The Facility Planning Model

Introduction

The Facility Planning Model (referred to below as the Model) provides an objective assessment of the relationship between the likely demand for sports facilities in an area and their supply.

Initially developed with the University of Edinburgh, the model is currently maintained and developed in partnership with Sport England (used on licence from the University of Edinburgh) and takes into account the distribution of the local population and its demographic structure, as well as the capacity and availability of facilities in the area and their catchment areas. Using this data, the model is able to distribute demand from the study area to available facilities on the basis of catchment areas, linking people (demand) to facilities (supply) in terms of realistic travel patterns.

The Model provides an objective input to the planning process, assisting with decisions on the provision, upgrading and replacement of certain types of sports facilities (swimming pools, sports halls that are equivalent to at least 3 badminton courts in size and full size synthetic pitches). The data which it provides can help develop a strategic approach to the provision of facilities, but must be used with other information as part of a comprehensive approach to developing sport in the community.

Description of the Model

The Model has three key components:

Demand – the estimated number of visits from people wanting to use the facility in the normal peak periods per week (the times when most people want to participate and therefore when facilities are under the greatest pressure – for example after 5pm on weekdays and at weekends)

Supply - the aggregated capacity of those facilities available in the area during the normal peak periods per week to accommodate the estimated demand for each sport.

Catchment areas - the model uses a distance decay function to allocate visits from people, and is based on where people live.

How you can use the model

The model can be used for the following:

A) Local sport and recreation planning

- As an aid to developing a strategy for the most effective use of available resources
- The extent to which the existing pattern of provision of facilities is capable of accommodating the forecast demand
- As a method of helping to determine the most appropriate location and scale for proposed new facilities
- To assess the potential impact of proposed new facilities on local participation patterns; for example, the extent to which the users of an existing facility might transfer to a new one
- The impact of closing existing facilities
- The implications of population change and major new housing development for sports facility provision
- to consider whether changing the availability of the school estate could have an impact on how facilities are used and the available capacity
- to help identify the potential impact of management policies, for example in relation to opening hours
- to provide an input to feasibility studies for individual projects when estimating demand and therefore possible use
- Considering the implications of different synthetic pitch surfaces

However, the Model output must be interpreted with great care when used at the level of the individual project because of specific local circumstances.

B) Spatial policy planning

The Model can be used as part of the evidence base for the Local Development Plan process. Scottish Planning Policy requires LDPs to identify new sites for sports facilities where a need has been identified, and to provide good quality, accessible facilities in sufficient quantity to meet current and future demand. The Model can help inform this, in conjunction with a sports strategy and related sports facility strategy.

The Model can also be used to estimate the impact of planned or forecast changes in the population structure and distribution, for example as a result of major housing developments. As such it can assist in negotiating planning agreements for developer contributions to the provision of new or improved sports facilities.

Key Features of the Model

Relates demand to supply

It provides an objective assessment of the relationship between the likely demand for sports facilities and their supply in a defined area, based on the demographic structure and distribution of the local population and typical catchment areas for the facility types.

Uses research-based catchment areas

Information about typical catchment areas for specific facility types enables the link between demand (volume of visits) and supply (capacity of facilities) to be made in terms of realistic travel patterns and distances.

The model ignores administrative boundaries but takes account of road and path networks and barriers to travel, such as rivers and lochs.

Applies to a range of facilities

The Model can provide a consistent and objective analysis across the following facility types:

- sports halls (at least 3 badminton courts in size)
- full size synthetic grass pitches
- swimming pools

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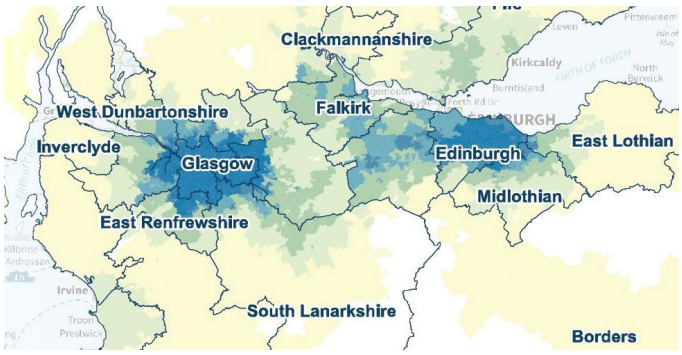
Adopts realistic model assumptions based on research and available data

All models are only as good as the information and assumptions on which they are based. Accordingly, we have sought to identify realistic demand parameters, travel choices and catchments. The Model parameters are kept under review to take account of changes in participation levels for the relevant sports.

Adopts a consistent, evidence-based developmental approach

An important feature of the Model is that it produces a number of outputs based on nationally derived participation rates. We think this represents good practice rather than an unattainable ideal because the demand parameters used have been determined practically and not theoretically.

The Model does not predict actual usage of those facilities: this is determined by a range of factors, not least management and promotional policies, programming and the quality or attractiveness of the facility concerned. Nonetheless, the Model will generate broad estimates of potential throughput which may be useful when considering policy options.



Map - shows driving catchment information for pools in the Central Belt - number of pools within a 20 minute drivetime

How are the model outputs determined?

A) Estimating Demand

Demand for a sports facility is a function of:

Population - The total number of people resident within the study area and its demographic structure. As the Model uses census data, the demand estimates relate only to the resident population and not visitors or tourists. It also means that the model assumes people will make their choice of sports facility based on where they live, which obviously is not always the case, especially in relation to those who work.

Population projections supplied by the National Records of Scotland are used to provide population estimates for years following the census year.

The Demand Rate - the proportion of people living in the study area who will wish to use the facility. As people participate in the sports covered by the Model differently due to age and gender, the model splits the population into a number of groups based on these two factors. It is appreciated that other factors, such as socioeconomic and health status, also have an influence in participation in sport.

Demand is based on a range of data sources, for sports halls and pools, mainly the Scottish Health Survey, Sport England's Active People Survey, and in relation to young people, the Taking Part survey. For synthetic pitches, demand was based on specific survey work undertaken in 2007. Given the change in the use of and technology relating to synthetic surfaces since that time, the nature of the demand for them has changed and the model should accordingly be treated with caution for this facility type.

Desired frequency of visit - how often they wish to visit their chosen facility type.

The proportion of peak time visits - the proportion of visits which arise in the normal peak periods per week. Just as demand for sport and recreation is not uniform throughout the population, neither is it uniform throughout the week or year. Instead, a high proportion of demand is nearly always concentrated into a limited number of peak hours per week when most people have the time and want to participate. These are the times of peak demand.

The demand in the peak period is based on the following formula:

$$D = P \times DR \times FV \times VNP$$

D = Demand (visits per week in the normal peak hours)
P = Resident population numbers in each of the age/gender bands
DR = The demand rate for each age/gender sector
FV = The frequency of visit for each age/gender sector
VNP = Proportion of visits in normal peak hours

B) Calculating Supply

The Model calculates the capacity of existing or proposed sports facilities to accommodate visits in the normal peak hours per week. There are two main components when calculating supply.

One time capacity - For many activities this is determined by the rules of the sport – for example, ignoring substitutes, a football pitch is used by 22 players. Other facilities such as swimming pools do not have a comparable fixed capacity but may be subject to constraints on the number of people who can use them simultaneously, for example for reasons of health and safety.

Activity time - This is the typical booking period or length of visit.

These components are used to calculate the number of visits each facility can accommodate each week in the normal peak periods.

The basic supply capacity calculation is:

$$S = (C \times HANPP)/ADV$$

S = Supply (visits per week in the normal peak hours)
C = At one time capacity
HANPP = Hours available in normal peak hours per week
ADV = Average duration of visit

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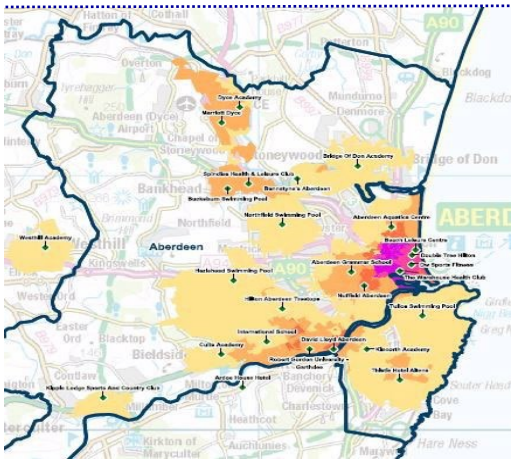
C) Catchment Areas

The catchment area is the link between demand and supply.

Through research we have identified typical travel times for facilities, and these are key inputs to the Model. Travel times are applied to the most recent ITN road and path network data from Ordnance Survey.

The model uses choice functions to determine how far a user will travel and which transport mode (walking, public transport by bus, or car) will be used; this is based on survey information and information in relation to car ownership levels. It also applies a distance decay function to how people will access a sports facility - the closer you live to it, the more likely you are to use it - this has a maximum travel time of 30 minutes for pools and halls and 90 minutes for synthetic pitches.

The Model distributes the demand from each Output Area (this is the lowest geographical level at which census estimates are provided) to all the facilities within whose catchment travel time it falls.



Map - shows walking catchment information for pools in the Aberdeen - number of pools within a 20 minute walktime

If there is more than one facility available to the residents of a particular Output Area, it does not assume they will always use the one nearest to their home. Instead, it seeks to allocate demand in proportion to available facility capacity. A large facility with a high capacity will therefore attract more demand than a small one with low capacity. This is the equivalent to assuming that users will prefer a quiet facility to a busy one so eventually all facilities will be equally busy at peak times in relation to their capacity.

The model also allocates demand to facilities based on a number of other factors:

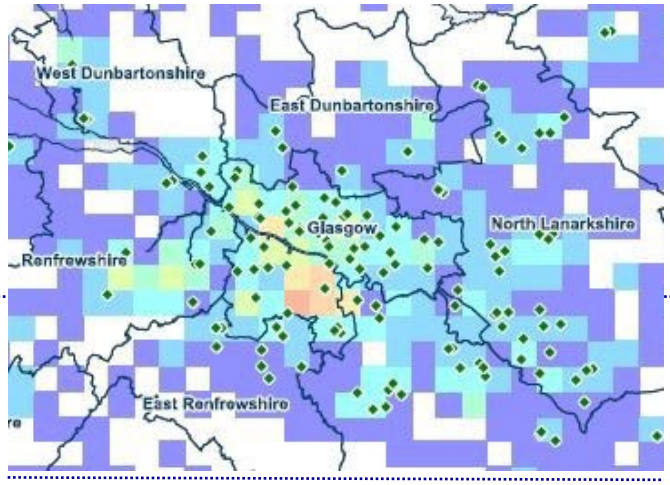
Age of facilities (for pools and sports halls) - The Model assumes that newer facilities, or those more recently refurbished, are more attractive to users and will allocate more of the demand to them rather than older facilities or those which have not been recently refurbished.

SIMD (Scottish Index of Multiple Deprivation) data (commercially run facilities only) - It assumes that those in more deprived areas as defined by the SIMD will be less likely to use these facilities.

Dedicated Sports Facilities (School halls only) - The model allocates a greater proportion of demand to dedicated sports centres, as it is assumed that these are more attractive to users than school facilities which are not run as a sports centres.

When all of the demand is allocated to those facilities within the travel times the model uses, it is possible to identify whether there is any 'unmet demand' i.e. demand which cannot be accommodated by existing facilities.

This demand can be either within the catchment area of existing facilities (i.e. these facilities are estimated to be `full to capacity' and therefore cannot accommodate all of the demand within their catchment) or outside the catchment area of existing facilities. In the former case it is possible to assess whether the existing supply can be increased, for example by changing opening hours or other management policies or extending the facility. In both cases it is necessary to consider whether there is a case for additional provision.



Map - shows patterns of unmet demand for sports halls in the central belt.

Running the Model

Here are some issues to consider before the model is run:

- Identify the geographical area to which the model results and subsequent policy decisions will apply - the 'policy area'. It will usually be defined by local government administrative boundaries. It will normally make sense to include surrounding Council areas, especially in urban areas, to take account of movement between Council areas.
- Key is having current and accurate facilities information. We can supply you with data we hold but checking this is crucial, especially in relation to such matters as: sizes; age; opening hours.
- Decide what years you want considered – the model uses current census information and the relevant population projections, we would recommend that population projections be used to consider the impact of future changes to the population profile.
- Consider what scenarios you want to model – we would recommend keeping the scenarios to the minimum required.

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The Model Results

The Output

The standard Model output is a series of tables and maps

Map outputs

- Location and (walking and driving) catchments
- Demand
- Unmet demand
- Aggregated Unmet demand
- Import and Export
- Share of supply in relation to demand

Table Outputs – these contain a variety of outputs at Council level and in relation to facilities themselves, including:

- For each run detailed information in relation to predicted: demand; met and unmet demand; used capacities; annual throughput; import and export information.
- Facility summaries which have information on a facility basis in relation to predicted used capacity and annual throughput.
- Run summaries which compare the different Model outputs between the different scenarios considered.

Below are examples of table outputs, examples of map outputs are shown previously in the datasheet.

Table 5 - Unmet Demand	Local Authority
Total number of visits in the peak, not currently being met	2152
Unmet demand as a % of total demand	8.7
Equivalent in Courts - with comfort factor	13.29
% of Unmet Demand due to ;	
Lack of Capacity -	10.6
Outside Catchment -	89.35
Outside Catchment;	89.35
% Unmet demand who do not have access to a car	87.15
% of Unmet demand who have access to a car	2.2
Lack of Capacity;	10.6
% Unmet demand who do not have access to a car	10.37
% of Unmet demand who have access to a car	0.28

Table Output – shows unmet demand information

Table 6 - Used Capacity	Local Authority
Total number of visits used of current capacity	3938
% of overall capacity of halls used	40.8
% of visits made to halls by walkers	13.8
% of visits made to halls by road	86.2
Visits Imported;	
Number of visits imported	1431
As a % of used capacity	36.3
Visits Retained:	
Number of Visits retained	2507
As a % of used capacity	63.7

Table Output – shows used capacity information

Interpretation of the Model Results

sportscotland will provide you with a report which interprets the outputs. When interpreting the Model outputs it is essential to remember the following limitations:

- It offers a logical analysis of a dynamic situation based on a number of key assumptions.
- Although the Model provides an objective input to the planning process, it is not a substitute for a comprehensive sports facilities strategy. It is a tool for investigating supply and demand in order to assist policy formulation for the provision of facilities, not a replacement for such a policy document.
- The Model output is not predictive. Its purpose is to prescribe an appropriate, and hopefully achievable, level of community sports provision for identifiable geographical areas.
- It is appropriate for use in connection only with facility planning and not sport planning – it does not offer guidance on areas such as sports development. Nonetheless, it can contribute to the appraisal of the use and performance of existing facilities.
- If appraisal highlights a significant gap between the estimated demand and actual throughput at under-used facilities, this may point to the need to undertake promotional or sports development initiatives or it may be that the condition or management of existing facilities are constraining participation.
- It is essential to identify key issues and set the Model results in a policy context. Appropriate courses of action must be identified and evaluated, some of which will not relate to facility provision but to other issues such as management or sports development initiatives.
- The Model output must be interpreted in the light of local circumstances and aspirations.

Access to the Model

The FPM was developed initially by sportscotland and University of Edinburgh, it is now developed under licence from the University in partnership with Sport England and its ongoing copyright is owned by sportscotland and Sport England.

Conclusion

If you would like further information about the Model and its uses for your sport or local authority area, please contact our planning team - eplanning@sportscotland.org.uk.