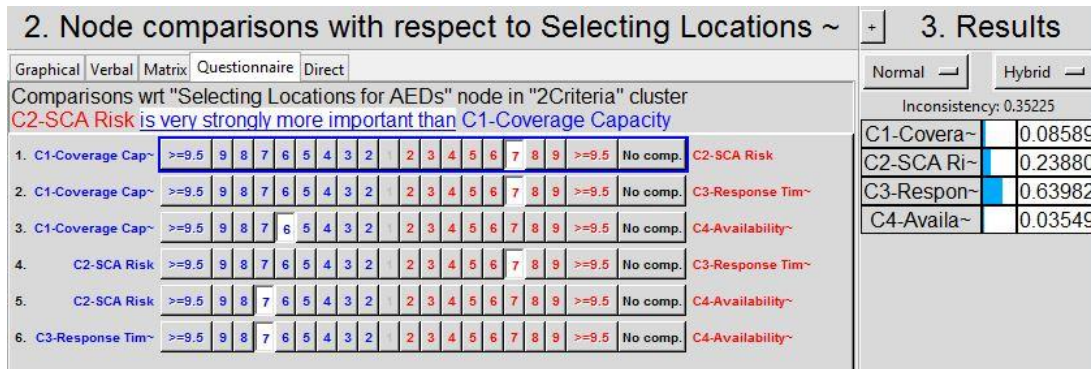


Figure 4.4 : Initial Pairwise Comparisons of the Decision Maker.

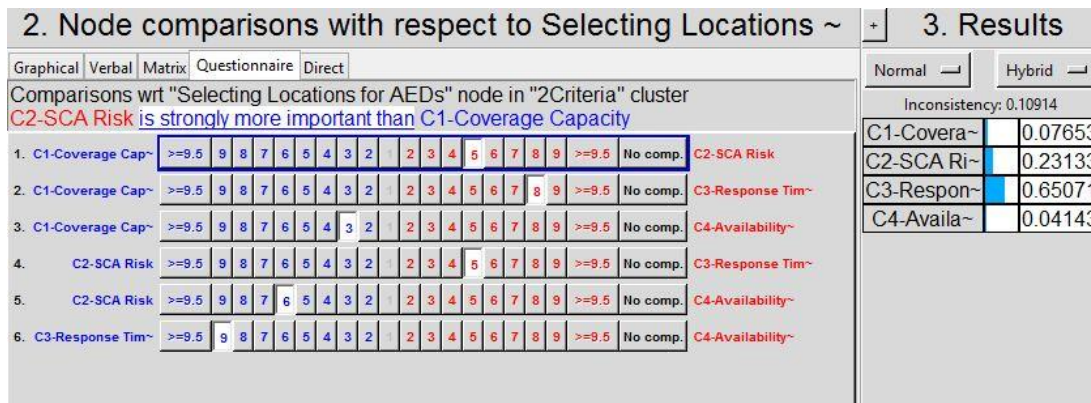


Figure 4.5 : Modified Pairwise Comparisons of the Decision Maker.

The pairwise comparison of the criteria according to the goal may be seen in Table 4.5 together with Table 4.6, Table 4.7, and Table 4.8 showing the pairwise comparisons of the sub-criteria according to each criteria.

Table 4.5 : Pairwise Comparison Matrix for Criteria.

	C1	C2	C3	C4
C1	1	1/5	1/8	3
C2	5	1	1/5	6
C3	8	5	1	9
C4	1/3	1/6	1/9	1

Table 4.6 : Pairwise Comparison Matrix for Sub-criteria of “Coverage Capacity”.

	C1.1	C1.2
C1.1	1	1/5
C1.2	5	1

Table 4.7 : Pairwise Comparison Matrix for Sub-criteria of “SCA Risk”.

	C2.1	C2.2
C2.1	1	1
C2.2	1	1

Table 4.8 : Pairwise Comparison Matrix for Sub-criteria of “Response Time”.

	C3.1	C3.2
C3.1	1	1
C3.2	1	1

4.7.2 Preferences for alternatives

The ratings of the alternatives were calculated using Super Decisions Software version 2.6.6. The names of alternatives and performance levels were defined to the software. The intervals of the performance levels were used as assigned by the decision maker and the performance levels of each criteria of all alternatives were entered to the software as shown in Figure 4.6.

	C1.1-Population 0.012756	C1.2-Physical 0.063777	C2.1-Risk Level 0.115663	C2.2-Risk Level 0.115663	C3.1-Time to 0.325355	C3.2-Time to 0.325355	C4-Availability of 0.041431
1. Central Market	High	High	Average	Average	Long	Long	Possible
2. Market of Colon	Average	High	Average	Average	Average	Short	Not Available
3. Basilica of the Virgin	High	Average	Average	Very Low	Long	Very Short	Possible
4. The Valencia Cathedral	High	Average	Average	Low	Long	Average	Possible
5. North Train Station	High	High	Average	Average	Long	Average	Possible
6. Joaquin Sorolla Train Station	High	High	Average	Average	Long	Average	Possible
7. Valencia Central Bus Station	High	High	Average	Average	Long	Long	Possible
8. City Hall (Ayuntamiento)	Average	Average	Average	Average	Long	Long	Possible
9. Ciudad de las Artes y las Ciencias	Average	Low	Low	Low	Average	Long	Not Available
10. Mestalla Football Stadium	High	High	Average	High	Average	Average	Possible
11. Palace of Congress	Low	Low	Average	Low	Average	Average	Possible
12. Palace of Music	Average	Average	Low	Low	Average	Average	Possible
13. Government Hall (Generalitat)	Low	Low	Low	Low	Average	Average	Possible
14. Oceanographic	Low	Low	Low	Low	Average	Average	Possible
15. Malvarrosa Beach	Average	Average	Average	Average	Long	Long	Possible
16. UV Blasco Ibañez Campus	Average	Average	Average	Average	Long	Long	Not Available
17. UV Tarongers Campus	Average	Average	Average	Average	Long	Long	Not Available
18. UPV Vera Campus	Average	Average	Average	Average	Long	Long	Possible
19. Market of Campanar	Low	Low	Low	Low	Long	Long	Possible
20. School of San Jose	Low	Average	Low	Average	Long	Long	Possible
21. Sports Centre (Polideportivo) in G	Low	Low	Average	Average	Long	Long	Not Available
22. Football Pitches Pont de Fusta, G	Low	Low	Low	Average	Long	Long	Not Available
23. Vara de Quart Industrial Zone	Low	Low	Low	Average	Long	Long	Not Available
24. Alboraya Industrial Zone	Average	Average	Low	Average	Long	Long	Not Available
25. Cabanyal Sports Centre (Polideport	Average	Average	Low	Average	Long	Long	Possible
26. Nazaret Football Pitch	Low	Low	Low	Average	Long	Long	Possible
27. Nazaret Sports Centre (Polideportiv	Low	Low	Average	Average	Very Long	Long	Possible
28. UV Sports Centre (Polideportivo) o	Low	Low	Average	Average	Long	Long	Possible
29. Stadium on Av. de les Corts Valenc	High	Average	Average	High	Long	Long	Possible
30. Valencia City Stadium	High	High	Average	High	Long	Long	Possible

Figure 4.6 : Ratings Screen of Super Decisions Software.

The global score of each alternative was calculated by the software as the sum of the products of the weight for a criterion and the performance level of the alternative according to that criterion, as shown in Equation 4.1.

$$V(a_i) = \sum_{j=1}^n w_j r_{ij} \quad (4.1)$$

Whereas;

$V(a_i)$: The global score of the i^{th} alternative.

w_j : Weight of the j^{th} criteria according to the goal.

r_{ij} : Performance level of the i^{th} alternative for the j^{th} criteria.

4.8 Results

4.8.1 Weights of criteria

After the analysis done utilizing the Super Decisions software, the weights of the criteria were obtained. It is observed that response time is by far the leading criterion with a weight of 65.07%, which is followed by SCA risk with 23.13%, coverage capacity with 7.65%, and availability of assigned user with 4.14%. The graphical comparison of the weights of four main criteria with respect to the goal is shown in Figure 4.7.

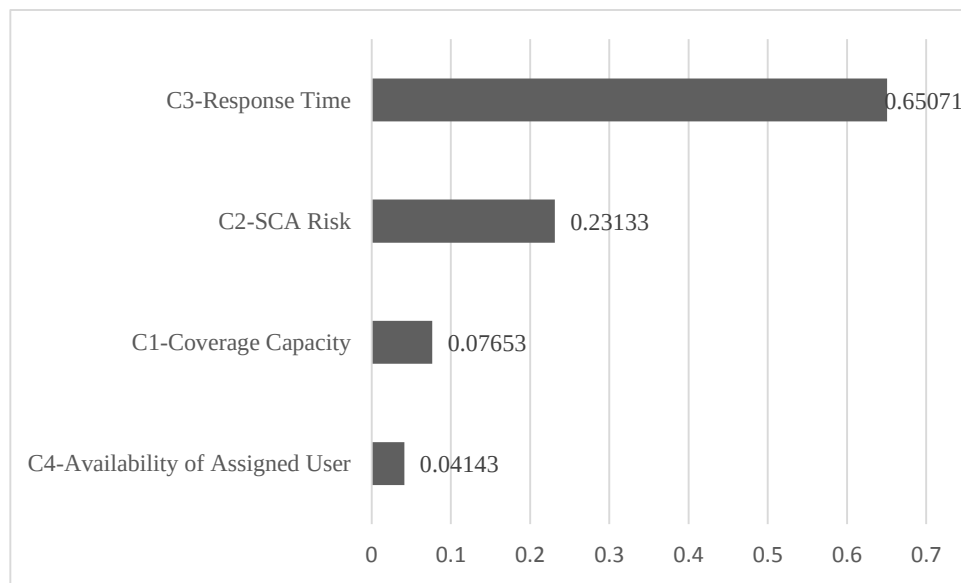


Figure 4.7 : Weights of criteria according to the goal.

The weights of physical coverage with respect to the main criteria coverage capacity is 83.33% while population coverage has a weight of 16.67%. The graphical comparison is shown in Figure 4.8.

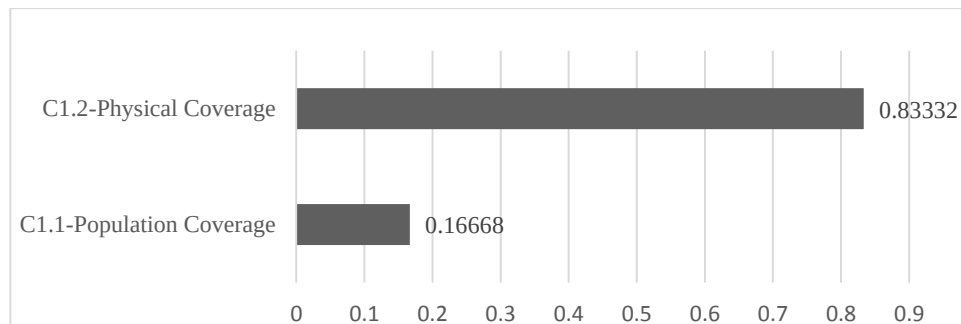


Figure 4.8 : Weights of its sub-criteria according to criteria C1.

The sub-criteria of SCA risk, risk level of activities and risk level of people are observed to have equal weights with respect to the main criterion, as shown in Figure 4.9.

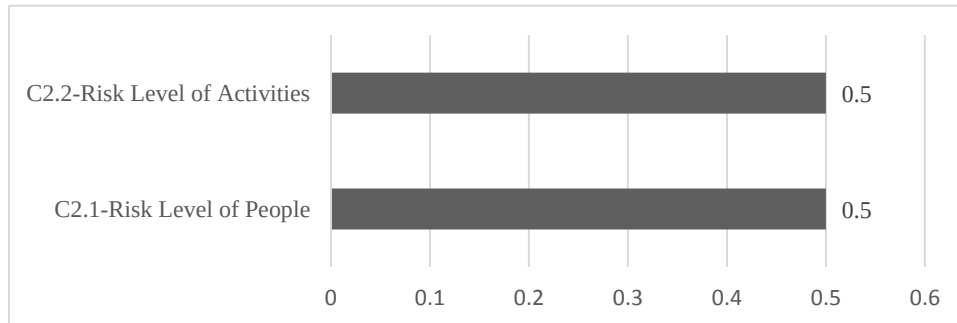


Figure 4.9 : Weights of its sub-criteria according to criteria C2.

The sub-criteria of resonance time, time to place and time to furthest point are observed to have equal weights with respect to the main criterion, as shown in Figure 4.10.

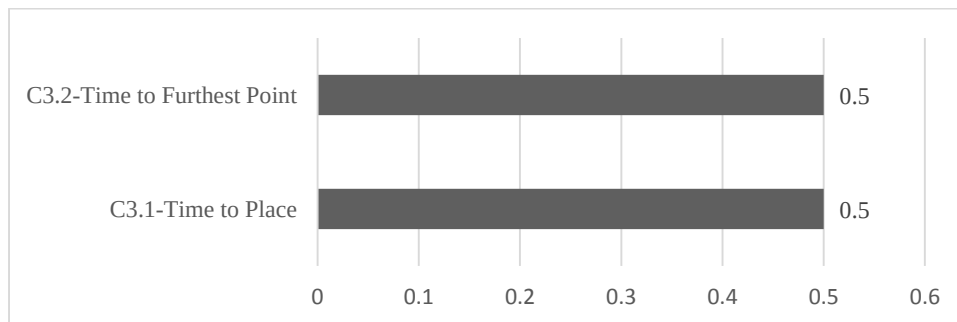


Figure 4.10 : Weights of its sub-criteria according to criteria C3.

4.8.2 Ranking of Alternatives

The ranking of the alternatives were obtained as explained in Section 4.7.2. Ranking of alternatives according to the global scores together with the performance levels for each criterion are shown in Table C.1 of Appendix C. It should be noted that alternatives with equal global scores share the same rank.

However, it is important to note that for the purpose of an AED deployment project which would be applied directly or recommended by the authorities, a simple ranking of the alternatives would not be of perfect meaning since the AED placement project will probably not be done as one AED at a time, and also the main purpose of this study is to serve as a guideline for projects in the near future. For this reason, the alternatives were grouped according to their global scores with respect to the goal. The grouping could not be done strictly by assigning equal number of alternatives to each group, because it might result in having two alternatives with equal or very close global scores ending up in two different groups. Instead, the global scores of all alternatives were plotted on a graph in descending order to be able to see possible separation points. The study on the graph concluded with forming four groups as shown colour-coded in Figure 4.11. The alternatives were also colour-coded on the map according to their groups as shown in Figure 4.12. The complete map may be found in Appendix E.

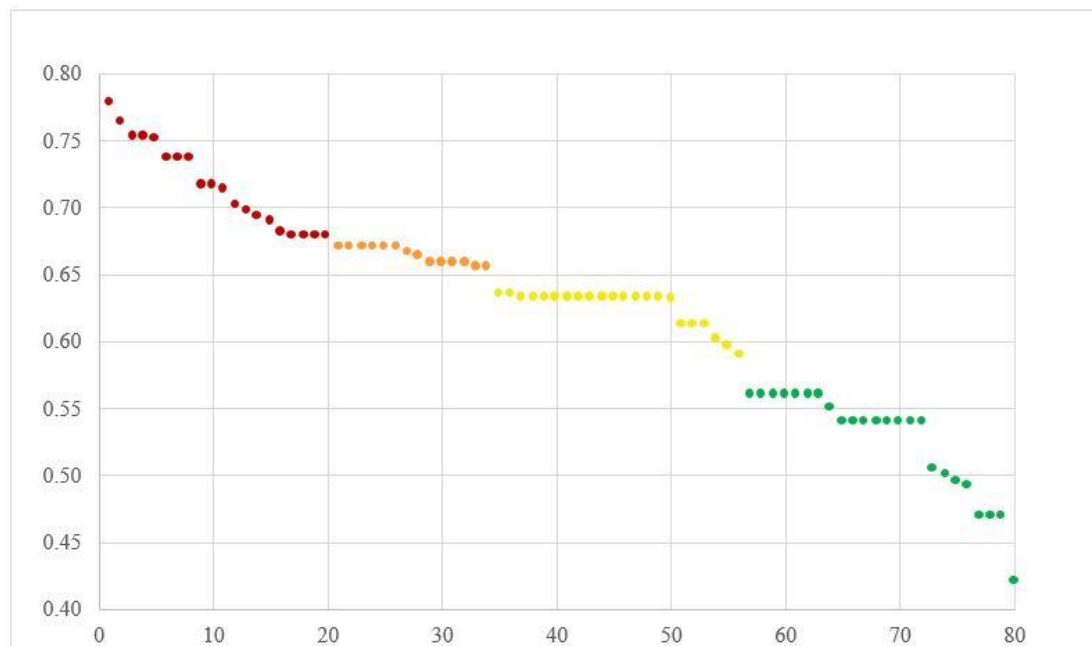


Figure 4.11 : Grouping alternatives according to their global scores.

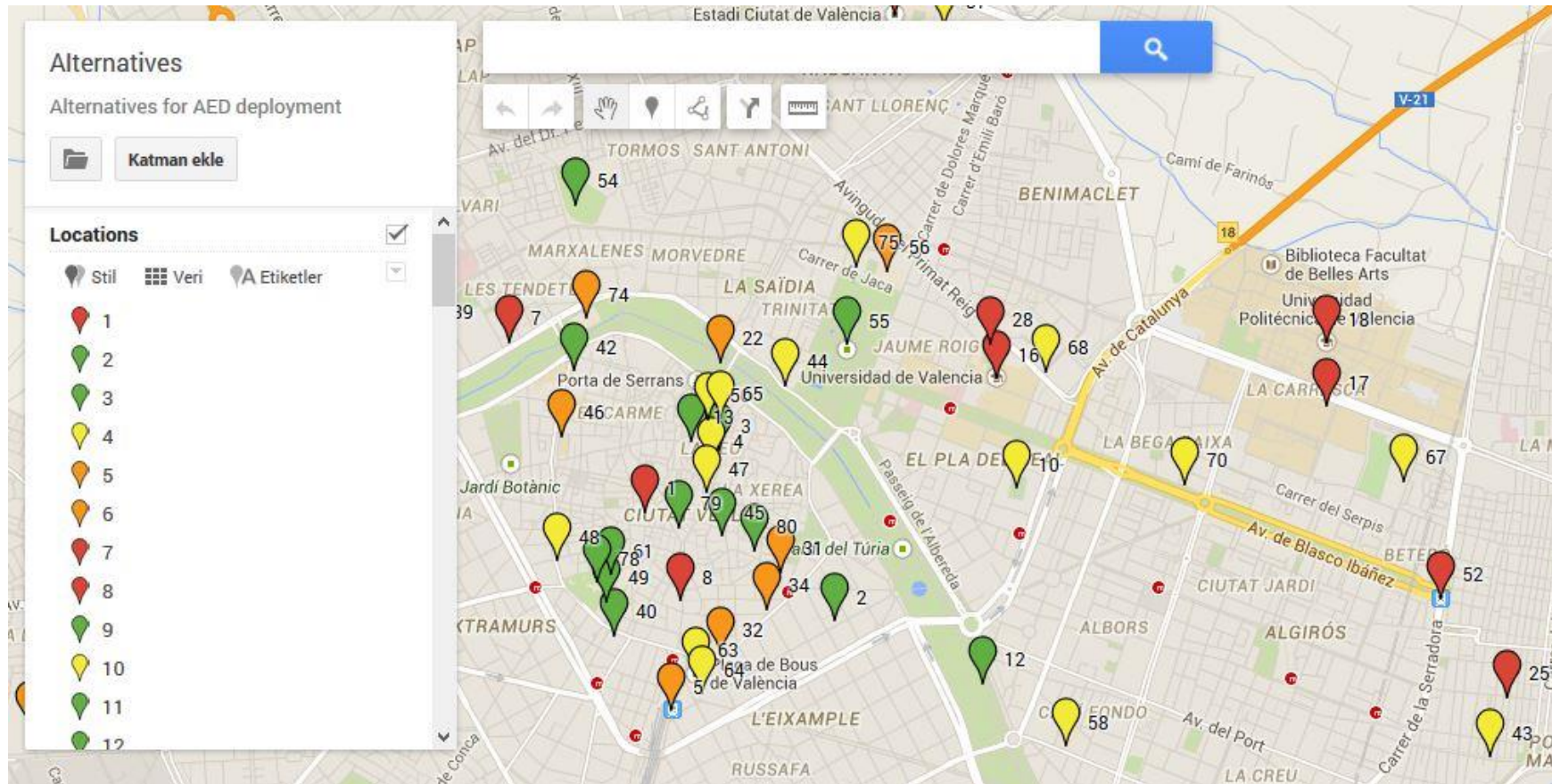


Figure 4.12 : Groups of alternatives marked on the map.

The first-priority group which was coloured red throughout the tables and graphs includes 20 alternatives with the highest global scores. This group represents the locations which should be considered urgent or may be the subject of a pilot study. The alternatives in this group are shown in Table 4.9 together with their ranks and global scores.

Table 4.9 : Alternatives in first-priority group.

RANK	FIRST-PRIORITY ALTERNATIVES	TOTALS
1	27.Nazaret Sports Centre	0.778402
2	30.Valencia City Stadium	0.764438
3	1.Central Market	0.752872
3	7.Valencia Central Bus Station	0.752872
5	29.Stadium on Av. de les Corts Vlc.	0.751683
6	8.City Hall (Ayuntamiento)	0.736290
6	15.Malvarrosa Beach	0.736290
6	18.UPV Vera Campus	0.736290
9	16.UV Blasco Ibáñez Campus	0.715989
9	17.UV Tarongers Campus	0.715989
11	28.UV Sports Centre Av. Pr. Reig	0.713331
12	25.Cabanyal Sports Centre	0.701591
13	20.School of San José	0.697765
14	21.Sports Centre in Garden Turia	0.693030
15	52.Cabanyal Train Station	0.690025
16	24.Alboraya Industrial Zone	0.681290
17	26.Nazaret Football Pitch	0.678632
17	69.Patacona Sports Complex	0.678632
17	76.Mercavalència Wholesale Centre	0.678632
17	77.Barri de la Llum Sports Centre	0.678632

The second-priority group which was coloured orange throughout the tables and graphs includes 15 alternatives with the highest global scores after the first 20 alternatives. This group represents the locations which should be considered after the first-priority group is covered. If the project offers enough AEDs, these alternatives may be equipped together with the first-priority group. The alternatives in this group are shown in Table 4.10 together with their ranks and global scores.

Table 4.10 : Alternatives in second-priority group.

RANK	SECOND-PRIORITY ALTERNATIVES	TOTALS
21	31.Shopping Mall El Corte Inglés-1	0.670892
21	32.Shopping Mall El Corte Inglés-2	0.670892
21	33.Shopping Mall El Corte Inglés-3	0.670892
21	34.Shopping Mall El Corte Inglés-4	0.670892
21	35.Shopping Mall El Saler	0.670892
21	36.Shopping Mall Gran Turia	0.670892
27	39.Shopping Mall Nuevo Centro	0.667066
28	56.Valencia Tennis Club	0.664601
29	46.Campus of Vlc. Catholic Uni.	0.659153
30	22.Football Pitches Pont de Fusta	0.658331
30	23.Vara de Quart Industrial Zone	0.658331
30	74.Football Pitches Pont de les Arts	0.658331
33	5.North Train Station	0.655265
33	6.Joaquín Sorolla Train Station	0.655265
35	58.Tennis Club "Sporting Tennis Vlc."	0.635685

The third-priority group which was coloured yellow throughout the tables and graphs includes 21 alternatives. This group represents the locations which should be considered in case of enough resources. If the project offers enough AEDs, these alternatives may be equipped together with the first and second-priority groups. The alternatives in this group are shown in Table 4.11 together with their ranks.

Table 4.11 : Alternatives in third-priority group.

RANK	THIRD-PRIORITY ALTERNATIVES	TOTALS
36	48.Church of Pilar	0.635025
37	19.Market of Campanar	0.632367
37	37.Shopping Mall Arena Multiesp.	0.632367
37	38.Shopping Mall Ademuz	0.632367
37	43.Rice Museum	0.632367
37	44.San Pio Museum of Fine Arts	0.632367
37	50.Presidency Office	0.632367
37	62.9 de Octubre Adm. Complex	0.632367
37	64.Bullfight Museum	0.632367
37	65.Vlc. Parliament (Les Corts)	0.632367
37	66.Palace of Arts	0.632367
37	67.Virg. del C. Betero Sports Centre	0.632367
37	71.BioParc	0.632367
37	75.La Hípica Event Garden	0.632367
50	47.Reina Square	0.631198
51	63.Bullring	0.612066
51	68.Benimaclet Sports Centre	0.612066
51	70.Blasco Ibáñez Avenue	0.612066
54	10.Mestalla Football Station	0.601760
55	4.The Valencia Cathedral	0.596245
56	60.Real Club Náutico	0.589420

The fourth-priority group which was coloured green throughout the tables and graphs includes 24 alternatives. This group contains the locations with lowest global scores. However, it should not be noted that this does not mean that these places should not be equipped with AEDs. If the project offers enough AEDs, these alternatives may be considered. The alternatives in this group are shown in Table 4.12 together with their ranks.

Table 4.12 : Alternatives in fourth-priority group.

RANK	FOURTH-PRIORITY ALTERNATIVES	TOTALS
57	41.Lladro Museum	0.560505
57	45.Ceramics Museum	0.560505
57	49.Vlc. Museum of Modern Illustr.	0.560505
57	51.Museum of Fallas	0.560505
57	78.Provincial Public Library	0.560505
57	79.Octubre Centre of Ctp. Culture	0.560505
57	80.UV Library	0.560505
64	9.City of Arts & Sciences	0.550821
65	53.Public Garden of Benicalap	0.540203
65	54.Public Garden of Marxalenes	0.540203
65	55.Royal Gardens	0.540203
65	57.Municipality Cemetery	0.540203
65	59.Marina Real Juan Carlos I	0.540203
65	61.Handcrafts Centre	0.540203
65	72.Public Garden of Cabecera	0.540203
65	73.Public Garden West	0.540203
73	11.Palace of Congresses	0.504388
74	2.Market of Colón	0.500995
75	42.Valencia Institute of Modern Art	0.495433
76	12.Palace of Music	0.492648
77	13.Government Hall (Generalitat)	0.469689
77	14.Oceanographic	0.469689
77	40.Shopping Mall Fnac	0.469689
80	3.Basilica of the Virgin	0.420919

4.9 Sensitivity Analysis

Sensitivity analysis is an indispensable part of a decision model as it offers broader understanding and critique of the model. Sensitivity analysis might be broadly defined as the investigation of the potential changes with their effects on the results (Pannell, 1997). For this study, the sensitivity of the results to the changes in the weights of main criteria was investigated. To be able to do this, eight scenarios were tested and compared with the original results:

- Scenario 1: This is the situation where the ranking of the alternatives were done only according to the main criteria response time, i.e. the criterion has a weight

of 100%. Results of the model for this scenario are shown in Table D.1 in Appendix D.

- Scenario 2: This is the situation where the main criteria response time has no effect on the results; i.e. the criterion has a weight of 0%. Results of the model for this scenario are shown in Table D.2 in Appendix D.
- Scenario 3: This is the situation where the ranking of the alternatives were done considering only the main criteria SCA risk, i.e. the criterion has a weight of 100%. Results of the model for this scenario are shown in Table D.3 in Appendix D.
- Scenario 4: This is the situation where the main criteria SCA risk has no effect on the results; i.e. the criterion has a weight of 0%. Results of the model for this scenario are shown in Table D.4 in Appendix D.
- Scenario 5: This is the situation where the ranking of the alternatives were done considering only the main criteria coverage capacity, i.e. the criterion has a weight of 100%. The global scores, rankings and groups for this scenario are shown in Table D.5 in Appendix D.
- Scenario 6: This is the situation where the main criteria coverage capacity has no effect on the results; i.e. the criterion has a weight of 0%. The global scores for this scenario together with the new ranking and priority groups are shown in Table D.6 in Appendix D.
- Scenario 7: This is the situation where the ranking of the alternatives were done only according to the main criteria availability of assigned user, i.e. the criterion has a weight of 100%. Results of the model for this scenario are shown in Table D.7 in Appendix D.
- Scenario 8: This is the situation where the main criteria availability of assigned user has no effect on the results; i.e. the criterion has a weight of 0%. Results of the model for this scenario are shown in Table D.8 in Appendix D.

It should be noted that, for a better comparison in terms of priorities of the groups, the number of alternatives belonging to each priority group was not kept the same for all scenarios. Instead, the global scores of alternatives under each scenario were analysed as it was done for the original results, and alternatives were grouped according to their

global scores for each structure. This caused differences in the number of alternatives in each group for different scenarios. In other words, first-priority group contains 20 alternatives in the model while this number is 19 for Scenario 1. It may be observed that for Scenario 1 and Scenario 7, first-priority groups are significantly larger: containing 67 and 58 alternatives respectively. The reason of this was the large number of alternatives with the same global score under these scenarios, making it impossible to divide them into different groups. The number of alternatives in each priority group of all scenarios is summarized in Table 4.13.

Table 4.13 : Number of alternatives in groups for each scenario.

	Original	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
First Priority	20	67	20	16	22	21	19	58	23
Second Priority	15	5	20	21	19	9	13	22	12
Third Priority	21	6	19	26	18	31	29	-	18
Fourth Priority	24	2	21	17	21	19	19	-	27

Comparison of rankings and groups under different scenarios are shown in Table D.9 in Appendix D. When this table is analysed, it might be stated that the alternatives mostly fall in same groups under different scenarios, despite a few sharp changes. For example, Alternative 4 (The Valencia Cathedral), an alternative originally in the third-priority group, falls into fourth-priority group under scenario 6 (where the weight of coverage capacity is 0) and into first-priority group under scenario 5 (where the weight of coverage capacity is 1). Additionally, it is observed that Scenario 1 and Scenario 7 seem unfeasible to make comparisons with other scenarios as most alternatives end up with same global scores in these two scenarios.

We believe that a closer look to the sensitivity of first-priority group to the scenarios would be useful. The rankings and groups of the first 20 alternatives are shown in Table 4.14. It is observed that these alternatives are mostly in first-priority group for all scenarios. Especially first 10 alternatives show strong insensitivity to the weights of all criteria, meaning these alternatives would be the first choice no matter what the weights of criteria are.

Table 4.14 : Ranking of first-priority group for each scenario.

ALTERNATIVES IN FIRST-PRIORITY GROUP	Original	Scn 1	Scn 2	Scn 3	Scn 4	Scn 5	Scn 6	Scn 7	Scn 8
27.Nazaret Sports Centre	1	1	14	4	1	31	1	1	1
30.Valencia City Stadium	2	2	1	1	2	1	2	1	2
1.Central Market	3	2	3	4	2	1	4	1	3
7.Valencia Central Bus Station	3	2	3	4	2	1	4	1	3
29.Stadium on Av. de les Corts Vlc.	5	2	7	1	5	8	2	1	5
8.City Hall (Ayuntamiento)	6	2	8	4	7	12	4	1	6
15.Malvarrosa Beach	6	2	8	4	7	12	4	1	6
18.UPV Vera Campus	6	2	8	4	7	12	4	1	6
16.UV Blasco Ibáñez Campus	9	2	12	4	19	12	10	59	6
17.UV Tarongers Campus	9	2	12	4	19	12	10	59	6
28.UV Sports Centre Av. Pr. Reig	11	2	14	4	23	31	4	1	11
25.Cabanyal Sports Centre	12	2	16	17	7	12	13	1	13
20.School of San José	13	2	17	17	12	23	13	1	15
21.Sports Centre in Garden Turia	14	2	19	4	53	31	10	59	11
52.Cabanyal Train Station	15	2	20	20	7	12	20	1	16
24.Alboraya Industrial Zone	16	2	21	17	19	12	20	59	13
26.Nazaret Football Pitch	17	2	22	17	23	31	13	1	17
69.Patacona Sports Complex	17	2	22	17	23	31	13	1	17
76.Mercavalència Wholesale Centre	17	2	22	17	23	31	13	1	17
77.Barri de la Llum Sports Centre	17	2	22	17	23	31	13	1	17

5 CONCLUSIONS AND FURTHER SUGGESTIONS

Cardiovascular diseases is reported by World Health Organisation to be the leading cause of death globally (2010); more than 50% of these deaths being caused by sudden cardiac arrest (Zheng, 2001). The unpredictable and fatal nature of sudden cardiac arrest (SCA) puts emphasis on the necessity of an immediate defibrillation and CPR treatment for any chance of survival. It is agreed by all authorities that the chances of survival decrease by about 10% with each minute without defibrillation. In search of ways to increase the survival rates from SCA, developments in technology created the solution: Automated external defibrillators (AED). AEDs created a whole different perspective to the concept of resuscitation and first-aid by enabling any first-responder to be able to deliver the life-saving defibrillation treatment within moments of any incident, long before the ambulance arrives. This led the question to be “where to place AEDs?”, searching for a solution to the unpredictability of SCA and the cost of AEDs. This has been a popular topic among researchers in resuscitation domain. Yet, the problem has not been studied under decision making domain sufficiently. The aim of this study was to provide a novel approach to the problem by using Analytical Hierarchy Process (AHP) and offer a solution in terms of a case study in City of Valencia, Spain.

After reviewing the previous studies on the subject, criteria and potential categories for alternatives were determined. The decision problem is constructed of four main criteria, three of them having two sub-criteria each. The location alternatives were discussed by local experts and a final list of 80 alternatives were agreed on. The pairwise comparisons were made by a decision maker who is an expert of AED programmes under supervision of a professor who is an expert on AHP.

Criterion response time was the most important criterion with a weight of 65.07%, followed by SCA risk (23.13%). The weight of coverage capacity was 7.65% and that of availability of assigned user was 4.14%. This showed that the most critical criterion for selecting the suitability of a location for AED deployment is the response time. However, it was interesting to observe that remote locations such as public gardens

did not have high preferences. This shows although the criterion response time dominates the selection; other criteria played important role since most locations did not differ much in terms of response time.

A rigid ranking of the alternatives would not be of perfect meaning since the AED placement project will probably not be done as one AED at a time, and also the main purpose of this study was to serve as a general guideline for projects in the near future. For this reason, the alternatives were grouped according to their global scores with respect to the goal. The global scores of all alternatives were analysed and four groups with descending priorities were formed. These groups were aimed to serve as a guideline or a road map for future projects for AED deployment.

Additionally, a sensitivity analysis was performed to test the robustness of the model with regard to the changes in weights of criteria. It was observed that especially the first-priority alternatives are not highly sensitive to the changes in weights of criteria, showing the importance of selecting these locations if a pilot study is intended. However, it should be noted that a pilot study might fail as a determinant of success of an AED deployment project and it might be a better choice to use the results of this study as a road map which will lead a project that will cover all locations throughout a time period.

Although providing a novel approach for selecting public locations for AED deployment, this study indeed would benefit further improvement. The first step further to this study would definitely be to widen the study by including location alternatives which were discarded in this study such as schools or locations within a broader geographical area. Treating the problem within group decision making subject and having opinions of multiple decision makers might also provide valuable results. Additionally, the problem might be studied using different decision making models and the results might be compared. Last but not least, it is obvious that having one AED per location would not be enough for most locations and a valuable contribution to this study would be focusing on determining the number of AEDs needed for each location.

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APPENDICES

APPENDIX A Summary of Literature Review

APPENDIX B The Questionnaire

APPENDIX C Performance Levels and Global Scores of Alternatives

APPENDIX D Alternative Rankings Under Different Scenarios

APPENDIX E Priority Groups of Alternatives Marked on The Map

APPENDIX A Summary of Literature Review

Table A.1 : Summary of literature review (1).

ARTICLE	SUBJECT							RESEARCH TYPE				SCOPE				SPECIFIC METHOD										
	Safety of AED use	Current Situation of AEDs	Public Attitude Towards AEDs	Cost-effectiveness of AEDs	SCA Incident History	Allocation of AEDs	Sociological Aspect of AED Use	Effectiveness of AEDs	Controlled Trial	Retrospective Study	Survey	Interview	Report / Guideline / Recommendation	Multi Countries	A Country / State	A City	Smaller Community	Specific Type	Mathematical Optimization	Voronoi Diagrams	GIS	Integer Programming	Crocco Method	Genetic Algorithm	Temporally & Spatially Weighted Model	Markov Decision Model
Adams et al., 2006								X	X									X								
Ammirati et al., 2011								X	X								X									
Bahr et al., 2010		X								X				X												
Balady et al., 2002		X											X					X								
Bardy et al., 2008								X	X									X								
Becker et al., 1998		X			X	X				X						X										
Berdowski et al., 2010				X						X						X										
Berger, 2009		X											X					X								
Brooks et al., 2013						X				X						X										
Chan et al., 2013						X				X									X							
Colquhoun et al., 2008		X						X	X					X												
Connaughton et al., 2011		X									X						X									
Cram et al., 2003				X						X					X										X	
Destro et al., 1996								X	X									X								
Domanovits et al., 1998								X	X								X									
Eckstein, 2012		X								X						X										
Elsensohn et al., 2006								X					X					X								
Finn & Jacobs, 2004								X	X									X								
Fleischhackl et al., 2006			X								X				X											
Folke et al., 2009					X					X						X										
Folke et al., 2010					X					X						X										
Forrer et al., 2002				X						X							X									
Gilchrist et al., 2012		X								X					X											
Gratton et al., 1999					X					X						X										
Haskell et al., 2009		X									X						X									
Hazinski et al., 2010		X						X					X	X												
Hirsch et al., 2012		X								X					X											
Imai et al., 2008						X											X			X						
Jorgenson et al., 2003			X							X					X											
Kuisma et al., 2003				X				X	X							X										
Lubin et al., 2004			X								X						X									
Ministry of Health of Spain, 2007		X											X		X											

Table A.2 : Summary of literature review (2).

ARTICLE	SUBJECT						RESEARCH TYPE					SCOPE				SPECIFIC METHOD										
	Safety of AED use	Current Situation of AEDs	Public Attitude Towards AEDs	Cost-effectiveness of AEDs	SCA Incident History	Allocation of AEDs	Sociological Aspect of AED Use	Effectiveness of AEDs	Controlled Trial	Retrospective Study	Survey	Interview	Report / Guideline / Recommendation	Multi Countries	A Country / State	A City	Smaller Community	Specific Type	Mathematical Optimization	Voronoi Diagrams	GIS	Integer Programming	Crocco Method	Genetic Algorithm	Temporally & Spatially Weighted Model	Markov Decision Model
Motyka et. al, 2005						X				X						X	X									
Muraoka et al., 2006					X	X				X						X										
Myerburg et al., 2005		X											X					X								
Myers & Mohite, 2009						X											X		X							
Nichol et al., 2009				X					X						X										X	
Nielsen et al., 2013a		X								X					X											
Nielsen et al., 2013b			X								X						X									
Norton & Norton, 2008		X											X					X								
Oldenburg et al., 2011							X	X										X								
Ong et al., 2008					X				X						X					X						
Page et al., 2013					X				X									X								
Peberdy et al., 2006	X								X					X												
Peli et al., 2003					X				X						X											
Rauner & Bajmoczy, 2003				X											X						X					
Rea et al., 2011					X					X					X											
Reinier et al., 2006					X				X								X									
Richardson et al., 2005							X	X						X												
Roessler et al., 2007					X				X									X								
Sasaki et al., 2011					X				X							X										
Schneider et al., 2004			X							X						X										
Schober et al., 2011			X								X						X									
Siddiq et al., 2013							X		X							X										
Swor et al., 2013		X			X				X									X								
Timmons et al., 2010							X					X				X										
Tsai et al., 2012					X	X										X							X	X		
Varon et al., 1999		X							X						X											
Walker et al., 2003				X					X						X											X
Watson et al., 2013		X								X					X											
Weisfeldt et al., 1996		X							X						X											
Weisfeldt et al., 2010							X		X						X											
Whitfield et al., 2005							X		X						X											
Whitney-Cashio et al., 2012						X						X					X									

APPENDIX B The Questionnaire

Dear Dr. D. Rafael Rodríguez de Sanabria Gil,

We wish to thank you for your valuable contribution as being the decision maker for our study, which will be a part of the master's thesis titled **“Determining Suitable Public Locations for Automated External Defibrillator (AED) Deployment: A Case Study in Valencia”**.

Please read carefully the explanations and examples; and answer all the questions completely. Feel free to ask if you need any further explanation for any point.

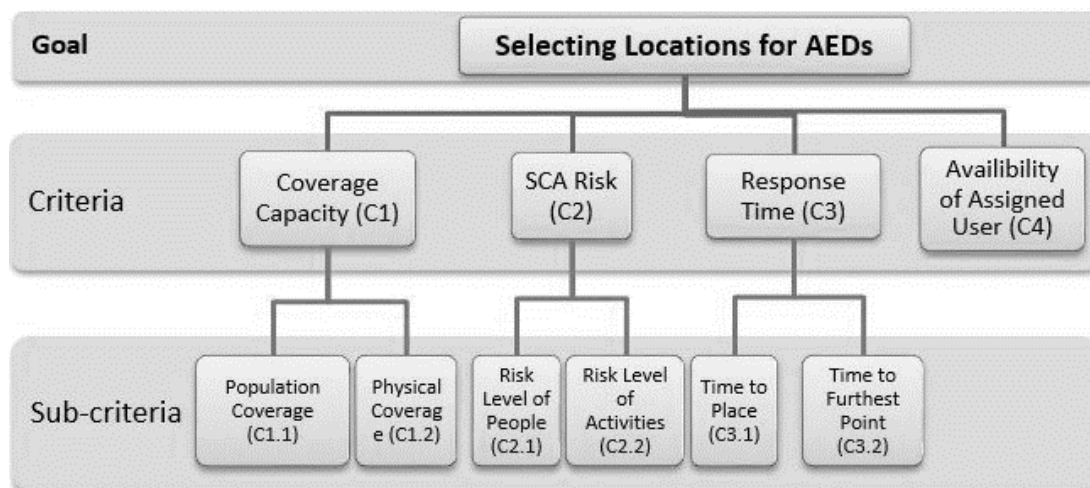
Best Regards,

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INTRODUCTION

- For this study, we will use Analytical Hierarchy Process (AHP) technique. In this method, the decision maker (in this case, it is you) is asked to compare items at a time. This is easier than trying to decide the importance levels of all items at the same time. Then, we will process your answers into a software to find the importance degree of all items.
- We determined 4 main criteria which affect the decision of placing an AED to a location or not. Also, three of the criteria have sub-criteria. Please take a moment to see the model below:



- Before the survey, there are some explanations and examples for clarification. We hope you find them useful.
- The survey is consisted of three parts:
 - In Part 1; you will make pairwise comparisons of the criteria according to their importance for the goal.
 - In Part 2; you will decide the weights of the performance levels of each criterion.
 - In Part 3; you will assess the alternatives and decide to which degree each alternative contributes to the criteria.

EXPLANATION OF CRITERIA

1. **Coverage capacity (C1):** It may be defined as the combination of the population coverage capacity, i.e. the number of visitors / students / residents of a place on a daily basis; and the physical coverage capacity, i.e. the width of the area which may benefit from the AED deployment at the specified spot. In other words, it reflects the number of people and the width of the area which the AED may cover. For example, an AED located in the library could also be used for an SCA incident which occurred on the street in front of the library. This criterion may be divided into 2 sub-criteria:

- a. **Population Coverage (C1.1):** It represents the number of people the AED will serve.
- b. **Physical Coverage (C1.2):** It represents the physical area the AED will serve.

5. **SCA risk (C2):** This criterion represents the likelihood of witnessing SCA in the premises. It may be divided into two sub-criteria:

- a. **Risk level of people (C2.1):** It represents the connection between the demographics of people in the location. As an example, locations utilized by mostly people over 50 years of age or with a history of heart disease would have higher level of risk.
- b. **Risk level of activities (C2.2):** It represents the connection between the activities performed at the location and the probability of witnessing an SCA incident. As an example, places where certain activities are performed (such as excessive physical activity) would have higher level of risk.

6. **Response Time (C3):**

- a. **Time to the place (C3.1):** This may be defined as the approximate time it takes for an ambulance to arrive to the place.
- b. **Time to the furthest point (C3.2):** This is the time it takes for the medical professionals to reach from the parking spot of the ambulance to the furthest point in the building. In other words, this criteria reflects the “vertical response time” mentioned in previous studies.

Availability of an assigned user (C4): This criterion represents the possibility of the presence of a pre-trained person who is able to recognize the incident and assure the AED is used without delay. For example receptionists, security guards etc.

EXPLANATION OF THE SURVEY

Starting from the next page, you will be asked to compare the criteria according to their importance with respect to the goal “Selecting locations for AEDs”. Each time, you will be asked to compare two of the criteria. Please see the examples below:

Evaluation example question:

With respect to goal “**Selecting locations for AEDs**” compare the following criteria pair:

1=Equal importance 3=Moderately more important 5=Strongly more important
7=Very strongly more important 9=Extremely more important

Coverage Capacity (C1)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	SCA Risk (C2)
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Evaluation Case 1:

*If you think that the criterion “Coverage Capacity” has **exactly the same importance** as “SCA Risk”, you should select **1**:*

1=Equal importance 3=Moderately more important 5=Strongly more important
7=Very strongly more important 9=Extremely more important

Coverage Capacity (C1)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	SCA Risk
------------------------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	----------

Evaluation Case 2:

*If you think that the left-hand side criterion “Coverage Capacity” is **very strongly more important** than the right-hand side criterion “SCA Risk”, you should sign the left-hand side **7**:*

1=Equal importance 3=Moderately more important 5=Strongly more important
7=Very strongly more important 9=Extremely more important

Coverage Capacity (C1)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	SCA Risk (C2)
------------------------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---------------

Evaluation Case 3:

*If you think that the right-hand side criterion “SCA Risk” is **very strongly more important** than the left-hand side criterion “SCA Risk”, you should sign the right-hand side **7**:*

1=Equal importance 3=Moderately more important 5=Strongly more important
7=Very strongly more important 9=Extremely more important

Coverage Capacity (C1)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	SCA Risk (C2)
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Evaluation Case 4:

*If you think that the right-hand side criterion “SCA Risk” is **somewhat between moderately less important and strongly less important** than the right hand side “Coverage Capacity”, you should sign the right hand side **4**:*

1=Equal importance 3=Moderately more important 5=Strongly more important
7=Very strongly more important 9=Extremely more important

Coverage Capacity (C1)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	SCA Risk (C2)
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EXPLANATION OF THE SCALE IN SPANISH

For further clarification, you may also find below the Spanish explanation of the scale you will be using to compare the criteria:

Escala numérica	Escala verbal	Explicación
1	Igual importancia	Los dos elementos contribuyen igualmente a la propiedad o criterio.
3	Moderadamente más importante un elemento que el otro.	El juicio y la experiencia previa favorecen a un elemento frente al otro.
5	Fuertemente más importante un elemento que en otro.	El juicio y la experiencia previa favorecen fuertemente a un elemento frente al otro.
7	Mucho más fuerte la importancia de un elemento que la del otro.	Un elemento domina fuertemente. Su dominación está probada en práctica.
9	Importancia extrema de un elemento frente al otro.	Un elemento domina al otro con el mayor orden de magnitud posible.

SURVEY

PART 1

1. Please compare the criteria pairs below, according to their importance for the goal
“Selecting locations for AEDs”:

1=Equal importance 3=Moderately more important 5=Strongly more important

7=Very strongly more important 9=Extremely more important

Coverage Capacity (C1)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	SCA Risk (C2)
SCA Risk (C2)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Response Time (C3)
Response Time (C3)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Availability of Assigned User (C4)
Availability of Assigned User (C4)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Coverage Capacity (C1)
Coverage Capacity (C1)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Response Time (C3)
SCA Risk (C2)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Availability of Assigned User (C4)

2. Please compare the 2 sub-criteria below, according to their importance for
“Coverage Capacity”:

1=Equal importance 3=Moderately more important 5=Strongly more important

7=Very strongly more important 9=Extremely more important

Population Coverage (C1.1)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Physical Coverage (C1.2)
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3. Please compare the 2 sub-criteria below, according to their importance for **“SCA Risk”:**

1=Equal importance 3=Moderately more important 5=Strongly more important

7=Very strongly more important 9=Extremely more important

Risk Level of People (C2.1)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Risk Level of Activities (C2.2)
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4. Please compare the 2 sub-criteria below, according to their importance for
“Response Time”:

1=Equal importance 3=Moderately more important 5=Strongly more important

7=Very strongly more important 9=Extremely more important

Time to Place (C3.1)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Time to Furthest Point (C3.2)
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PART 2

5. As you may see below, there are performance levels for each criterion. In your opinion, what would be the importance weight of each level if the weight of the highest level is 100? Please fill in the table below with your points.

Example:

Please note that the difference between these levels might or might not be equal of importance. Also, in some cases the lowest level might have 0 (zero). For example, a person can give points as below:

CRITERIA	WEIGHTS OF LEVELS				
Population Coverage (C1.1)	Very Low	Low	Average	High	Very High
	<i>0</i>	<i>10</i>	<i>50</i>	<i>80</i>	<i>100</i>

While, another person can decide the weights of the levels as below:

CRITERIA	WEIGHTS OF LEVELS				
Population Coverage (C1.1)	Very Low	Low	Average	High	Very High
	<i>10</i>	<i>25</i>	<i>40</i>	<i>90</i>	<i>100</i>

Now, please fill in the table below according to your opinion and as shown in the examples above:

CRITERIA	WEIGHTS OF LEVELS				
Population Coverage (C1.1)	Very Low	Low	Average	High	Very High
	.....	.....	.....	.....	<i>100</i>
Physical Coverage (C1.2)	Very Low	Low	Average	High	Very High
	.....	.....	.....	.....	<i>100</i>
Risk Level of People (C2.1)	Very Low	Low	Average	High	Very High
	.....	.....	.....	.....	<i>100</i>
Risk Level of Activities (C2.2)	Very Low	Low	Average	High	Very High
	.....	.....	.....	.....	<i>100</i>
Time to Place (C3.1)	Very Short	Short	Average	Long	Very Long
	.....	.....	.....	.....	<i>100</i>
Time to Furthest Point (C3.2)	Very Short	Short	Average	Long	Very Long
	.....	.....	.....	.....	<i>100</i>
Availability of Assigned User (C4)	Not available		Possible	Available	
	.....		.....	<i>100</i>	

PART 3

6. For each alternative, please select the performance level according to criteria. For further clarification, you may utilize the attached map with locations of each alternative which was created for this survey.

- 6.1. Please select the performance level of **Central Market (Mercado Central)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

- 6.2. Please select the performance level of **Market of Colón (Mercado Colón)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.3. Please select the performance level of **Basilica of the Virgin (Basilica de la Virgen)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.4. Please select the performance level of **The Valencia Cathedral (Iglesia Catedral)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.5. Please select the performance level of **North Train Station (Estación del Norte)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.6. Please select the performance level of **Joaquín Sorolla Train Station** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.7. Please select the performance level of **Valencia Central Bus Station** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.8. Please select the performance level of **North Train Station (Estación del Norte)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.9. Please select the performance level of **City of Arts & Sciences (Ciudad de las Artes y las Ciencias)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.10. Please select the performance level of **Mestalla Football Stadium** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.11. Please select the performance level of **Palace of Congress** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.12. Please select the performance level of **Palace of Music** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.13. Please select the performance level of **Government Hall (Generalitat)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.14. Please select the performance level of **Oceanographic (Oceanográfico)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.15. Please select the performance level of **Malvarrosa Beach** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.16. Please select the performance level of **UV Blasco Ibáñez Campus** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.17. Please select the performance level of **UV Tarongers Campus** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.18. Please select the performance level of **UPV Vera Campus** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.19. Please select the performance level of **Market of Campanar** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.20. Please select the performance level of **School of San José (Escuelas San José)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.21. Please select the performance level of **Sports Centre (Polideportivo) in Garden Turia** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.22. Please select the performance level of **Football Pitches Serranos Bridge, Garden Turia** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.23. Please select the performance level of **Vara de Quart Industrial Zone** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.24.Please select the performance level of **Alboraya Industrial Zone (Polígono Industrial en Alboraya)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.25.Please select the performance level of **Cabanyal Sports Centre (Polideportivo)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.26.Please select the performance level of **Nazaret Football Pitch** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.27. Please select the performance level of **Nazaret Sports Centre (Polideportivo)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.28. Please select the performance level of **UV Sports Centre (Polideportivo) on Av. Primat Reig** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.29. Please select the performance level of **Stadium on Av. de les Corts Valencianes** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.30. Please select the performance level of **Valencia City Stadium** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.31. Please select the performance level of **Shopping Mall El Corte Inglés-1 (Pintor Sorolla, 26)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.32. Please select the performance level of **Shopping Mall El Corte Inglés-2 (Colón, 1)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.33. Please select the performance level of **Shopping Mall El Corte Inglés-3 (Av. Francia/Pintor Maella, 37)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.34. Please select the performance level of **Shopping Mall El Corte Inglés-4 (Colón, 27)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.35. Please select the performance level of **Shopping Mall El Saler** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.36. Please select the performance level of **Shopping Mall Gran Turia** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.37. Please select the performance level of **Shopping Mall Arena Multiespacio** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.38. Please select the performance level of **Shopping Mall Ademuz** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.39.Please select the performance level of **Shopping Mall Nuevo Centro** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.40.Please select the performance level of **Shopping Mall Fnac** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.41.Please select the performance level of **Lladro Museum** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.42.Please select the performance level of **Valencia Institute of Modern Art (IVAM)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.43.Please select the performance level of **Rice Museum** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.44.Please select the performance level of **San Pio Museum of Fine Arts** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.45.Please select the performance level of **Ceramics Museum** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.46.Please select the performance level of **Campus of Valencia Catholic University** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.47.Please select the performance level of **Reina Square (Plaza de la Reina)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.48. Please select the performance level of **Church of Pilar** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.49. Please select the performance level of **Valencia Museum of Modern Illustration (MUVIM)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.50. Please select the performance level of **Presidency Office (Conselleria de Presidencia)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.51. Please select the performance level of **Museum of Fallas** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.52. Please select the performance level of **Cabanyal Train Station** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.53. Please select the performance level of **Public Garden of Benicalap** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.54.Please select the performance level of **Public Garden of Marxalenes** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.55.Please select the performance level of **Royal Gardens (Jardines del Real)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.56.Please select the performance level of **Valencia Tennis Club** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.57.Please select the performance level of **Municipality Cemetery** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.58.Please select the performance level of **Tennis Club “Sporting Tenis Valencia”** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.59.Please select the performance level of **Marina Real Juan Carlos I** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.60. Please select the performance level of **Real Club Náutico** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.61. Please select the performance level of **Handcrafts Centre** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.62. Please select the performance level of **9 de Octubre Administrative Complex** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.63. Please select the performance level of **Bullring** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.64. Please select the performance level of **Bullfight Museum** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.65. Please select the performance level of **Valencian Parliament (Les Corts)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.66. Please select the performance level of **Palace of Arts** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.67. Please select the performance level of **Virgen del Carmen Betero Sports Centre (Polideportivo)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.68. Please select the performance level of **Benimaclet Sports Centre (Polideportivo)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.69. Please select the performance level of **Patacona Sports Complex (Complejo Deportivo Patacona)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.70. Please select the performance level of **Blasco Ibáñez Avenue** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.71. Please select the performance level of **BioParc** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.72.Please select the performance level of **Public Garden of Cabecera** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.73.Please select the performance level of **Public Garden West** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.74.Please select the performance level of **Football Pitches Pont de les Arts, Garden Turia** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.75. Please select the performance level of **La Hípica Event Garden** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.76. Please select the performance level of **Mercavalència Wholesale Centre** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.77. Please select the performance level of **Barri de la Llum Sports Centre (Polideportivo)** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.78.Please select the performance level of **Provincial Public Library** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.79.Please select the performance level of **Octubre Centre of Contemporary Culture** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

6.80.Please select the performance level of **UV Library** for each criterion:

CRITERIA	PERFORMANCE LEVEL				
Population Coverage (C1.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Physical Coverage (C1.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of People (C2.1)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Risk Level of Activities (C2.2)	Very Low ☐	Low ☐	Average ☐	High ☐	Very High ☐
Time to Place (C3.1)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Time to Furthest Point (C3.2)	Very Short ☐	Short ☐	Average ☐	Long ☐	Very Long ☐
Availability of Assigned User (C4)	Not available ☐		Possible ☐	Available ☐	

--- END OF SURVEY ---

THANK YOU.

APPENDIX C Performance Levels and Global Scores of Alternatives

Table C.1 : Performance levels and global scores of alternatives.

RANK	ALTERNATIVES	C1.1	C1.2	C2.1	C2.2	C3.1	C3.2	C4	TOTALS
1	27.Nazaret Sports Centre	0.2	0.3	0.6	0.7	1	0.8	0.5	0.778402
2	30.Valencia City Stadium	0.8	0.8	0.6	0.8	0.8	0.8	0.5	0.764438
3	1.Central Market	0.8	0.8	0.6	0.7	0.8	0.8	0.5	0.752872
3	7.Valencia Central Bus Station	0.8	0.8	0.6	0.7	0.8	0.8	0.5	0.752872
5	29.Stadium on Av. de les Corts Vlc.	0.8	0.6	0.6	0.8	0.8	0.8	0.5	0.751683
6	8.City Hall (Ayuntamiento)	0.5	0.6	0.6	0.7	0.8	0.8	0.5	0.736290
6	15.Malvarrosa Beach	0.5	0.6	0.6	0.7	0.8	0.8	0.5	0.736290
6	18.UPV Vera Campus	0.5	0.6	0.6	0.7	0.8	0.8	0.5	0.736290
9	16.UV Blasco Ibáñez Campus	0.5	0.6	0.6	0.7	0.8	0.8	0.01	0.715989
9	17.UV Tarongers Campus	0.5	0.6	0.6	0.7	0.8	0.8	0.01	0.715989
11	28.UV Sports Centre Av. Pr. Reig	0.2	0.3	0.6	0.7	0.8	0.8	0.5	0.713331
12	25.Cabanyal Sports Centre	0.5	0.6	0.3	0.7	0.8	0.8	0.5	0.701591
13	20.School of San José	0.2	0.6	0.3	0.7	0.8	0.8	0.5	0.697765
14	21.Sports Centre in Garden Turia	0.2	0.3	0.6	0.7	0.8	0.8	0.01	0.693030
15	52.Cabanyal Train Station	0.5	0.6	0.6	0.3	0.8	0.8	0.5	0.690025
16	24.Alboraya Industrial Zone	0.5	0.6	0.3	0.7	0.8	0.8	0.01	0.681290
17	26.Nazaret Football Pitch	0.2	0.3	0.3	0.7	0.8	0.8	0.5	0.678632
17	69.Patacona Sports Complex	0.2	0.3	0.3	0.7	0.8	0.8	0.5	0.678632
17	76.Mercavalència Wholesale Centre	0.2	0.3	0.3	0.7	0.8	0.8	0.5	0.678632
17	77.Barri de la Llum Sports Centre	0.2	0.3	0.3	0.7	0.8	0.8	0.5	0.678632
21	31.Shopping Mall El Corte Inglés-1	0.5	0.3	0.6	0.3	0.8	0.8	0.5	0.670892
21	32.Shopping Mall El Corte Inglés-2	0.5	0.3	0.6	0.3	0.8	0.8	0.5	0.670892
21	33.Shopping Mall El Corte Inglés-3	0.5	0.3	0.6	0.3	0.8	0.8	0.5	0.670892
21	34.Shopping Mall El Corte Inglés-4	0.5	0.3	0.6	0.3	0.8	0.8	0.5	0.670892
21	35.Shopping Mall El Saler	0.5	0.3	0.6	0.3	0.8	0.8	0.5	0.670892
21	36.Shopping Mall Gran Turia	0.5	0.3	0.6	0.3	0.8	0.8	0.5	0.670892
27	39.Shopping Mall Nuevo Centro	0.2	0.3	0.6	0.3	0.8	0.8	0.5	0.667066
28	56.Valencia Tennis Club	0.1	0.1	0.3	0.7	0.8	0.8	0.5	0.664601
29	46.Campus of Vlc. Catholic Uni.	0.8	0.6	0.3	0.3	0.8	0.8	0.5	0.659153
30	22.Football Pitches Pont de Fusta	0.2	0.3	0.3	0.7	0.8	0.8	0.01	0.658331
30	23.Vara de Quart Industrial Zone	0.2	0.3	0.3	0.7	0.8	0.8	0.01	0.658331
30	74.Football Pitches Pont de les Arts	0.2	0.3	0.3	0.7	0.8	0.8	0.01	0.658331
33	5.North Train Station	0.8	0.8	0.6	0.7	0.8	0.5	0.5	0.655265
33	6.Joaquín Sorolla Train Station	0.8	0.8	0.6	0.7	0.8	0.5	0.5	0.655265
35	58.Tennis Club "Sporting Tennis Vlc."	0.1	0.1	0.05	0.7	0.8	0.8	0.5	0.635685
36	48.Church of Pilar	0.5	0.6	0.3	0.3	0.8	0.8	0.01	0.635025
37	19.Market of Campanar	0.2	0.3	0.3	0.3	0.8	0.8	0.5	0.632367
37	37.Shopping Mall Arena Multiesp.	0.2	0.3	0.3	0.3	0.8	0.8	0.5	0.632367
37	38.Shopping Mall Ademuz	0.2	0.3	0.3	0.3	0.8	0.8	0.5	0.632367
37	43.Rice Museum	0.2	0.3	0.3	0.3	0.8	0.8	0.5	0.632367
37	44.San Pio Museum of Fine Arts	0.2	0.3	0.3	0.3	0.8	0.8	0.5	0.632367
37	50.Presidency Office	0.2	0.3	0.3	0.3	0.8	0.8	0.5	0.632367
37	62.9 de Octubre Adm. Complex	0.2	0.3	0.3	0.3	0.8	0.8	0.5	0.632367
37	64.Bullfight Museum	0.2	0.3	0.3	0.3	0.8	0.8	0.5	0.632367
37	65.Vlc. Parliament (Les Corts)	0.2	0.3	0.3	0.3	0.8	0.8	0.5	0.632367

Table C.1 (continued) : Performance levels and global scores of alternatives.

37	66.Palace of Arts	0.2	0.3	0.3	0.3	0.8	0.8	0.5	0.632367
37	67.Virg. del C. Betero Sports Centre	0.2	0.3	0.3	0.3	0.8	0.8	0.5	0.632367
37	71.BioParc	0.2	0.3	0.3	0.3	0.8	0.8	0.5	0.632367
37	75.La Hípica Event Garden	0.2	0.3	0.3	0.3	0.8	0.8	0.5	0.632367
50	47.Reina Square	0.2	0.6	0.3	0.3	0.8	0.8	0.01	0.631198
51	63.Bullring	0.2	0.3	0.3	0.3	0.8	0.8	0.01	0.612066
51	68.Benimaclet Sports Centre	0.2	0.3	0.3	0.3	0.8	0.8	0.01	0.612066
51	70.Blasco Ibáñez Avenue	0.2	0.3	0.3	0.3	0.8	0.8	0.01	0.612066
54	10.Mestalla Football Station	0.8	0.8	0.6	0.8	0.6	0.5	0.5	0.601760
55	4.The Valencia Cathedral	0.8	0.6	0.6	0.3	0.8	0.5	0.5	0.596245
56	60.Real Club Náutico	0.1	0.1	0.05	0.3	0.8	0.8	0.5	0.589420
57	41.Lladro Museum	0.1	0.1	0.05	0.05	0.8	0.8	0.5	0.560505
57	45.Ceramics Museum	0.1	0.1	0.05	0.05	0.8	0.8	0.5	0.560505
57	49.Vlc. Museum of Modern Illustr.	0.1	0.1	0.05	0.05	0.8	0.8	0.5	0.560505
57	51.Museum of Fallas	0.1	0.1	0.05	0.05	0.8	0.8	0.5	0.560505
57	78.Provincial Public Library	0.1	0.1	0.05	0.05	0.8	0.8	0.5	0.560505
57	79.Octubre Centre of Ctp. Culture	0.1	0.1	0.05	0.05	0.8	0.8	0.5	0.560505
57	80.UV Library	0.1	0.1	0.05	0.05	0.8	0.8	0.5	0.560505
64	9.City of Arts & Sciences	0.5	0.3	0.3	0.3	0.6	0.8	0.01	0.550821
65	53.Public Garden of Benicalap	0.1	0.1	0.05	0.05	0.8	0.8	0.01	0.540203
65	54.Public Garden of Marxalenes	0.1	0.1	0.05	0.05	0.8	0.8	0.01	0.540203
65	55.Royal Gardens	0.1	0.1	0.05	0.05	0.8	0.8	0.01	0.540203
65	57.Municipality Cemetery	0.1	0.1	0.05	0.05	0.8	0.8	0.01	0.540203
65	59.Marina Real Juan Carlos I	0.1	0.1	0.05	0.05	0.8	0.8	0.01	0.540203
65	61.Handcrafts Centre	0.1	0.1	0.05	0.05	0.8	0.8	0.01	0.540203
65	72.Public Garden of Cabecera	0.1	0.1	0.05	0.05	0.8	0.8	0.01	0.540203
65	73.Public Garden West	0.1	0.1	0.05	0.05	0.8	0.8	0.01	0.540203
73	11.Palace of Congresses	0.2	0.3	0.6	0.3	0.6	0.5	0.5	0.504388
74	2.Market of Colón	0.5	0.8	0.6	0.7	0.6	0.3	0.01	0.500995
75	42.Valencia Institute of Modern Art	0.1	0.1	0.05	0.05	0.6	0.8	0.5	0.495433
76	12.Palace of Music	0.5	0.6	0.3	0.3	0.6	0.5	0.5	0.492648
77	13.Government Hall (Generalitat)	0.2	0.3	0.3	0.3	0.6	0.5	0.5	0.469689
77	14.Oceanographic	0.2	0.3	0.3	0.3	0.6	0.5	0.5	0.469689
77	40.Shopping Mall Fnac	0.2	0.3	0.3	0.3	0.6	0.5	0.5	0.469689
80	3.Basilica of the Virgin	0.8	0.6	0.6	0.05	0.8	0.05	0.5	0.420919

APPENDIX D Alternative Rankings Under Different Scenarios

Table D.1 : Ranking of alternatives under scenario 1.

RANK	ALTERNATIVES	TOTALS
1	27.Nazaret Sports Centre	0.900000
2	1.Central Market	0.800000
2	7.Valencia Central Bus Station	0.800000
2	8.City Hall (Ayuntamiento)	0.800000
2	15.Malvarrosa Beach	0.800000
2	16.UV Blasco Ibáñez Campus	0.800000
2	17.UV Tarongers Campus	0.800000
2	18.UPV Vera Campus	0.800000
2	19.Market of Campanar	0.800000
2	20.School of San José	0.800000
2	21.Sports Centre in Garden Turia	0.800000
2	22.Football Pitches Pont de Fusta	0.800000
2	23.Vara de Quart Industrial Zone	0.800000
2	24.Alboraya Industrial Zone	0.800000
2	25.Cabanyal Sports Centre	0.800000
2	26.Nazaret Football Pitch	0.800000
2	28.UV Sports Centre Av. Pr. Reig	0.800000
2	29.Stadium on Av. de les Corts Vlc.	0.800000
2	30.Valencia City Stadium	0.800000
2	31.Shopping Mall El Corte Inglés-1	0.800000
2	32.Shopping Mall El Corte Inglés-2	0.800000
2	33.Shopping Mall El Corte Inglés-3	0.800000
2	34.Shopping Mall El Corte Inglés-4	0.800000
2	35.Shopping Mall El Saler	0.800000
2	36.Shopping Mall Gran Turia	0.800000
2	37.Shopping Mall Arena Multiesp.	0.800000
2	38.Shopping Mall Ademuz	0.800000
2	39.Shopping Mall Nuevo Centro	0.800000
2	41.Lladro Museum	0.800000
2	43.Rice Museum	0.800000
2	44.San Pio Museum of Fine Arts	0.800000
2	45.Ceramics Museum	0.800000
2	46.Campus of Vlc. Catholic Uni.	0.800000
2	47.Reina Square	0.800000
2	48.Church of Pilar	0.800000
2	49.Vlc. Museum of Modern Illustr.	0.800000
2	50.Presidency Office	0.800000
2	51.Museum of Fallas	0.800000
2	52.Cabanyal Train Station	0.800000
2	53.Public Garden of Benicalap	0.800000
2	54.Public Garden of Marxalenes	0.800000

Table D.1 (continued) : Ranking of alternatives under scenario 1.

2	55.Royal Gardens	0.800000
2	56.Valencia Tennis Club	0.800000
2	57.Municipality Cemetry	0.800000
2	58.Tennis Club "Sporting Tenis Vlc."	0.800000
2	59.Marina Real Juan Carlos I	0.800000
2	60.Real Club Náutico	0.800000
2	61.Handcrafts Centre	0.800000
2	62.9 de Octubre Adm. Complex	0.800000
2	63.Bullring	0.800000
2	64.Bullfight Museum	0.800000
2	65.Vlc. Parliament (Les Corts)	0.800000
2	66.Palace of Arts	0.800000
2	67.Virg. del C. Betero Sports Centre	0.800000
2	68.Benimaclet Sports Centre	0.800000
2	69.Patacona Sports Complex	0.800000
2	70.Blasco Ibáñez Avenue	0.800000
2	71.BioParc	0.800000
2	72.Public Garden of Cabecera	0.800000
2	73.Public Garden West	0.800000
2	74.Football Pitches Pont de les Arts	0.800000
2	75.La Hípica Event Garden	0.800000
2	76.Mercavalència Wholesale Centre	0.800000
2	77.Barri de la Llum Sports Centre	0.800000
2	78.Provincial Public Library	0.800000
2	79.Octubre Centre of Ctp. Culture	0.800000
2	80.UV Library	0.800000
63	9.City of Arts & Sciences	0.700000
63	42.Valencia Institute of Modern Art	0.700000
70	4.The Valencia Cathedral	0.650000
70	5.North Train Station	0.650000
70	6.Joaquín Sorolla Train Station	0.650000
73	10.Mestalla Football Station	0.550000
73	11.Palace of Congresses	0.550000
73	12.Palace of Music	0.550000
73	13.Government Hall (Generalitat)	0.550000
73	14.Oceanographic	0.550000
73	40.Shopping Mall Fnac	0.550000
79	2.Market of Colón	0.450000
80	3.Basilica of the Virgin	0.425000

Table D.2 : Ranking of alternatives under scenario 2.

RANK	ALTERNATIVES	TOTALS
1	10.Mestalla Football Station	0.698187
1	30.Valencia City Stadium	0.698187
3	1.Central Market	0.665074
3	5.North Train Station	0.665074
3	6.Joaquín Sorolla Train Station	0.665074
3	7.Valencia Central Bus Station	0.665074
7	29.Stadium on Av. de les Corts Vlc.	0.661670
8	8.City Hall (Ayuntamiento)	0.617601
8	15.Malvarrosa Beach	0.617601
8	18.UPV Vera Campus	0.617601
11	2.Market of Colón	0.595996
12	16.UV Blasco Ibáñez Campus	0.559479
12	17.UV Tarongers Campus	0.559479
14	27.Nazaret Sports Centre	0.551869
14	28.UV Sports Centre Av. Pr. Reig	0.551869
16	25.Cabanyal Sports Centre	0.518259
17	20.School of San José	0.507303
18	4.The Valencia Cathedral	0.496100
19	21.Sports Centre in Garden Turia	0.493747
20	52.Cabanyal Train Station	0.485145
21	24.Alboraya Industrial Zone	0.460137
22	26.Nazaret Football Pitch	0.452527
22	69.Patacona Sports Complex	0.452527
22	76.Mercavalència Wholesale Centre	0.452527
22	77.Barri de la Llum Sports Centre	0.452527
26	31.Shopping Mall El Corte Inglés-1	0.430369
26	32.Shopping Mall El Corte Inglés-2	0.430369
26	33.Shopping Mall El Corte Inglés-3	0.430369
26	34.Shopping Mall El Corte Inglés-4	0.430369
26	35.Shopping Mall El Saler	0.430369
26	36.Shopping Mall Gran Turia	0.430369
32	11.Palace of Congresses	0.419413
32	39.Shopping Mall Nuevo Centro	0.419413
33	3.Basilica of the Virgin	0.413315
35	56.Valencia Tennis Club	0.412358
36	46.Campus of Vlc. Catholic Uni.	0.396759
37	22.Football Pitches Pont de Fusta	0.394405
37	23.Vara de Quart Industrial Zone	0.394405
37	74.Football Pitches Pont de les Arts	0.394405
40	12.Palace of Music	0.385803
41	58.Tennis Club "Sporting Tennis Vlc."	0.329573
42	48.Church of Pilar	0.327681

Table D.2 (continued) : Ranking of alternatives under scenario 2.

43	13.Government Hall (Generalitat)	0.320071
43	14.Oceanographic	0.320071
43	19.Market of Campanar	0.320071
43	37.Shopping Mall Arena Multiesp.	0.320071
43	38.Shopping Mall Ademuz	0.320071
43	40.Shopping Mall Fnac	0.320071
43	43.Rice Museum	0.320071
43	44.San Pio Museum of Fine Arts	0.320071
43	50.Presidency Office	0.320071
43	62.9 de Octubre Adm. Complex	0.320071
43	64.Bullfight Museum	0.320071
43	65.Vlc. Parliament (Les Corts)	0.320071
43	66.Palace of Arts	0.320071
43	67.Virg. del C. Betero Sports Centre	0.320071
43	71.BioParc	0.320071
43	75.La Hípica Event Garden	0.320071
59	47.Reina Square	0.316726
60	9.City of Arts & Sciences	0.272905
61	63.Bullring	0.261950
61	68.Benimaclet Sports Centre	0.261950
61	70.Blasco Ibáñez Avenue	0.261950
64	60.Real Club Náutico	0.197117
65	41.Lladro Museum	0.114332
65	42.Valencia Institute of Modern Art	0.114332
65	45.Ceramics Museum	0.114332
65	49.Vlc. Museum of Modern Illustr.	0.114332
65	51.Museum of Fallas	0.114332
65	78.Provincial Public Library	0.114332
65	79.Octubre Centre of Ctp. Culture	0.114332
65	80.UV Library	0.114332
73	53.Public Garden of Benicalap	0.056211
73	54.Public Garden of Marxalenes	0.056211
73	55.Royal Gardens	0.056211
73	57.Municipality Cemetery	0.056211
73	59.Marina Real Juan Carlos I	0.056211
73	61.Handcrafts Centre	0.056211
73	72.Public Garden of Cabecera	0.056211
73	73.Public Garden West	0.056211

Table D.3 : Ranking of alternatives under scenario 3.

RANK	ALTERNATIVES	TOTALS
1	10.Mestalla Football Station	0.700000
1	29.Stadium on Av. de les Corts Vlc.	0.700000
1	30.Valencia City Stadium	0.700000
4	1.Central Market	0.650000
4	2.Market of Colón	0.650000
4	5.North Train Station	0.650000
4	6.Joaquín Sorolla Train Station	0.650000
4	7.Valencia Central Bus Station	0.650000
4	8.City Hall (Ayuntamiento)	0.650000
4	15.Malvarrosa Beach	0.650000
4	16.UV Blasco Ibáñez Campus	0.650000
4	17.UV Tarongers Campus	0.650000
4	18.UPV Vera Campus	0.650000
4	21.Sports Centre in Garden Turia	0.650000
4	27.Nazaret Sports Centre	0.650000
4	28.UV Sports Centre Av. Pr. Reig	0.650000
12	20.School of San José	0.500000
12	22.Football Pitches Pont de Fusta	0.500000
12	23.Vara de Quart Industrial Zone	0.500000
12	24.Alboraya Industrial Zone	0.500000
12	25.Cabanyal Sports Centre	0.500000
12	26.Nazaret Football Pitch	0.500000
12	56.Valencia Tennis Club	0.500000
12	69.Patacona Sports Complex	0.500000
12	74.Football Pitches Pont de les Arts	0.500000
12	76.Mercavalència Wholesale Centre	0.500000
12	77.Barri de la Llum Sports Centre	0.500000
20	4.The Valencia Cathedral	0.450000
20	11.Palace of Congresses	0.450000
20	31.Shopping Mall El Corte Inglés-1	0.450000
20	32.Shopping Mall El Corte Inglés-2	0.450000
20	33.Shopping Mall El Corte Inglés-3	0.450000
20	34.Shopping Mall El Corte Inglés-4	0.450000
20	35.Shopping Mall El Saler	0.450000
20	36.Shopping Mall Gran Turia	0.450000
20	39.Shopping Mall Nuevo Centro	0.450000
20	52.Cabanyal Train Station	0.450000
38	58.Tennis Club "Sporting Tenis Vlc."	0.375000
39	3.Basilica of the Virgin	0.325000
40	9.City of Arts & Sciences	0.300000
40	12.Palace of Music	0.300000
40	13.Government Hall (Generalitat)	0.300000

Table D.3 (continued) : Ranking of alternatives under scenario 3.

40	14.Oceanographic	0.300000
40	19.Market of Campanar	0.300000
40	37.Shopping Mall Arena Multiesp.	0.300000
40	38.Shopping Mall Ademuz	0.300000
40	40.Shopping Mall Fnac	0.300000
40	43.Rice Museum	0.300000
40	44.San Pio Museum of Fine Arts	0.300000
40	46.Campus of Vlc. Catholic Uni.	0.300000
40	47.Reina Square	0.300000
40	48.Church of Pilar	0.300000
40	50.Presidency Office	0.300000
40	62.9 de Octubre Adm. Complex	0.300000
40	63.Bullring	0.300000
40	64.Bullfight Museum	0.300000
40	65.Vlc. Parliament (Les Corts)	0.300000
40	66.Palace of Arts	0.300000
40	67.Virg. del C. Betero Sports Centre	0.300000
40	68.Benimaclet Sports Centre	0.300000
40	70.Blasco Ibáñez Avenue	0.300000
40	71.BioParc	0.300000
40	75.La Hípica Event Garden	0.300000
64	60.Real Club Náutico	0.175000
65	41.Lladro Museum	0.050000
65	42.Valencia Institute of Modern Art	0.050000
65	45.Ceramics Museum	0.050000
65	49.Vlc. Museum of Modern Illustr.	0.050000
65	51.Museum of Fallas	0.050000
65	53.Public Garden of Benicalap	0.050000
65	54.Public Garden of Marxalenes	0.050000
65	55.Royal Gardens	0.050000
65	57.Municipality Cemetry	0.050000
65	59.Marina Real Juan Carlos I	0.050000
65	61.Handcrafts Centre	0.050000
65	72.Public Garden of Cabecera	0.050000
65	73.Public Garden West	0.050000
65	78.Provincial Public Library	0.050000
65	79.Octubre Centre of Ctp. Culture	0.050000
65	80.UV Library	0.050000

Table D.4 : Ranking of alternatives under scenario 4.

RANK	ALTERNATIVES	TOTALS
1	27.Nazaret Sports Centre	0.817043
2	1.Central Market	0.783830
2	7.Valencia Central Bus Station	0.783830
2	30.Valencia City Stadium	0.783830
5	29.Stadium on Av. de les Corts Vlc.	0.767237
5	46.Campus of Vlc. Catholic Uni.	0.767237
7	8.City Hall (Ayuntamiento)	0.762258
7	15.Malvarrosa Beach	0.762258
7	18.UPV Vera Campus	0.762258
7	25.Cabanyal Sports Centre	0.762258
7	52.Cabanyal Train Station	0.762258
12	20.School of San José	0.757280
13	31.Shopping Mall El Corte Inglés-1	0.737368
13	32.Shopping Mall El Corte Inglés-2	0.737368
13	33.Shopping Mall El Corte Inglés-3	0.737368
13	34.Shopping Mall El Corte Inglés-4	0.737368
13	35.Shopping Mall El Saler	0.737368
13	36.Shopping Mall Gran Turia	0.737368
19	16.UV Blasco Ibáñez Campus	0.735848
19	17.UV Tarongers Campus	0.735848
19	24.Alboraya Industrial Zone	0.735848
19	48.Church of Pilar	0.735848
23	19.Market of Campanar	0.732390
23	26.Nazaret Football Pitch	0.732390
23	28.UV Sports Centre Av. Pr. Reig	0.732390
23	37.Shopping Mall Arena Multiesp.	0.732390
23	38.Shopping Mall Ademuz	0.732390
23	39.Shopping Mall Nuevo Centro	0.732390
23	43.Rice Museum	0.732390
23	44.San Pio Museum of Fine Arts	0.732390
23	50.Presidency Office	0.732390
23	62.9 de Octubre Adm. Complex	0.732390
23	64.Bullfight Museum	0.732390
23	65.Vlc. Parliament (Les Corts)	0.732390
23	66.Palace of Arts	0.732390
23	67.Virg. del C. Betero Sports Centre	0.732390
23	69.Patacona Sports Complex	0.732390
23	71.BioParc	0.732390
23	75.La Hípica Event Garden	0.732390
23	76.Mercavalència Wholesale Centre	0.732390
23	77.Barri de la Llum Sports Centre	0.732390

Table D.4 (continued) : Ranking of alternatives under scenario 4.

42	47.Reina Square	0.730869
43	41.Lladro Museum	0.714137
43	45.Ceramics Museum	0.714137
43	49.Vlc. Museum of Modern Illustr.	0.714137
43	51.Museum of Fallas	0.714137
43	56.Valencia Tennis Club	0.714137
43	58.Tennis Club "Sporting Tenis Vlc."	0.714137
43	60.Real Club Náutico	0.714137
43	78.Provincial Public Library	0.714137
43	79.Octubre Centre of Ctp. Culture	0.714137
43	80.UV Library	0.714137
53	21.Sports Centre in Garden Turia	0.705979
53	22.Football Pitches Pont de Fusta	0.705979
53	23.Vara de Quart Industrial Zone	0.705979
53	63.Bullring	0.705979
53	68.Benimaclet Sports Centre	0.705979
53	70.Blasco Ibáñez Avenue	0.705979
53	74.Football Pitches Pont de les Arts	0.705979
60	53.Public Garden of Benicalap	0.687726
60	54.Public Garden of Marxalenes	0.687726
60	55.Royal Gardens	0.687726
60	57.Municipality Cemetery	0.687726
60	59.Marina Real Juan Carlos I	0.687726
60	61.Handcrafts Centre	0.687726
60	72.Public Garden of Cabecera	0.687726
60	73.Public Garden West	0.687726
68	5.North Train Station	0.656849
68	6.Joaquín Sorolla Train Station	0.656849
70	4.The Valencia Cathedral	0.640256
71	42.Valencia Institute of Modern Art	0.629483
72	9.City of Arts & Sciences	0.626303
73	10.Mestalla Football Station	0.572196
74	12.Palace of Music	0.550624
75	11.Palace of Congresses	0.520755
75	13.Government Hall (Generalitat)	0.520755
75	14.Oceanographic	0.520755
75	40.Shopping Mall Fnac	0.520755
79	2.Market of Colón	0.456153
80	3.Basilica of the Virgin	0.449785

Table D.5 : Ranking of alternatives under scenario 5.

RANK	ALTERNATIVES	TOTALS
1	1.Central Market	0.800000
1	5.North Train Station	0.800000
1	6.Joaquín Sorolla Train Station	0.800000
1	7.Valencia Central Bus Station	0.800000
1	10.Mestalla Football Station	0.800000
1	30.Valencia City Stadium	0.800000
7	2.Market of Colón	0.749999
8	3.Basilica of the Virgin	0.633334
8	4.The Valencia Cathedral	0.633334
8	29.Stadium on Av. de les Corts Vlc.	0.633334
8	46.Campus of Vlc. Catholic Uni.	0.633334
12	8.City Hall (Ayuntamiento)	0.583333
12	12.Palace of Music	0.583333
12	15.Malvarrosa Beach	0.583333
12	16.UV Blasco Ibáñez Campus	0.583333
12	17.UV Tarongers Campus	0.583333
12	18.UPV Vera Campus	0.583333
12	24.Alboraya Industrial Zone	0.583333
12	25.Cabanyal Sports Centre	0.583333
12	48.Church of Pilar	0.583333
12	52.Cabanyal Train Station	0.583333
22	20.School of San José	0.533332
22	47.Reina Square	0.533332
23	9.City of Arts & Sciences	0.333334
23	31.Shopping Mall El Corte Inglés-1	0.333334
23	32.Shopping Mall El Corte Inglés-2	0.333334
23	33.Shopping Mall El Corte Inglés-3	0.333334
23	34.Shopping Mall El Corte Inglés-4	0.333334
23	35.Shopping Mall El Saler	0.333334
23	36.Shopping Mall Gran Turia	0.333334
31	11.Palace of Congresses	0.283333
31	13.Government Hall (Generalitat)	0.283333
31	14.Oceanographic	0.283333
31	19.Market of Campanar	0.283333
31	21.Sports Centre in Garden Turia	0.283333
31	22.Football Pitches Pont de Fusta	0.283333
31	23.Vara de Quart Industrial Zone	0.283333
31	26.Nazaret Football Pitch	0.283333
31	27.Nazaret Sports Centre	0.283333
31	28.UV Sports Centre Av. Pr. Reig	0.283333
31	37.Shopping Mall Arena Multiesp.	0.283333
31	38.Shopping Mall Ademuz	0.283333

Table D.5 (continued) : Ranking of alternatives under scenario 5.

31	39.Shopping Mall Nuevo Centro	0.283333
31	40.Shopping Mall Fnac	0.283333
31	43.Rice Museum	0.283333
31	44.San Pio Museum of Fine Arts	0.283333
31	50.Presidency Office	0.283333
31	62.9 de Octubre Adm. Complex	0.283333
31	63.Bullring	0.283333
31	64.Bullfight Museum	0.283333
31	65.Vlc. Parliament (Les Corts)	0.283333
31	66.Palace of Arts	0.283333
31	67.Virg. del C. Betero Sports Centre	0.283333
31	68.Benimaclet Sports Centre	0.283333
31	69.Patacona Sports Complex	0.283333
31	70.Blasco Ibáñez Avenue	0.283333
31	71.BioParc	0.283333
31	74.Football Pitches Pont de les Arts	0.283333
31	75.La Hípica Event Garden	0.283333
31	76.Mercavalència Wholesale Centre	0.283333
31	77.Barri de la Llum Sports Centre	0.283333
62	41.Lladro Museum	0.100000
62	42.Valencia Institute of Modern Art	0.100000
62	45.Ceramics Museum	0.100000
62	49.Vlc. Museum of Modern Illustr.	0.100000
62	51.Museum of Fallas	0.100000
62	53.Public Garden of Benicalap	0.100000
62	54.Public Garden of Marxalenes	0.100000
62	55.Royal Gardens	0.100000
62	56.Valencia Tennis Club	0.100000
62	57.Municipality Cemetery	0.100000
62	58.Tennis Club "Sporting Tennis Vlc."	0.100000
62	59.Marina Real Juan Carlos I	0.100000
62	60.Real Club Náutico	0.100000
62	61.Handcrafts Centre	0.100000
62	72.Public Garden of Cabecera	0.100000
62	73.Public Garden West	0.100000
62	78.Provincial Public Library	0.100000
62	79.Octubre Centre of Ctp. Culture	0.100000
62	80.UV Library	0.100000

Table D.6 : Ranking of alternatives under scenario 6.

RANK	ALTERNATIVES	TOTALS
1	27.Nazaret Sports Centre	0.819430
2	29.Stadium on Av. de les Corts Vlc.	0.761491
2	30.Valencia City Stadium	0.761491
4	1.Central Market	0.748966
4	7.Valencia Central Bus Station	0.748966
4	8.City Hall (Ayuntamiento)	0.748966
4	15.Malvarrosa Beach	0.748966
4	18.UPV Vera Campus	0.748966
4	28.UV Sports Centre Av. Pr. Reig	0.748966
10	16.UV Blasco Ibáñez Campus	0.726983
10	17.UV Tarongers Campus	0.726983
10	21.Sports Centre in Garden Turia	0.726983
13	20.School of San José	0.711392
13	25.Cabanyal Sports Centre	0.711392
13	26.Nazaret Football Pitch	0.711392
13	56.Valencia Tennis Club	0.711392
13	69.Patacona Sports Complex	0.711392
13	76.Mercavalència Wholesale Centre	0.711392
13	77.Barri de la Llum Sports Centre	0.711392
20	31.Shopping Mall El Corte Inglés-1	0.698867
20	32.Shopping Mall El Corte Inglés-2	0.698867
20	33.Shopping Mall El Corte Inglés-3	0.698867
20	34.Shopping Mall El Corte Inglés-4	0.698867
20	35.Shopping Mall El Saler	0.698867
20	36.Shopping Mall Gran Turia	0.698867
20	39.Shopping Mall Nuevo Centro	0.698867
20	52.Cabanyal Train Station	0.698867
20	22.Football Pitches Pont de Fusta	0.689408
20	23.Vara de Quart Industrial Zone	0.689408
20	24.Alboraya Industrial Zone	0.689408
20	74.Football Pitches Pont de les Arts	0.689408
22	58.Tennis Club "Sporting Tenis Vlc."	0.680080
33	19.Market of Campanar	0.661292
33	37.Shopping Mall Arena Multiesp.	0.661292
33	38.Shopping Mall Ademuz	0.661292
33	43.Rice Museum	0.661292
33	44.San Pio Museum of Fine Arts	0.661292
33	46.Campus of Vlc. Catholic Uni.	0.661292
33	50.Presidency Office	0.661292
33	62.9 de Octubre Adm. Complex	0.661292

Table D.6 (continued) : Ranking of alternatives under scenario 6.

33	64.Bullfight Museum	0.661292
33	65.Vlc. Parliament (Les Corts)	0.661292
33	66.Palace of Arts	0.661292
33	67.Virg. del C. Betero Sports Centre	0.661292
33	71.BioParc	0.661292
33	75.La Hípica Event Garden	0.661292
47	5.North Train Station	0.643270
47	6.Joaquín Sorolla Train Station	0.643270
49	47.Reina Square	0.639309
49	48.Church of Pilar	0.639309
49	63.Bullring	0.639309
49	68.Benimaclet Sports Centre	0.639309
49	70.Blasco Ibáñez Avenue	0.639309
54	60.Real Club Náutico	0.629980
55	41.Lladro Museum	0.598668
55	45.Ceramics Museum	0.598668
55	49.Vlc. Museum of Modern Illustr.	0.598668
55	51.Museum of Fallas	0.598668
55	78.Provincial Public Library	0.598668
55	79.Octubre Centre of Ctp. Culture	0.598668
55	80.UV Library	0.598668
62	4.The Valencia Cathedral	0.593171
63	10.Mestalla Football Station	0.585331
64	53.Public Garden of Benicalap	0.576684
64	54.Public Garden of Marxalenes	0.576684
64	55.Royal Gardens	0.576684
64	57.Municipality Cemetery	0.576684
64	59.Marina Real Juan Carlos I	0.576684
64	61.Handcrafts Centre	0.576684
64	72.Public Garden of Cabecera	0.576684
64	73.Public Garden West	0.576684
72	9.City of Arts & Sciences	0.568845
73	42.Valencia Institute of Modern Art	0.528204
74	11.Palace of Congresses	0.522707
75	12.Palace of Music	0.485133
75	13.Government Hall (Generalitat)	0.485133
75	14.Oceanographic	0.485133
75	40.Shopping Mall Fnac	0.485133
79	2.Market of Colón	0.480359
80	3.Basilica of the Virgin	0.403315

Table D.7 : Ranking of alternatives under scenario 7.

RANK	ALTERNATIVES	TOTALS
1	1.Central Market	0.500000
1	3.Basilica of the Virgin	0.500000
1	4.The Valencia Cathedral	0.500000
1	5.North Train Station	0.500000
1	6.Joaquín Sorolla Train Station	0.500000
1	7.Valencia Central Bus Station	0.500000
1	8.City Hall (Ayuntamiento)	0.500000
1	10.Mestalla Football Station	0.500000
1	11.Palace of Congresses	0.500000
1	12.Palace of Music	0.500000
1	13.Government Hall (Generalitat)	0.500000
1	14.Oceanographic	0.500000
1	15.Malvarrosa Beach	0.500000
1	18.UPV Vera Campus	0.500000
1	19.Market of Campanar	0.500000
1	20.School of San José	0.500000
1	25.Cabanyal Sports Centre	0.500000
1	26.Nazaret Football Pitch	0.500000
1	27.Nazaret Sports Centre	0.500000
1	28.UV Sports Centre Av. Pr. Reig	0.500000
1	29.Stadium on Av. de les Corts Vlc.	0.500000
1	30.Valencia City Stadium	0.500000
1	31.Shopping Mall El Corte Inglés-1	0.500000
1	32.Shopping Mall El Corte Inglés-2	0.500000
1	33.Shopping Mall El Corte Inglés-3	0.500000
1	34.Shopping Mall El Corte Inglés-4	0.500000
1	35.Shopping Mall El Saler	0.500000
1	36.Shopping Mall Gran Turia	0.500000
1	37.Shopping Mall Arena Multiesp.	0.500000
1	38.Shopping Mall Ademuz	0.500000
1	39.Shopping Mall Nuevo Centro	0.500000
1	40.Shopping Mall Fnac	0.500000
1	41.Lladro Museum	0.500000
1	42.Valencia Institute of Modern Art	0.500000
1	43.Rice Museum	0.500000
1	44.San Pio Museum of Fine Arts	0.500000
1	45.Ceramics Museum	0.500000
1	46.Campus of Vlc. Catholic Uni.	0.500000
1	49.Vlc. Museum of Modern Illustr.	0.500000
1	50.Presidency Office	0.500000
1	51.Museum of Fallas	0.500000
1	52.Cabanyal Train Station	0.500000

Table D.7 (continued): Ranking of alternatives under scenario 7.

1	56.Valencia Tennis Club	0.500000
1	58.Tennis Club "Sporting Tenis Vlc."	0.500000
1	60.Real Club Náutico	0.500000
1	62.9 de Octubre Adm. Complex	0.500000
1	64.Bullfight Museum	0.500000
1	65.Vlc. Parliament (Les Corts)	0.500000
1	66.Palace of Arts	0.500000
1	67.Virg. del C. Betero Sports Centre	0.500000
1	69.Patacona Sports Complex	0.500000
1	71.BioParc	0.500000
1	75.La Hípica Event Garden	0.500000
1	76.Mercavalència Wholesale Centre	0.500000
1	77.Barri de la Llum Sports Centre	0.500000
1	78.Provincial Public Library	0.500000
1	79.Octubre Centre of Ctp. Culture	0.500000
1	80.UV Library	0.500000
59	2.Market of Colón	0.010000
59	9.City of Arts & Sciences	0.010000
59	16.UV Blasco Ibáñez Campus	0.010000
59	17.UV Tarongers Campus	0.010000
59	21.Sports Centre in Garden Turia	0.010000
59	22.Football Pitches Pont de Fusta	0.010000
59	23.Vara de Quart Industrial Zone	0.010000
59	24.Alboraya Industrial Zone	0.010000
59	47.Reina Square	0.010000
59	48.Church of Pilar	0.010000
59	53.Public Garden of Benicalap	0.010000
59	54.Public Garden of Marxalenes	0.010000
59	55.Royal Gardens	0.010000
59	57.Municipality Cemetery	0.010000
59	59.Marina Real Juan Carlos I	0.010000
59	61.Handcrafts Centre	0.010000
59	63.Bullring	0.010000
59	68.Benimaclet Sports Centre	0.010000
59	70.Blasco Ibáñez Avenue	0.010000
59	72.Public Garden of Cabecera	0.010000
59	73.Public Garden West	0.010000
59	74.Football Pitches Pont de les Arts	0.010000

Table D.8 : Ranking of alternatives under scenario 8.

RANK	ALTERNATIVES	TOTALS
1	27.Nazaret Sports Centre	0.790435
2	30.Valencia City Stadium	0.775868
3	1.Central Market	0.763801
3	7.Valencia Central Bus Station	0.763801
5	29.Stadium on Av. de les Corts Vlc.	0.762561
6	8.City Hall (Ayuntamiento)	0.746503
6	15.Malvarrosa Beach	0.746503
6	16.UV Blasco Ibáñez Campus	0.746503
6	17.UV Tarongers Campus	0.746503
6	18.UPV Vera Campus	0.746503
11	21.Sports Centre in Garden Turia	0.722551
11	28.UV Sports Centre Av. Pr. Reig	0.722551
13	24.Alboraya Industrial Zone	0.710304
13	25.Cabanyal Sports Centre	0.710304
15	20.School of San José	0.706312
16	52.Cabanyal Train Station	0.698238
17	22.Football Pitches Pont de Fusta	0.686353
17	23.Vara de Quart Industrial Zone	0.686353
17	26.Nazaret Football Pitch	0.686353
17	69.Patacona Sports Complex	0.686353
17	74.Football Pitches Pont de les Arts	0.686353
17	76.Mercavalència Wholesale Centre	0.686353
17	77.Barri de la Llum Sports Centre	0.686353
23	31.Shopping Mall El Corte Inglés-1	0.678278
24	32.Shopping Mall El Corte Inglés-2	0.678278
24	33.Shopping Mall El Corte Inglés-3	0.678278
24	34.Shopping Mall El Corte Inglés-4	0.678278
24	35.Shopping Mall El Saler	0.678278
24	36.Shopping Mall Gran Turia	0.678278
30	39.Shopping Mall Nuevo Centro	0.674286
31	56.Valencia Tennis Club	0.671716
32	46.Campus of Vlc. Catholic Uni.	0.666031
33	48.Church of Pilar	0.662039
34	5.North Train Station	0.661976
34	6.Joaquín Sorolla Train Station	0.661976
36	47.Reina Square	0.658047
37	58.Tennis Club "Sporting Tenis Vlc."	0.641550
38	19.Market of Campanar	0.638088
38	37.Shopping Mall Arena Multiesp.	0.638088
38	38.Shopping Mall Ademuz	0.638088
38	43.Rice Museum	0.638088
38	44.San Pio Museum of Fine Arts	0.638088

Table D.8 (continued) : Ranking of alternatives under scenario 8.

38	50.Presidency Office	0.638088
38	62.9 de Octubre Adm. Complex	0.638088
38	63.Bullring	0.638088
38	64.Bullfight Museum	0.638088
38	65.Vlc. Parliament (Les Corts)	0.638088
38	66.Palace of Arts	0.638088
38	67.Virg. del C. Betero Sports Centre	0.638088
38	68.Benimaclet Sports Centre	0.638088
38	70.Blasco Ibáñez Avenue	0.638088
38	71.BioParc	0.638088
38	75.La Hípica Event Garden	0.638088
54	10.Mestalla Football Station	0.606158
55	4.The Valencia Cathedral	0.600405
56	60.Real Club Náutico	0.593285
57	9.City of Arts & Sciences	0.574196
58	41.Lladro Museum	0.563120
58	45.Ceramics Museum	0.563120
58	49.Vlc. Museum of Modern Illustr.	0.563120
58	51.Museum of Fallas	0.563120
58	53.Public Garden of Benicalap	0.563120
58	54.Public Garden of Marxalenes	0.563120
58	55.Royal Gardens	0.563120
58	57.Municipality Cemetery	0.563120
58	59.Marina Real Juan Carlos I	0.563120
58	61.Handcrafts Centre	0.563120
58	72.Public Garden of Cabecera	0.563120
58	73.Public Garden West	0.563120
58	78.Provincial Public Library	0.563120
58	79.Octubre Centre of Ctp. Culture	0.563120
58	80.UV Library	0.563120
73	2.Market of Colón	0.522216
74	11.Palace of Congresses	0.504577
75	42.Valencia Institute of Modern Art	0.495236
76	12.Palace of Music	0.492330
77	13.Government Hall (Generalitat)	0.468379
77	14.Oceanographic	0.468379
77	40.Shopping Mall Fnac	0.468379
80	3.Basilica of the Virgin	0.417501

Table D.9 : Comparison of rankings under different scenarios.

ALTERNATIVES IN FIRST-PRIORITY GROUP	Original	Scn 1	Scn 2	Scn 3	Scn 4	Scn 5	Scn 6	Scn 7	Scn 8
27.Nazaret Sports Centre	1	1	14	4	1	31	1	1	1
30.Valencia City Stadium	2	2	1	1	2	1	2	1	2
1.Central Market	3	2	3	4	2	1	4	1	3
7.Valencia Central Bus Station	3	2	3	4	2	1	4	1	3
29.Stadium on Av. de les Corts Vlc.	5	2	7	1	5	8	2	1	5
8.City Hall (Ayuntamiento)	6	2	8	4	7	12	4	1	6
15.Malvarrosa Beach	6	2	8	4	7	12	4	1	6
18.UPV Vera Campus	6	2	8	4	7	12	4	1	6
16.UV Blasco Ibáñez Campus	9	2	12	4	19	12	10	59	6
17.UV Tarongers Campus	9	2	12	4	19	12	10	59	6
28.UV Sports Centre Av. Pr. Reig	11	2	14	4	23	31	4	1	11
25.Cabanyal Sports Centre	12	2	16	17	7	12	13	1	13
20.School of San José	13	2	17	17	12	22	13	1	15
21.Sports Centre in Garden Turia	14	2	19	4	53	31	10	59	11
52.Cabanyal Train Station	15	2	20	20	7	12	20	1	16
24.Alboraya Industrial Zone	16	2	21	20	19	12	20	59	13
26.Nazaret Football Pitch	17	2	22	17	23	31	13	1	17
69.Patacona Sports Complex	17	2	22	17	23	31	13	1	17
76.Mercavalència Wholesale Centre	17	2	22	17	23	31	13	1	17
77.Barri de la Llum Sports Centre	17	2	22	17	23	31	13	1	17
31.Shopping Mall El Corte Inglés-1	21	2	26	20	13	24	20	1	24
32.Shopping Mall El Corte Inglés-2	21	2	26	20	13	24	20	1	24
33.Shopping Mall El Corte Inglés-3	21	2	26	20	13	24	20	1	24
34.Shopping Mall El Corte Inglés-4	21	2	26	20	13	24	20	1	24
35.Shopping Mall El Saler	21	2	26	20	13	24	20	1	24
36.Shopping Mall Gran Turia	21	2	26	20	13	24	20	1	24
39.Shopping Mall Nuevo Centro		2	27	20	23	31		1	30
56.Valencia Tennis Club	28	2	35	17	43	62	13	1	31
46.Campus of Vlc. Catholic Uni.	29	2	36	40	5	8	33	1	32
22.Football Pitches Pont de Fusta	30	2	37	17	53	31	28	59	17
23.Vara de Quart Industrial Zone	30	2	37	17	53	31	28	59	17
74.Football Pitches Pont de les Arts	30	2	37	17	53	31	28	59	17
5.North Train Station	33	70	3	4	68	1	47	1	34
6.Joaquín Sorolla Train Station	33	70	3	4	68	1	47	1	34
58.Tennis Club "Sporting Tennis Vlc."	35	2	41	38	43	62	32	1	37
48.Church of Pilar	36	2	42	40	19	12	49	59	33
19.Market of Campanar	37	2	43	40	23	31	33	1	38
37.Shopping Mall Arena Multiesp.	37	2	43	40	23	31	33	1	38
38.Shopping Mall Ademuz	37	2	43	40	23	31	33	1	38
43.Rice Museum	37	2	43	40	23	31	33	1	38
44.San Pio Museum of Fine Arts	37	2	43	40	23	31	33	1	38
50.Presidency Office	37	2	43	40	23	31	33	1	38
62.9 de Octubre Adm. Complex	37	2	43	40	23	31	33	1	38
64.Bullfight Museum	37	2	43	40	23	31	33	1	38
65.Vlc. Parliament (Les Corts)	37	2	43	40	23	31	33	1	38

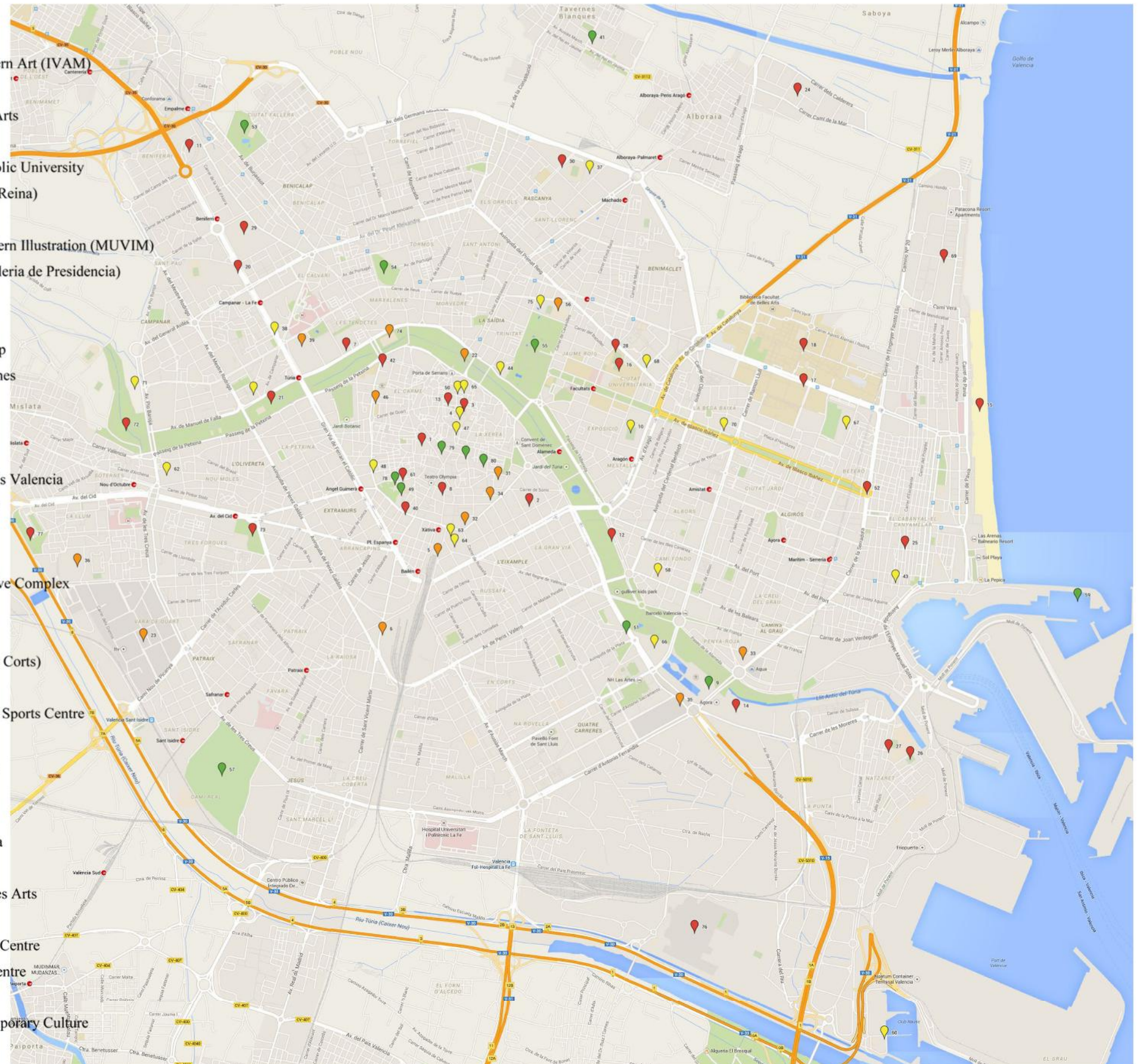
Table D.9 (continued) : Comparison of rankings under different scenarios.

66.Palace of Arts	37	2	43	40	23	31	33	1	38
67.Virg. del C. Betero Sports Centre	37	2	43	40	23	31	33	1	38
71.BioParc	37	2	43	40	23	31	33	1	38
75.La Hípica Event Garden	37	2	43	40	23	31	33	1	38
47.Reina Square	50	2	59	40	42	22	49	53	36
63.Bullring	51	2	61	40	53	31	49	59	38
68.Benimaclet Sports Centre	51	2	61	40	53	31	49	59	38
70.Blasco Ibáñez Avenue	51	2	61	40	53	31	49	59	38
10.Mestalla Football Station	54	73	1	1	73	1	63	1	54
4.The Valencia Cathedral	55	73	18	26	70	8	62	1	55
60.Real Club Náutico	56	2	64	64	43	62	54	1	56
41.Lladro Museum	57	2	65	65	43	62	55	1	58
45.Ceramics Museum	57	2	65	65	43	62	55	1	58
49.Vlc. Museum of Modern Illustr.	57	2	65	65	43	62	55	1	58
51.Museum of Fallas	57	2	65	65	43	62	55	1	58
78.Provincial Public Library	57	2	65	65	43	62	55	1	58
79.Octubre Centre of Ctp. Culture	57	2	65	65	43	62	55	1	58
80.UV Library	57	2	65	65	43	62	55	1	58
9.City of Arts & Sciences	64	65	60	40	72	24	72	59	57
53.Public Garden of Benicalap	65	2	73	65	60	62	64	59	58
54.Public Garden of Marxalenes	65	2	73	65	60	62	64	59	58
55.Royal Gardens	65	2	73	65	60	62	64	59	58
57.Municipality Cemetery	65	2	73	65	60	62	64	59	58
59.Marina Real Juan Carlos I	65	2	73	65	60	62	64	59	58
61.Handcrafts Centre	65	2	73	65	60	62	64	59	58
72.Public Garden of Cabecera	65	2	73	65	60	62	64	59	58
73.Public Garden West	65	2	73	65	60	62	64	59	58
11.Palace of Congresses	73	73	33	26	75	31	74	1	74
2.Market of Colón	74	79	11	4	79	7	79	59	73
42.Valencia Institute of Modern Art	75	59	65	65	71	62	73	1	75
12.Palace of Music	76	73	38	40	74	12	75	1	76
13.Government Hall (Generalitat)	77	73	43	40	75	31	75	1	77
14.Oceanographic	77	73	43	40	75	31	75	1	77
40.Shopping Mall Fnac	77	73	43	40	75	31	75	1	77
3.Basilica of the Virgin	80	80	34	39	80	8	80	1	80

APPENDIX E Priority Groups of Alternatives Marked on The Map

1. Central Market
2. Market of Colón
3. Basilica of the Virgin
4. The Valencia Cathedral
5. North Train Station
6. Joaquín Sorolla Train Station
7. Valencia Central Bus Station
8. City Hall (Ayuntamiento)
9. City of Arts & Sciences
10. Mestalla Football Stadium
11. Palace of Congress
12. Palace of Music
13. Government Hall
14. Oceanographic
15. Malvarrosa Beach
16. UV Blasco Ibáñez Campus
17. UV Tarongers Campus
18. UPV Vera Campus
19. Market of Campanar
20. School of San José
21. Sports Centre in Garden Turia
22. Football Pitches Pont de Fusta
23. Vara de Quart Industrial Zone
24. Alboraya Industrial Zone
25. Cabanyal Sports Centre
26. Nazaret Football Pitch
27. Nazaret Sports Centre
28. UV Sports Centre on Av. Primat Reig
29. Stadium on Av. de les Corts Valencianes
30. Valencia City Stadium
31. Shopping Mall El Corte Inglés-1
32. Shopping Mall El Corte Inglés-2
33. Shopping Mall El Corte Inglés-3
34. Shopping Mall El Corte Inglés-4
35. Shopping Mall El Saler
36. Shopping Mall Gran Turia
37. Shopping Mall Arena Multiespacio
38. Shopping Mall Ademuz
39. Shopping Mall Nuevo Centro
40. Shopping Mall Fnac

41. Lladro Museum
42. Valencia Institute of Modern Art (IVAM)
43. Rice Museum
44. San Pio Museum of Fine Arts
45. Ceramics Museum
46. Campus of Valencia Catholic University
47. Reina Square (Plaza de la Reina)
48. Church of Pilar
49. Valencia Museum of Modern Illustration (MUVIM)
50. Presidency Office (Conselleria de Presidencia)
51. Museum of Fallas
52. Cabanyal Train Station
53. Public Garden of Benicalap
54. Public Garden of Marxalenes
55. Royal Gardens
56. Valencia Tennis Club
57. Municipality Cemetery
58. Tennis Club Sporting Tenis Valencia
59. Marina Real Juan Carlos I
60. Real Club Náutico
61. Handcrafts Centre
62. 9 de Octubre Administrative Complex
63. Bullring
64. Bullfight Museum
65. Valencian Parliament (Les Corts)
66. Palace of Arts
67. Virgen del Carmen Betero Sports Centre
68. Benimaclet Sports Centre
69. Patacona Sports Complex
70. Blasco Ibáñez Avenue
71. BioParc
72. Public Garden of Cabecera
73. Public Garden West
74. Football Pitches Pont de les Arts
75. La Hípica Event Garden
76. Mercavalència Wholesale Centre
77. Barri de la Llum Sports Centre
78. Provincial Public Library
79. Octubre Centre of Contemporary Culture
80. UV Library



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