

Isochrones: Analysis of Local Geographic Markets

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The identification of the geographic scope of a local market can be performed using various methods. One method, which appears to be gaining favour in recent years from lawyers, competition authorities and economists, is the use of isochrones.

What is an Isochrone?

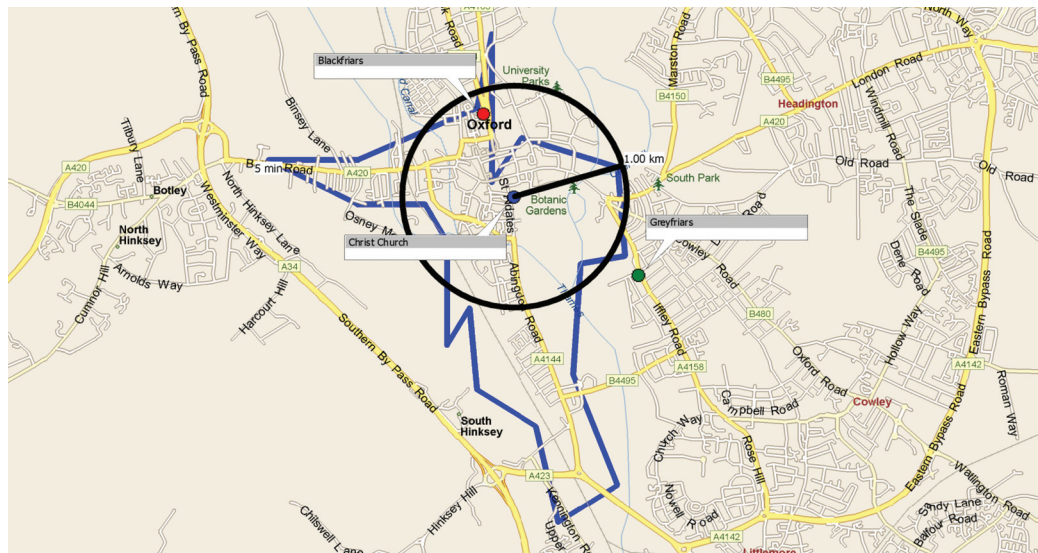
The word isochrone is of Greek derivation (*iso(s)* – the same) and (*chronos* - time). It is a line on a chart or map connecting points of the same time. In competition analysis, the line connects points of equal travel time.

The map in diagram 1 identifies three Oxford university colleges. Centred on Christ Church College (in blue) is a five minute drive-time isochrone (also in blue). The isochrone shows that Blackfriars is within five minutes travel by car from Christ Church College, while Greyfriars would take slightly longer to reach.

An isochrone is easily distinguishable from a line connecting points of equal distance. In diagram 1, an iso-distance line is drawn (in black); in this case the radius of the circle is 1 km.

Diagram 1

Oxford University Colleges



How is an Isochrone Constructed?

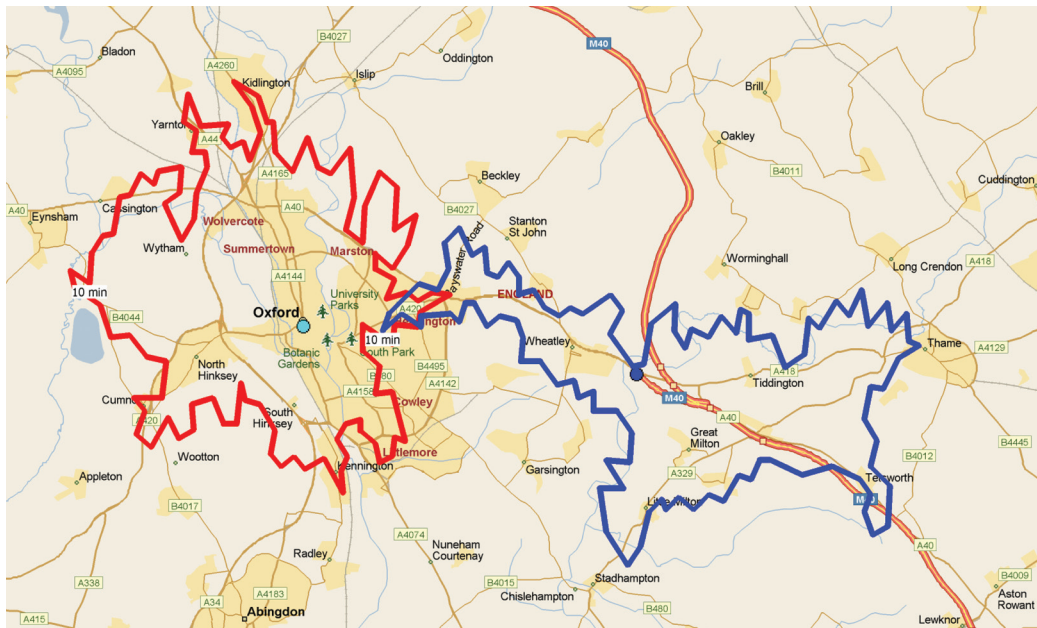
Specialist software such as Microsoft's MapPoint® exists to help construct isochrones.

Depending on the sophistication of the software, account can be taken of the type of road being used, how fast one can travel, whether the road is in a non-urban, urban or large urban area, and even the time of day of travel. These parameters are likely to have important effects on the size and shape of the isochrone.

For example, diagram 2 shows the stretch that can be caused by the road network. Using two hypothetical locations, one based in the centre of Oxford, the other an out-of-town site. The central town store's 10 minute drive-time isochrone (in red) is relatively rounded, reflecting a somewhat similar and even distribution of roads in the area. In contrast, the out-of-town store's 10 minute drive-time isochrone (in blue) is stretched along the few roads and particularly along the motorway south-east of the store. It can also be observed that the isochrone of the out-of-town store stretches into the town, whereas that of the central town store barely stretches out. This isochrone stretching, due to the type (speed) of road and shape of the road network can offer useful insights to the geographic market definition.

Diagram 2

Stretch Caused by Road Network



Diagrams 3 and 4 show the effect on the size of an isochrone depending on whether the area in question is urban or non-urban.

Diagram 3



Diagram 4



The difference between urban and non-urban areas is principally the average travel speed. For example, diagram 3 shows a non-urban area, where the travel speed on average is expected to be approximately the lawful maximum for the road in question. In diagram 3, the isochrone is centred on the English village of Bridgnorth, for which the population density is less than one person per hectare. The 10 minute drive-time isochrone's point located furthest away from the centre is 7 km. In contrast, diagram 4 is an example of an urban area with the 10 minute drive-time isochrone being centred in central London. The isochrone's furthest point from the centre is 2.74 km away.

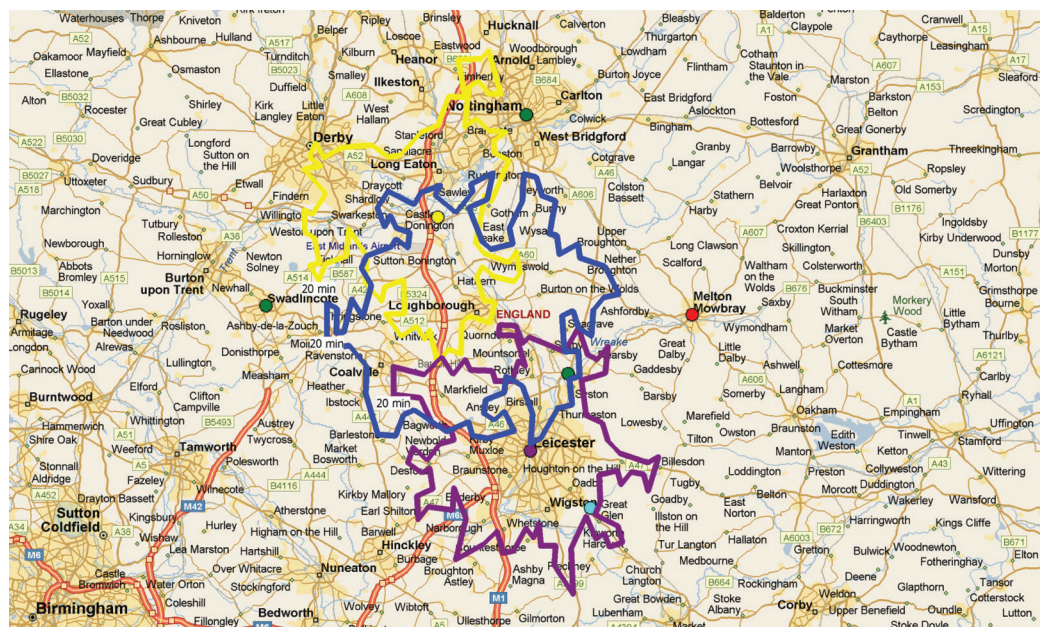
How is an Isochrone Used?

Isochrones can be used in increasingly complex ways in an attempt to obtain a more robust response to the question: What is the geographic market? The starting point, and one that has a fundamental effect on the size of the isochrone, is determining the travel time that should be used. The travel time will vary, depending upon the product market. For example, in the last few years the UK's Office of Fair Trading (OFT) has used isochrones in relation to mergers concerning betting shops, cinemas, book shops, DIY stores and supermarkets. Various tools are used to determine the travel time including: views of the parties to the merger, consumer surveys, information from the parties' customer loyalty data base, views of competitors and third parties, and even officials visiting sites and driving in the area to get a feel for what is appropriate. Commonly, a travel time is chosen, and then a shorter and/or longer time is used as a sensitivity check. For example, in its consideration of recent mergers between cinema exhibitors (theatre owners), the OFT adopted a 20 minute isochrone with a 30 minute isochrone used as a sensitivity check.

The next step is to decide where the isochrone should be centred. The starting point is the target site. The catchment area for that site will then be determined. If the purchaser already has a site within the isochrone, then it is presumed that the sites compete. If the purchaser has a site situated outside but close to the isochrone, an additional isochrone can be centred on this outlying site. The area of overlap between the two isochrones indicates the area where customers had a choice of at least the target's and the purchaser's sites, and each were in reasonably equivalent travelling time. Finally, the purchaser's site and its corresponding isochrone may be close to, but not overlap with, the isochrone centred on the target site. In this case, it may be appropriate to centre an isochrone on the population of customers that lies between the two sites. This population centred isochrone identifies which is the site closest to that population. Diagram 5 provides an example of the above exercise.

Diagram 5

Isochrone Overlap

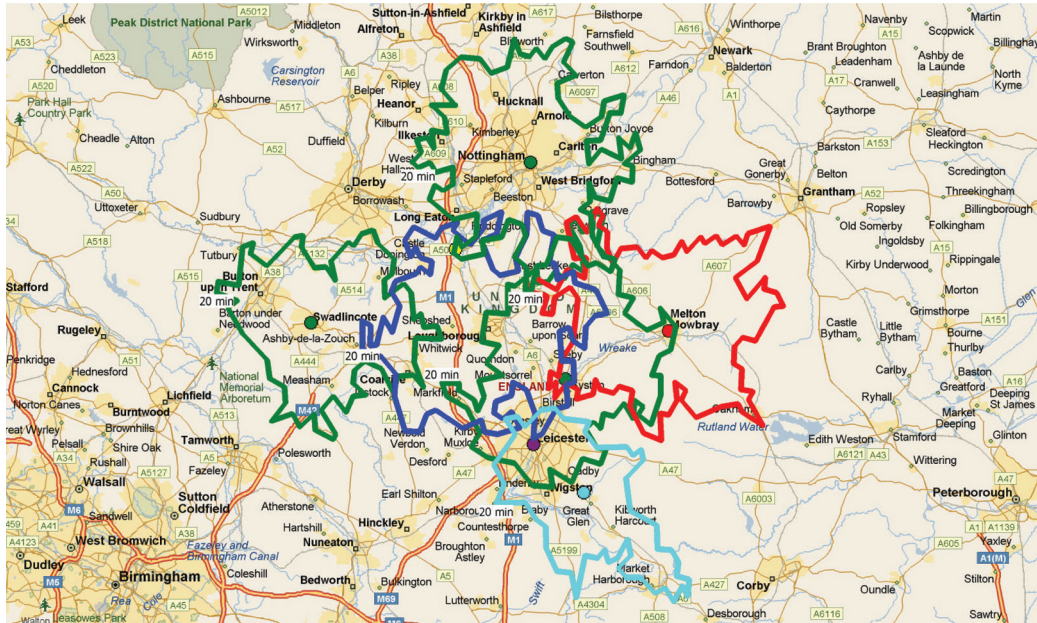


Purchaser site (purple) in Leicester wishes to acquire the target site (yellow), just south of Nottingham. The two sites' 20 minute drive-time isochrones do not overlap. Assuming customers travel no more than 20 minutes to a site, this might suggest there is no competitive interaction between the sites. However, there is a clear population centring question, given that Loughborough lies between the two sites. A 20 minute drive-time isochrone centred on Loughborough includes the target site, but not the purchaser site. However, there is significant overlap between the population centred isochrone (blue) and the isochrones of the purchaser (purple) and the target (yellow). These factors indicate that further analysis is required.

Diagram 6 considers the other sites in the area (green, red and turquoise). The 20 minute isochrones centred on these sites show the following: First, the isochrones of the green and turquoise competitors include the purchaser (purple) and target (yellow) sites, suggesting they have a strong competitive relationship with the latter. Second, isochrones of the green and red competitors, particularly the former, overlap with the population centred isochrone (blue), suggesting that the customers of Loughborough have choices of sites other than the purchaser (purple) and target (yellow).

Diagram 6

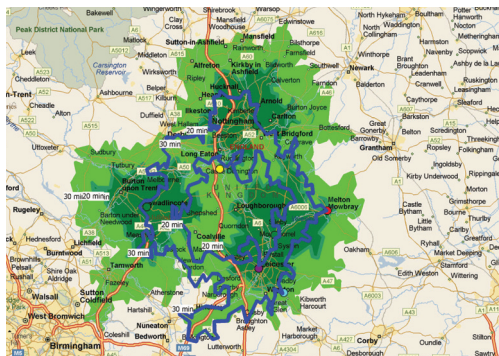
Isochrone Overlap



Finally, a sensitivity check using a 30 minute isochrone can be used, which can be centred on all of the points used for the 20 minute isochrone. Diagram 7 shows a simplified version, because the isochrones for the red and turquoise competitors are not shown. What this isochrone analysis suggests is that the customers in Loughborough, namely in the area between the sites of the purchaser and the target, are adequately served at least by the green competitor's sites.

Diagram 7

Isochrone Overlap Simplified



The result of the analysis might suggest that yet further analysis is required. The present example might suggest that post-transaction the market, or a substantial part of it, would only be served by two competitors (green and the combined purple/yellow). Thus, by using isochrones, focus can be put on the inter-competitive relationship between, on the one hand, the red and turquoise competitors, and on the other hand, the sites of both the green and combined purple/yellow sites.

Do Isochrones Provide the Answer?

Unfortunately, isochrones are not a definitive method in determining the local geographic market. They are, however, a useful tool for identifying at least the principal likely competitors, and can provide insight to the likely degree of competitive interaction.

One reason why isochrones do not capture all the competitors is that the edge of an isochrone is not a “bright line” test for excluding a site. This has been recognised, for example, in a report by the UK’s senior competition authority, the Competition Commission (CC),¹ where the CC accept that a store just outside an isochrone might compete/offer choice to stores inside the isochrone.² Increasing the isochrone by either one or two minutes (as per the CC’s *Safeway* report) can have a material effect on the competitive outlook for a merger, because of the potential to increase or decrease the number/size of competitors.

Another reason why isochrones do not provide a definitive answer is that their construction is based on assumptions that may not be correct. Small changes to the average drive time, or to the time of day used for the calculation, can significantly affect the size of the isochrone. Population centring also presents a problem. It is undertaken to understand the competitive relevance of sites to customers from the perspective of where customers are based. This is reflective of the true position, but strictly speaking would need to be undertaken per customer, which is clearly not practical. However, the population centring exercise has been used by competition authorities to determine whether the population in question is adequately protected. While that objective is understandable, it may lead to competition authorities seeking to protect small pockets of the population. This may be in conflict with the jurisdictional ambit of the competition law being applied. For example, while the CC’s *Safeway* report does not provide sufficient details to understand the reasoning of the CC on this point, it appears that, using data from the UK’s Office of the Deputy Prime Minister and as a result of comments by *Safeway*, the CC identified that a population of 5,000 could be a population centre for a population centring exercise. Arguably all of those 5,000 people were relevant to the market, because everyone goes to the supermarket, or would at least be directly affected by that proposed transaction concerning supermarkets. For other markets, it may not be the case that all 5,000 people would be affected by a proposed transaction. For example, in the cinema exhibition sector, research indicates that 55 percent of the UK population does not go to the cinema, and a further 18.9 percent only go 2 to 3 times a year.³ Consequently, only 26 percent of the population can be said to be regular cinema attendees. On these figures, negative effects of a transaction on a population of 5,000 people would be felt by 1,300 people. In an even smaller market, for example one that is used by only 5 percent of the population, negative effects of a transaction on a population of 5,000 people would be felt by only 250 people.

Finally, despite the limits identified above, isochrone analysis is a very useful filtering technique to reduce what would otherwise likely be a burdensome level of investigation, both for the parties and the competition authorities. For example, the OFT’s analysis of horizontal

mergers between cinema exhibitors has used the filtering technique that a merger that does not reduce the number of competing cinema chains within an isochrone to below four is *prima facie* not likely to create competition concerns in those areas and no further analysis of those areas is undertaken by the OFT. This filtering technique allows the parties and the authorities to focus on sites that may raise concerns, and devote resources to analysing those sites, using more in-depth tools such as consumer surveys, gross margin analysis, customer location data, price analysis and analysis of non-price competitive factors. ♦

Endnotes

- ¹ The Competition Commission's Report, September 2003, *Safeway plc and Asda Group Limited (owned by Wal-Mart Stores Inc); Wm Morrison Supermarkets PLC; J Sainsbury plc; and Tesco plc* (Cmn 5950).
- ² Paragraphs 5.311 and 5.312 of the Report.
- ³ Source: Target Group Index (TGI).