A NEW APPROACH

A standard approach to warehouse location is to start with the centre of gravity of demand, and to model various options at or near the centre. The centre of gravity (CoG) method is technically unsound, but the error involved in using it in our densely populated island is generally small. As companies look increasingly to distribution strategies for Europe, the potential error becomes quite serious.

The fallacy of the CoG method is easily demonstrated. The simplest case is a warehouse with two demand points. If the demands are for 100 truck loads in Edinburgh and the same number in London, then the CoG method suggests a site halfway between the two, near Leeds.

If demand in Edinburgh increases by 10 truck loads, CoG shifts the 'ideal' location north a little, to Wetherby. In the first case the answer is incomplete, in the second it's plain wrong. Where the demand is equally balanced, the truck has to complete 100 round trips starting from base, running to Edinburgh, back to base, on to London and back to base again. Any base location along the route will incur exactly the same mileage. The warehouse location can be chosen freely anywhere along the 450 mile corridor. Grants, rents, rates and labour costs and quality dominate the decision, not CoG. The second case is even more serious. Delivery of the first 200 truck loads 'cancels out' — an important concept which we will return to in a moment. Providing we stick to the line of the MI/Al, the ideal location is arrived at by considering the first 200 truck loads as if they don't exist. Faced with the remaining 10 truckloads, there is only one possible location — as near to Edinburgh as land and labour considerations will allow. Technically, these last 10 loads are the 'un-paired, uncancelled' ones. Transporting them from Wetherby to Edinburgh incurs 10 round trips at 450 miles a time, a 4,500 truck mile penalty over the optimum location.

As companies look to a European Distribution Strategy, Consultant Bill Brockbank argues a fresh approach to the warehouse location problem.

The idea that equal demands at opposite ends of a delivery area cancel out, rather than simply balance out, is a powerful one. By progressively cancelling out equal demands from opposite extremities of the country, we can draw 'contour lines' of equal warehousing potential. Contouring is not only highly accurate, it also encourages the input of straight commercial logic.

In these case studies, the contour approach led to sites which would never have been considered using CoG. After all, what location planner faced with a computer model giving Leeds as a centre is going to look as far afield as Edinburgh?

CASE A

A distribution operation had a CoG near Belper in Derbyshire. We had run across a nearby location before, and had meticulously modelled sites at every motorway access point in a semi-circle from Stafford to Sheffield. In this particular case, the operation showed an extraordinary gap in demand stretching from Wales right through the Midlands. A particularly vigorous operation in Scotland pulled our 95% contour — the ring of locations containing the uncancelled 5% of demand — far further north than anyone had considered practical. Sites north of Manchester proved to have transport costs comparable with those in the Midlands. The rent and rate savings through choosing the less fashionable location were sufficient to buy, crew, fuel and run two drawbar combinations *for ever*. It would have required a quite astonishing growth of demand in the Midlands to nullify the cost benefits of the M62 corridor.

CASE B

A fast growing, London-based manufacturer considering a second site had turned its eyes enviously to the grants, land prices and labour skills of the North West. While the two site model is slightly different from the single site, exactly the same principles are used.

Progressive cancellation of paired outlying demand drew an 'hourglass' shaped contour. This led us to consider a quite extraordinary solution — that the new plant should be in Calais! Very significant flows of finished goods to (and raw material from) France dominated the picture after the progressive pairing and cancellation of demand from the extremities

CASE C

An importer bringing goods through Southampton distributed them out of Manchester. A quirk of import freight pricing through the scheme ports made this (at that time) more cost effective than it sounds. Cost effective it might be, at least on inbound costs. Logical it isn't. By the time a stream of northbound container lorries reaches Newbury, 50% of the goods have already been driven past their intended customers. Southampton as a possible DC site was rapidly added to the 'what if' distribution model.

THE EUROPEAN PICTURE

Our three case studies showed that the 'contours of equal warehousing opportunity' in this country can be 100, 400 or 150 miles across, depending on the circumstances. In mainland Europe, however, they can be larger than an entire country.

The CoG of the EC population is around Chamonix. Chamonix may be many things to many people, but as a distribution centre it rivals Lundy Island. The French/Swiss/Italian border shares some of the features of Belper, including the tiny proportion of total consumption which takes place within a reasonable distance of the CoG. Since Switzerland isn't even a member of the EC, the risk of putting a Distribution Centre in or next to an area of low demand, is that much greater. The costs of a wrong decision are horrendous. In case study 'B', the costs of going outside the 95% contour were £1,000 a year *per mile*. This for a £20m company struggling to make 1% net return on sales. In theory, there's a 'safety net'. Most warehouse locations are confirmed by detail route modelling. In practice, this provides a false sense of security. Firstly, detailed route planning is itself an approximation. With 20.92 billion possible ways to plan a single

16 drop route, the computer can't and doesn't look at every possible option. They do a pretty good job, but the control of route shape (the so called 'petal') is still down to the skill and experience of the operator.

Most seriously, the quality of the routes being modelled only reflect the quality of the starting assumptions. At best, detail route planning will prevent the location from ending up — to quote an Americanism — 'at the junction of two dead end streets'. However, nothing in the detailed routing will force the planner looking for sites around Whitchurch to start his search in Calais! Very much the opposite — total costs will increase as he or she experiments with sites south of Whitchurch, and they will rapidly focus on more northerly prospects for the position of the distribution centre.

On the European scene, use of the cancellation method will throw up possibilities that you, your competitors, the labour market and the land speculators would otherwise miss. The inclusion of Greece, Spain and perhaps Turkey in the CoG calculation is pulling the 'Euro-CoG' further South and East than any defensible logic. Those who continue to use the CoG method will turn the Swiss French border into a sort of 'Euro Keynes'. Those who don't will be building north of the Rhine gorge, into Belgium and the Alsace.

Author notes

Bill Brockbank has been involved in logistics across the Northern hemisphere for 30 years. An engineer by accident and mathematician by instinct, he has developed and published new methods for forecasting slow movers (Institute of Business Forecasting conference, Chicago), safety stock (Cranfield Supply Chain Knowledge Conference) and retail shelf fixturing (Cranfield)

Concerned at the poor communication between logisticians and their peers and 'customers' he founded Supply Chain Tools Ltd to encapsulate and animate supply chain principles in engaging, interactive and graphic ways.

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