CENTRAL PLACE THEORY AND PLANNING

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Dissertation for the degree of M. Phil.

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ACKNOWLEDGEMENT.

I would like to thank Miss Jean Forbes for commenting on the early stages of this dissertation and for reading through some of the early drafts.

CONTENTS.

MAPS AND DIAGRAMS.

-INTRODUCTION-

This disseration is concerned with the review of some actual and potential contributions that Central Place Theory is able to make to Town and Regional Planning. Although the theory was developed outside planning, mainly in the realms of geography and economics, it is of relevance to it. The special importance of Central Place Theory to planning, lies in the fact that no other body of theory in any of the academic disciplines attempts to provide a consistent framework wherein the spatial dimension of many different phenomena can be related to a wider spatial context.

It is important that this aspect should receive attention, as the spatial input, in the form of land, is basic to all Town and Regional Planning. All physical development, whether it has an economic, social, cultural or other function, does have a definite location and has an effect on the area of land around about it. The correct location is therefore important if the maximum benefit of these 'spread effects' is to be obtained. This is essentially what Central Place Theory is about, and this is its justification as a theory appropriate to Town and Regional Planning.

The structure of this paper is straighforward. Chapter One is concerned with the basic theory, while Chapter Two reviews and comments upon the nature of the evidence which is quoted in support of Central Place Theory. Chapter Three attempts to identify some quantitative techniques which would be of use in the practical application of the theory. Chapter Four presents some basic considerations which should be borne in mind when applying Central Place Theory, while the next two Chapters discuss, often in argumentative terms, two basic areas in which Central Place Theory may be applied. The first is concerned with the field of retailing, while the second is concerned with Regional Planning. A short conclusion then follows.

Chapter One. Central Place Theory.

The basis of Central Place Theory was laid down by Walter Christaller in his book 'Die Zentralen Orte in Suddeutschland', (1,1) published over thirty years ago. The main points of his theory are summarised below. Underlying all is the assumption that in the process of distributing goods and services, contact has to be established between the 'producer' and the consumer, and that this contact will take place in a town or 'Central Place' where the producer will have his premises.

The theory is based on the observation that, those goods and services which are in most frequent demand will be provided from a large number of sources, conveniently placed in relation to the market because people will not be willing to travel large distances for the purchase of these goods. Hence the term 'convenience goods' or in Christaller's own terminology 'low order goods'.

In the case of the less frequently demanded goods it is not possible, because of the smaller demand, to establish as many outlets. The provision of these goods therefore tends to be through those larger centres which are the most easily accessible to the largest number of people. These goods Christaller termed 'higher order goods'. These larger cities also of course provide the people in their immediate vicinity with all of those lower order goods found in the lower order centres.

Two points follow. As people will travel different distances to

obtain different goods and services (and Christaller assumed that people would travel to the nearest appropriate centre), goods could be considered to possess a 'range' of attraction, measured in terms of distance. Furthermore these goods can be ranked in terms of their different ranges. This ranking will produce a distinct clustering around certain ranges and thus a marked hierarchy will result, as distinct from a more regular grading. This in turn is reflected in a hierarchy of central places. The more services a centre provides the more centrally located and the larger it will be. This is in line with Christaller's belief that the main function of towns and cities is to act as centres for the provision of goods and services.

In developing the theory further, Christaller was to bring in a further set of assumptions, as a result of which it is possible to give a value to the range of a good and therefore to calculate its market area.

If it is taken as given that good x has a range of y miles, it is possible to draw a circle around the central place, p, which provides good x, (it is assumed that customers would not travel a distance greater than y to obtain x). This therefore would determine the market area of centre p in terms of the supply of good x.

The range of a good is also that distance which would define the optimum size of the market for any good. Hence the location and spacing of central places are important.

Christaller was of the belief (and here he introduces further

assumptions) that assuming a uniformly flat plain with a uniformly distributed population, with the same income and expenditure patterns, competition would result in the optimum allocation of central places, in that no central place would have a market area greater than, or less than that needed to yield normal profit.

Thus so far we have a system of circular market areas which are self-contained, in that people will not shop outside the particular market area as defined by the range of the good in question. If these circular market areas are as closely packed on a surface as far as possible, but without any overlapping then parts of this area will not be served by any market centre. In order that this should not be so, Christaller moved the market centres closer together until all the areas formerly outwith the circular market areas were just covered. Hence the minimum amount of overlap was allowed. The process is shown in diagrams 1,1 and 1,2.

Remembering the assumption that all consumers travel to the nearest central place the logical shape of the market area now becomes a hexagon. Theoretically the spacing of the settlements should now be slightly adjusted so that the new hexagonal market area is equal to the previously circular one, so that the principle of normal profit might still operate.

On the basis of the previously postulated hierarchy of central places, it follows that there exists a hierarchy of hexagonal shaped market areas attached to the centres.

Christaller proved that it was possible to vary the relationship

of the central places to each other so that the ratio of low to high order centres varied. But whichever relationship exists the ratio, once established, will always remain constant throughout the hierarchy. This is known as the fixed-k value, where k is the numerical expression of those centres dependent on a centre in the tier immediately above themselves in that particular arrangement.

Christaller recognised a number of arrangements, each one organised according to strict geometrical principles. Referring once more to diagram 1,2, if the centrally located settlement A is taken to be of higher order than the B settlements, the latter become the dependent centre of A. If the diagram is now enlarged to cover settlements located elsewhere, some of which are equal to A, it will be seen that each dependent centre, B, is dependent on 3 A centres. Put another way, each A centre has a one-third share in the ring of 6 B centres which surround it. (see diagram 1,3).

The k value is therefore $6 \times 1/3 + 1 = 3$, remembering that each A centre also fulfills the function of a B centre; hence the addition of one unit to the $6 \times 1/3$ units. This k-3 arrangement is known as the marketing principle.

There are two other principle arrangements. The system of central places can be arranged according to the transport principle, where $k = 4$. Here each dependent centre about A is shared with only one other equivalent centre, hence the value of B to A is $\frac{1}{2}$ unit. The important aspect of this arrangement is that the maximum number of settlements

are located on the main transport routes which radiate outwards from the major centre. This principle is illustrated in diagram 1,4.

The other principle arrangement is the k-7 system. In this instance every dependent centre about A is fully within the sphere of control of A. This is known as the administrative principle and is illustrated in diagram 1,5.

The Contribution of Losch.

Losch, writing subsequent to Christaller agreed that the hexagon was the most efficient market area, but disagreed where the fixed-k hierarchy was concerned. Losch started by assuming a number of villages arranged evenly on a uniformly flat plain according to a lattice arrangement.

Taking the lowest order good, he ascribed the ideal hexagonal market area for this good about one centre. Subsequently all those goods whose market threshold varied from one to three times that of the most basic (i.e.'lowest order') good would arrange themselves about the central point in a k-3 arrangement, while those with a basic threshold of three to four times that of the original good would arrange themselves according to a k-4 network. This process would be repeated until all the possible k values had been fulfilled.

The different hexagonal market areas which are related to these different k arrangements were then aligned, still about the original central place, so that the maximum number of dependent centres coincided. Therefore central functions would tend to agglomerate in a number of

settlements (see diagram 1,6). However in contrast to Christaller not all centres would provide all those goods which had a lower range than the highest order good they themselves provided. The one exception to this rule was the original centre which would become a metropolis by virtue of it being the focal point of all the different k-systems.

As the rest of the centres would perform different functions, an element of specialisation is thus introduced into the settlement pattern, or as Losch termed it, the 'economic landscape'. It is this belief that distinguishes Losch's contribution from that of Christaller.

The Contribution of Berry and Garrison.

Since the original formulation of Central Place Theory by Christaller, and especially since his book was translated into English, many scholars have attempted to test his theory and revise it.

Outstanding in this field have been Berry and Garrison (1,3) who have re-written Central Place Theory in terms of market thresholds and the ranges of goods. In doing so, they dropped many of Christaller's ideal assumptions including that of the uniform plain and evenly distributed population. In doing so, they have moved away from the strict spatial geometry of Christaller and Losch.

In its re-written form the 'range of a good' ceases to be a fixed distance but takes on an upper and lower limit. Hence the ranges of a particular good or service.

The lower or minimum range is that distance required to define a market area which will provide a supplier with the minimum sized market (or threshold) sufficient to tempt him to set up in business and provide him with normal profit returns on his investment.

At the other end of the scale, the maximum range of a good is that distance where it becomes more convenient for the customer to use another centre or do without. Consequently any population served by a supplier above the minimum range will yield him with greater than normal profit, a situation which would not develop under Christaller's ideal assumptions.

As Christaller's assumptions concerning the uniform plain and distribution of population and the fixed range are all dropped the idea of the hexagonal shared market area therefore collapses.

The virtue of the Berry and Garrison approach is that by placing emphasis solely on the nature of the relationships involved it places the study of the location and size of commercial service centres on a more realistic basis and thereby enhances the potential of Central Place Theory as regards practical applications in this particular field.

Conclusion.

Christaller's theory is based upon the observation that it is the norm with most service industries that for there to be a transaction the consumer must go to the producer. Thus necessarily a spatial consideration is involved and on this ground it can be claimed that

the theory is essentially geographic in nature. But it is also an economic model in the classical tradition as it shows the way towards an optimal distribution of resources in the tertiary sector. Duplication of investment is ruled out, only normal profit can be made, and customers' travelling time, which is essentially non-productive, is kept to a minimum.

The most ambitious of Christaller's claims for his theory was that it was based on laws which would explain the number, function and spacing of settlements in any given region. Christaller was able to put forward his claim because he believed that the raison d'etre of settlements was to act as central places from which goods and services were distributed.

It was a large claim and was open to attack. Most critics pointed out that while the theory (as originally conceived by Christaller) could conceivably be used to explain the settlement structures of non-industrial areas, it would not do so in an industrial environment which created its own forms of settlement pattern.

It was on these grounds that suggestions were made that Losch's economic landscape was more appropriate for industrial regions, particularly as Losch explicitly considered the locational patterns of industry. (1,4). It is,however,a fact that most subsequent studies using Central Place Theory have paid homage to Christaller as his work was primarily concerned with the tertiary economic sector, and it is in this field that Central Place Theory has most frequently been used.

Berry and Garrison were concerned almost entirely with this particular sector when they re-wrote Christaller's Theory in terms of thresholds and ranges of goods. Although they put Central Place Theory on more solid foundations for the purpose of analysing the patterns of retail trade and commercial services, they did so at the cost of sacrificing Christaller's more ambitious claims that his theory represented a lawful explanation of the overall settlement pattern.

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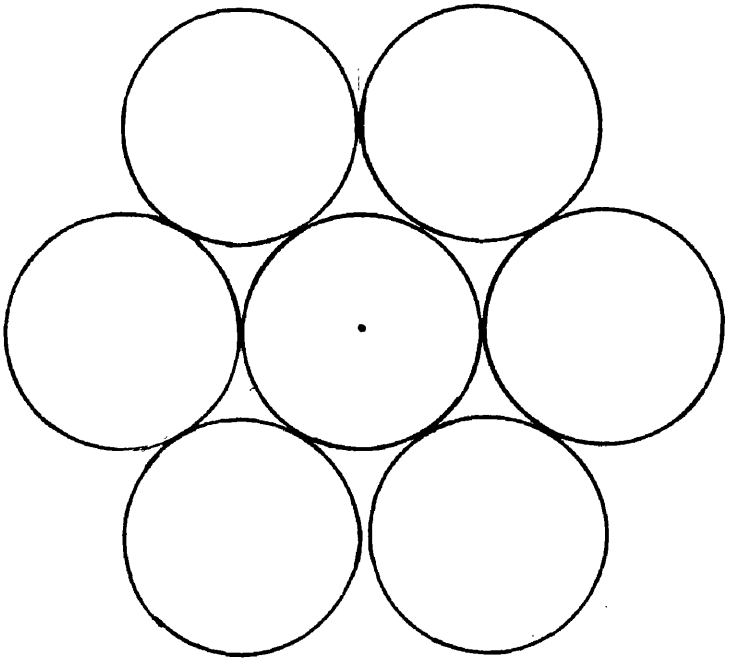
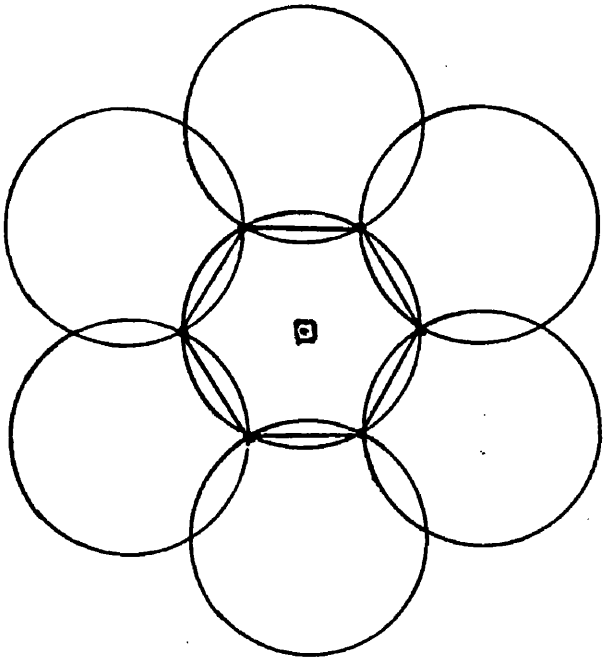
DIAGRAM 1.1.



A set of circular market areas, with no overlap.

DIAGRAM 1.2.

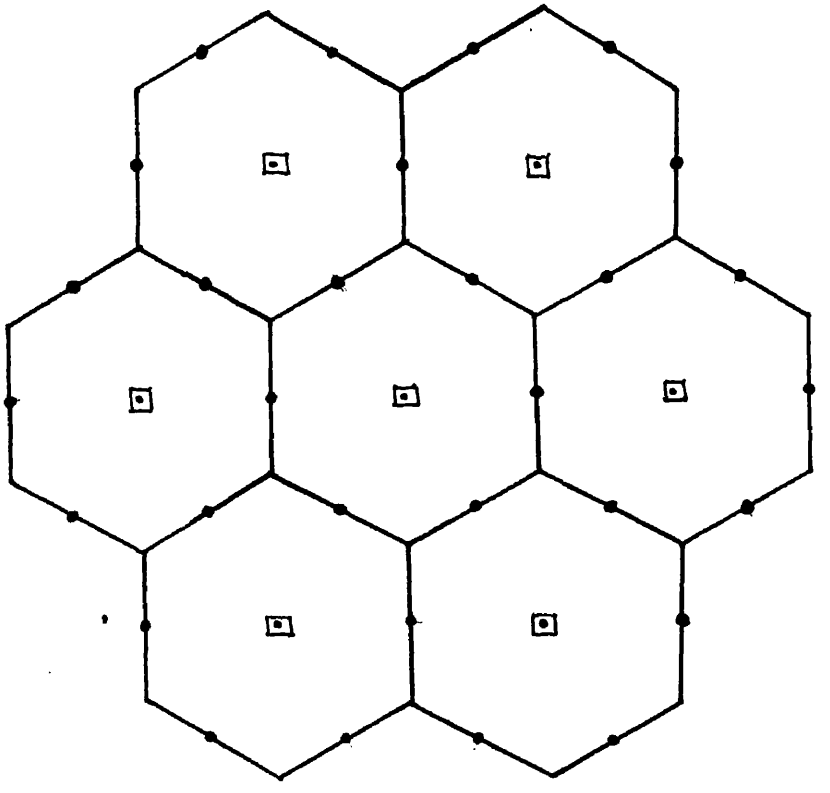


▣ A Settlement

• B Settlement

Overlapping circular market areas showing the Formation of hexagonal market areas.

DIAGRAM 1.4.

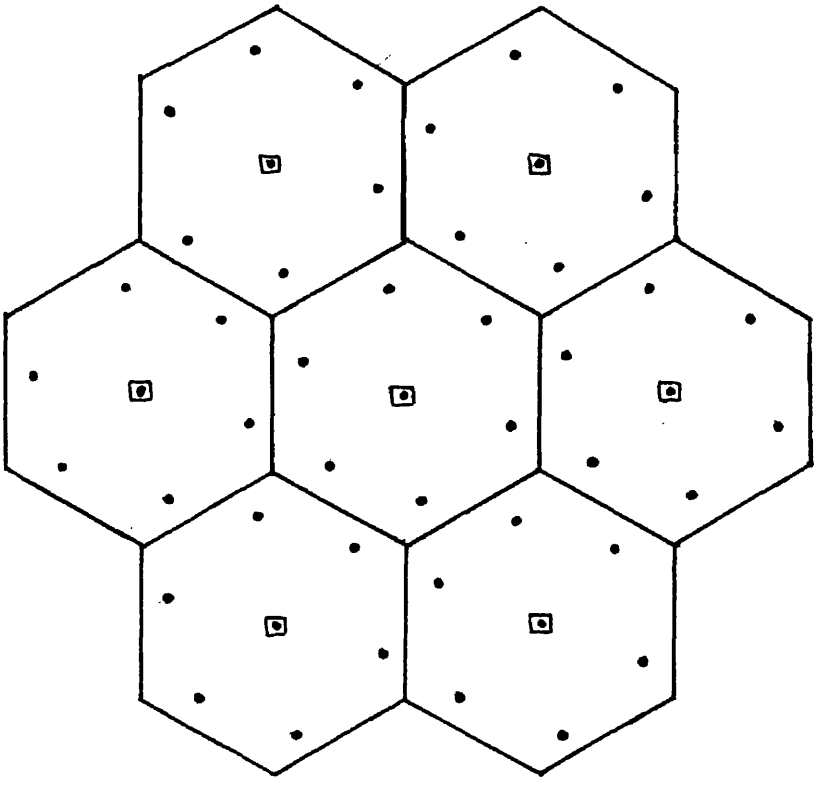


⊡ A Settlement

• B Settlement

A hierarchy according to Christaller's Transport Principle - The K-4 arrangement.

DIAGRAM 1.5.

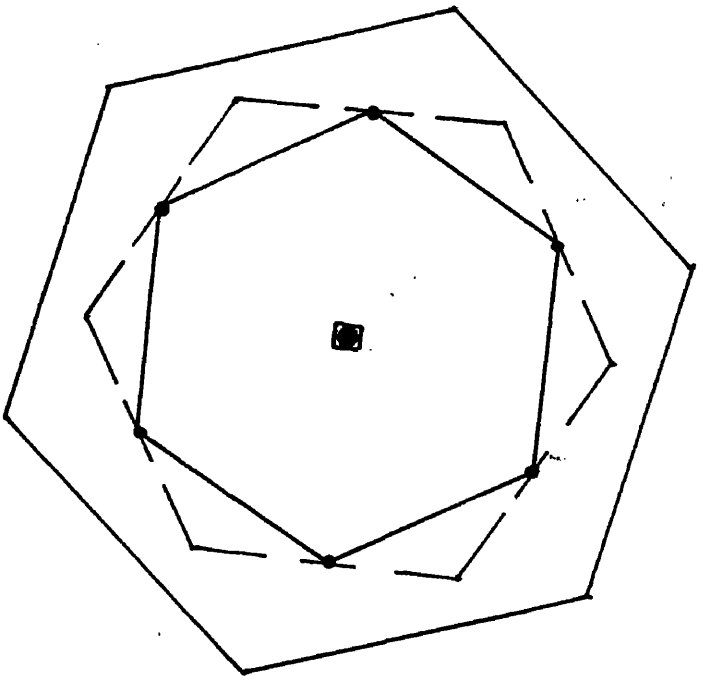


⊡ A Settlement

• B Settlement

A hierarchy according to Christaller's Administrative Principle - The K-7 arrangement.

DIAGRAM 1.6.



The three smallest market areas arranged about a common centre. This is the basis of Losch's Economic Landscape.

Chapter Two. Empirical Evidence for Central Place Theory.

Christaller himself tested his theory empirically with reference to Southern Germany and found a pattern that exhibited strong relationships to his theoretical ideas (2,1). Since Christaller first published his book many other studies have been undertaken which broadly confirm that many of the attributes of Central Place Theory do have an actual existence, independent of any theory. (2,2) (2,3) (2,4) There is however no one study which purports, to or is recognised as having the stature to offer conclusive proof that the Central Place System as conceived by Christaller (or, for that matter, Losch) exists in its entirety and has universal application. What many of these studies do show, however, is the existence of a structure which exhibits strong functional relationships between commercial centres and these centres and their market areas more or less along the lines suggested by Central Place Theory.

From such studies the presence of a hierarchy of Central Places emerges as the most readily recognisable feature of a Central Place System. As it is also the most easily measured feature it is often made the cornerstone of Central Place studies, and many planning studies which owe their inspiration to Central Place Theory tend to

build upon or around a hierarchy of centres (2,5) (2,6). It is therefore appropriate to use the hierarchy as a starting point for this review of some of the evidence that has been advanced in support of Central Place Theory.

The study of the Central Place Hierarchy can be undertaken at a number of different scales. It is possible to view the field from a national level, from a regional level or a local level.

For England and Wales as a whole, there are two basic studies; those by Smailes, and Carruthers. (2,7) (2,8). Both studies agree that London is the dominant centre and an example of a grade-one centre 'par excellence'. Below London there is also general agreement that there is a group of major regional centres and that below this there is a further level, the third tier, which is formed from the major towns, plus the smaller regional centres.

The centres recognised as the major regional centres are given below. The two studies do not agree exactly on what constitutes a major regional centre, as different standards are applied, but there is agreement that Manchester, Birmingham, Liverpool, Leeds and Newcastle are the most obvious examples.

Carruthers.	Smailes.
2A - none.	major; Manchester, Birmingham, Liverpool, Leeds, Newcastle, Nottingham, Cardiff, Bristol.
2B - Manchester, Birmingham, Liverpool, Leeds and Newcastle.	lesser; Bradford, Hull, Leicester, Norwich, Plymouth, Sheffield, Southampton.
2C - Sheffield, Cardiff, Leicester, Nottingham.	

Grade 2 Centres according to Carruthers and Smailes.

Carruthers deliberately sub-divided his second order into three sub-groupings so that, by not giving any regional centre the status of 2A, he could emphasise his belief in the total dominance of London.

Smailes, by giving more weight to regional linkages, and less weight to size, achieves a somewhat different ordering of centres, as well as recognising a larger number.

At the level of the third tier both Carruthers and Smailes distinguish between the 'larger towns' and the 'smaller regional cities'. Although both kinds of centre possess a comparable range of goods and services, the major towns, which are generally synonomous with manufacturing towns, possess their range of goods almost solely by virtue of their size, having a restricted hinterland in comparison to the smaller regional cities, who owe their status to the strong links between themselves and their (much wider) hinterlands. Again both Smailes and Carruthers recognise, although with a different emphasis, a range of sub-divisions within this third tier. Examples of the smaller regional centres at the upper end of the scale include Chester, York and Exeter, while Aberystwyth, Hexham and Kendal are examples from

the opposite end of the scale. Examples of the major towns range from Bolton, Huddersfield, Halifax and Stockport at the upper end of the scale to Nuneaton, Accrington and Neath at the lower end. Generally speaking, to possess an equivalent range of facilities an industrial town is required to have a larger population than a rural or regional centre because the latter is able to draw upon the trade of a wide hinterland whereas the former cannot.

Below the level of the third tier the structure of central places becomes somewhat less clear. In the rural areas it has been found that the hierarchical concept can be pursued further still, additional tiers being recognised without much ambiguity.

In the more industrialised or heavily built-up regions the position becomes confused and it is pertinent to ask whether or not a central place structure exists at such a level in such an environment.

For the rural area there is evidence to show that the Central Place System does conform quite well to Christaller's model. The clearest illustration of this has come from North America. In his book, 'Geography of Market Centres and Retail Distribution', (2,9), Berry uses a series of maps to illustrate how consumers use a clearly distinguished hierarchy of central places for the purpose of obtaining different goods and services, which in their turn have different ranges of attraction.

Berry is able to conclude that :-

"(1) Market areas seldom overlap, except to a limited 'peripheral

zone of indifference', so that consumers appear to be making a systematic choice of the closest centres offering the goods they need, although ... the larger places with greater cummulative accessibility draw in consumers from larger distances.

(2) Centers are indeed close to the geometric centre of their markets.

(3) As scale requirements drop, businessmen are able to exploit the consumer's desire to travel less to obtain what they need by 'squeezing' small centers mid-way between larger places.

(4) Smaller centers perform only a few limited scale activities whereas the larger centers perform a range of activities and serve a variety of areas of different sizes."

For Great Britain, Bracey (2,3) produces comparable findings in his work on rural Somerset, in which he shows that the market town still performs a valuable role. In rural Northumberland (2,5) a distinct hierarchy of settlements which corresponded to the frequency of demand for goods and services was noted by the planning department of that county.

One notable feature possessed by the studies of Bracey and those quoted by Bracey is that their findings are based on a study of what consumers actually do. This is important because it does show that in rural areas at least consumer behaviour is compatable

with the deductive theories of Christaller.

In the case of the heavily urbanised regions the empirical evidence suggests that the situation is somewhat different.

Berry, again using American data and terminology, has attempted to draw some comparisons between intra urban centres and inter-urban centres using Central Place Theory as a guide. (2,9). He suggests that 'villages' have their urban equivalent in the local convenience shopping parades, while 'towns' find their equivalents in the 'neighbourhood centers' and 'cities' in the 'urban community areas'.

That different sized centres do exist within the urban areas is known, but the answers to the wider questions concerning the degree to which inter and intra urban comparisons are valid is not known. Therefore at this stage, with the present level of understanding, it must be regarded as very questionable whether such comparisons should be made. On these grounds it is therefore felt to be justified in suggesting that any consideration of the empirical evidence for Central Place Theory should be studied against the background of the different forms of settlement patterns.

It may be the case however that the study of the physical and other measurable attributes (e.g. hierarchies and market areas) are insufficient for a full understanding of the central place system and that for a fuller understanding these physical (or 'objective') attributes must be studied in concert with patterns of consumer

behaviour. Central Place Studies have often been regarded solely in terms of, for example, hierarchies, sales turnover, etc., with little or no attention being given to the behaviour of consumers. Yet there is evidence to show that the pattern of consumer behaviour within large urban areas differs from that in the less densely settled areas. For example, within the Greater London area most people tend to shop regularly at two or three different but equivalent centres. (2,10). This is not the case in the rural areas and certainly such behaviour is not assumed in Central Place Theory, although to be fair to Christaller, he did not conceive of Central Place Theory as being a theory for the study of intra urban centres. Such studies are the work of subsequent scholars and indicate that Central Place Theory is being developed beyond its original sphere.

The basic differences between those parts of the country where Central Place Structures are clearly visible, such as the rural areas, and those areas where the structure is not readily visible, mainly the connurbation areas, are that the latter has to contend with a much larger number of people in a relatively small area and therefore at a much higher density. This means that the density of small service centres will be much greater per unit area. As a result the number of centres within acceptable travelling time is thereby, in theory, proportionately increased. This is in line with the behaviour noted above.

Nevertheless, there is evidence which is somewhat contradictory to this which indicates that the less frequently demanded services still tend to locate, on average, in the larger centres. The following table, Fig. 2,1, makes the point in a more detailed manner. (2,10).

	% expectation pro rata pop.n.	Actual Distribution (%)				
		Churches	Schools	Cinema	Post-Office	Library
Major Town Centres.1	4	10	6	50	3	16
Other Town Centres.2	9	25	12	30	17	24
Neighbourhood Centres.3	16	21	11	20	39	20
No Centre.	71	44	71	0	41	40
Total	100	100	100	100	100	100
No. of Facilities.	-	141	161	10	121	100

Figure 2,1. Source: G.L.C. Report of Studies.

Note: 1 Those with 1961 retail turnover of £2.5 m +

2 Those with 1961 retail turnover of £2.5 m - but 55+ shops

3 Those with -55 shops but 13+ (6 in rural areas)

In figure 2,1 note that the smaller the number of facilities of each type, particularly cinemas, the more central the mode of location, which in its turn is a reflection of the frequency of demand for a particular service.

Furthermore, there is some, albeit tentative, evidence to suggest that there is a tendency for the consumer to respond to this form of organisation. A survey of the use made of libraries in the London Borough of Haringey (2,11) shows that the use of branch libraries declines sharply beyond half a mile from the library. Central libraries however attract borrowers from a wider area but are used less frequently.

But in general the evidence for concluding that a central place network does exist, and is as readily recognisable as it is in some rural areas, is lacking. In the specific case of London, Carruthers (2,12) has ranked the 98 major centres but has not discovered a major break or distinct grouping of major centres. Instead the system is one of gentle graduation. To classify the major centres he tries to compare them with provincial centres. The result is:-

1st Order	London (central area	
2nd Order	Birmingham	
3rd Order	Derby, Leicester 3a (more significant)	eg. Croydon, Ilford
	Bedford, Worcester 3b (av. significance)	Bromley, Romford
	Boston, Yeovil 3c (less significance)	Eltham, Barking
4th Order	4a	Sidcup,Hornchurch
	4b	W.Wickham, Upminister
	4c	Hayes, Elm Park

Notably absent are the intermediately sized centres which, if the

population were distributed over a wider area would, according to Central Place Theory, develop. London is a case in point, but similar cases occur elsewhere. For example Oldham is overshadowed by Manchester and West Bromwich by Birmingham. From such areas, movement to the highest order centre become much more frequent undertakings, a pattern which only services to widen further the gap existing between the central area and the next highest order centres. This is the process of cumulative advantage.

There is evidence to show that this process of cumulative advantage is actively proceeding in the larger conurbations. In North West England the volume of trade for Manchester and Liverpool is growing faster than any other centre in that region (2,13). The projected increase in trade for the period 1961-71 for each of these two major centres, was greater than the existing trade (i.e. 1961) of many of the other major centres of that region, for example Preston, Chester, and Bolton. Similarly in the West Riding of Yorkshire, Bradford is losing out to Leeds. (2,14).

Two further differences between the ideal central place system and the situation as it is found in the large urban areas ought to be mentioned.

Firstly in rural areas, the suppliers of many services effectively possess a monopoly by virtue of being the only outlet available within an acceptable distance. In the heavily built-up areas the increase in density of population means that for the

threshold of many lower order goods to be achieved, only a small minimum range of attraction is necessary. Bearing in mind the lower absolute distances of such a range and the greater opportunity for personal mobility, customers have a real choice of where to shop or where to be entertained. Competition for their custom is therefore common, resulting in cut-price offers, special displays, extra-long opening hours and competition for desirable sites. The movement of consumers therefore becomes much more fluid. Two neighbours could quite conceivably shop in different centres. Perhaps this is one reason why it is difficult to recognise a viable hierarchy of centres in such an environment.

The second point may also have a bearing on this. Outside the conurbations and the built-up areas of large cities, the various central places cater for a complete cross section of the population. But it has been noted that within the urban areas the service centres often cater for a limited cross section only. Hence the character of the service centres is determined, not only by the number of people ser-ved but also by the type of person served. Weekly, for example, in his study of Nottingham cites the cases of two contrasting areas. (2,15).

The first, Mapperly, serves a middle class area. It is characterised by a number of banks, good hairdressers and a book shop.

The second example, Cinderhill, stands in complete contrast. It is a mining area and possesses a completely different range of shops

and services; a group of small stores, a working-mens club and a boys club.

As well as illustrating one major difference between Central Place Theory and the system of urban centres, it also illustrates the difficulty of comparing the grades of service centres within one built-up area. This feature would also be one major factor in explaining the lack of a distinctive hierarchy in urban areas.

This feature is also apparent in the newly expanding suburban areas. Pahl (2,16) has spoken of the breakdown of the traditional urban hierarchy and its replacement with a system of centres which reflect the increasing degree of spatial segregation between the social classes as more and bigger one-class housing estates are developed.

To conclude, outwith the heavily built-up areas a distinct hierarchy of settlements, performing different functions, clearly does exist, although the ideal spatial geometry is rarely, if ever, found. But this is only a secondary point. What is important, and particularly for planning, is the nature of the functional relationships. In general these do exist, more or less along the lines first postulated by Christaller.

In the case of the built-up areas, the strict version of Central Place Theory looses much of its relevance. However elements of a central place-type structure do exist. The Berry and Garrison approach (1,3) in which Central Place Theory takes on the task of

relating more general relationships would therefore seem more plausible in this context. However a more precise examination of the facts are needed, before any authoritative conclusions can be advanced. Techniques do exist for such an examination but have not yet been widely applied. This question is considered in more detail in the next chapter.

One point to emerge which is worthy of consideration is the question of how basic is Central Place Theory to human behaviour. The brief study of central places in urban areas showed how the change in the environment brought about different patterns of human behaviour.

It is worth giving consideration to this point. In a rural area the structure somewhat determines a regular pattern of behaviour and therefore the theory itself may be dependent upon a number of previously existing attributes. Central Place Theory then is perhaps not a theory in the strict sense, but more a rationalisation of a pattern of human behaviour where human needs respond to a given framework. The implication to be drawn here is that if the framework changes, in this case the means of distributing goods and services, then Central Place Theory will no longer be plausible. (2,17).

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Chapter Three. Measurement.

In the two preceding Chapters, the conceptual framework of Central Place Theory and the nature of the supporting evidence have been examined and it has been concluded that there is sufficient evidence for accepting some of the basic relationships that have been postulated. Thus there is a hierarchy of centres or central places, together with a hierarchy of related hinterlands.

The purpose of this Chapter is to examine the precision with which it is possible to state some of these more basic relationships. In doing so, it is hoped to take Central Place Theory a stage further towards providing a basis for practical planning tools.

Before proceeding it should be noted that attempts to qualify central place relationships have been somewhat restricted, mainly to the field of commercial services, particularly retailing. This Chapter will therefore limit itself to commenting on the work done in this field.

Various attempts have been made to devise numerical measures of centrality, and by ranking the results, to produce a hierarchy of central places. Most of these studies, some of which are quite elaborate, rely on a vairation of a points system whereby marks are awarded on the basis of a centre fulfilling certain desirable criteria, for example the provision of a department store or having a retail trade turnover in excess of £x m. Examples of such studies are those by Smailes (2,7) and Carruthers (2,8).

However no study using such a method has, as yet, been able to overcome all the problems involved in designing a fully objective measure of centrality which, at the same time will permit a worthwhile comparison with other studies.

Some of the problems facing workers in this field have been outlined by W.K.D. Davies (3,1). He maintains that while the physical scientist has the power to vary or control the environment in which he works, the environment for research into Central Place Theory is basically given. Due to the wide variation in the phenomena studied a cross comparison of results is difficult when identical input data and techniques are used. For example the size of individual stores in a variety chain (say Woolworths) may vary widely, and similarly the importance of markets may vary widely from place to place. But, once the input data is varied to suit the individual situation different results may be derived and the chance to compare results may be lost.

R.L. Davies (3,2) points out that traditionally this latter situation has been a common feature of work on Central Place Theory ... 'each rank procedure which has been applied has differed in some small respect from studies elsewhere, so that a constant basis for comparison of the effectiveness of these methods has hardly ever been possible'. Davies goes on to conclude ... 'that often the extra efforts experienced in data collection and surveying are not worth the greater degree of accuracy obtained,' simply because there are no standards against which to evaluate these claims for greater accuracy.

So it comes as no surprise that some recent reviews of the methods of measuring and ranking centres question whether elaborate procedures are appropriate or whether it is better, despite some drawbacks, to rely on existing standard measures such as those contained in the Census of Distribution (3,3) (3,4).

McEvoy however does suggest that the methods employed by the Haydock Study, which is a ranking procedure based on a points system, is acceptable where large centres only are being considered. (3,5) (3,6). At the same time he does reject this method for the classification of the smaller centres as the 'Objective' indicators used in this method,[1] for example Marks and Spencer and certain named Banks, are not present in the smaller centres, but are replaced by general stores and smaller chain stores, often of a local nature but which are more in keeping with local requirements.

McEvoy's conclusion, although justified, is somewhat unfortunate as it illustrates the fact that the problem of classifying the smaller centres on a basis that would allow them to be compared with the larger centres is still unresolved. The Census of Distribution is of little help here as only those larger centres of over 50,000 are normally considered.

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1 Appendix A gives a complete list of the indicators used by the Haydock Study.

In an attempt to overcome this, W.K.D. Davies has published a paper in which he suggests the use of a modified form of the industrial location quotient (3,7). This takes the form of an equation: $C = \frac{t.\ 100}{T}$

where, C = location quotient of function t

t = one outlet for function t

T = total number of outlets of function t in the study area

'Multiplication of the relevant location quotients by the number of outlets of each functional type present in a settlement, gives the degree of centrality (centrality value) imparted to each settlement for every different type of function. A functional index is derived by the addition of all the centrality values attained by any settlement.' (Note: t is expressed in terms of number employed at the revelant establishment.)

McEvoy (3,5) has pointed out a number of drawbacks associated with this method, not the least of which, especially from a planners point of view, is the immense amount of field work which would have to be undertaken to ascertain the number of retail outlets, their location and the numbers employed.

Associated with the hierarchy of central places are the related market areas or hinterlands.

One approach to this aspect is to express the hinterland solely in terms of its 'theoretical population'. By using data from the Census of Distribution it is possible, by dividing the total retail trade of a

centre by the average regional retail sales per capita, to obtain an estimate of the total population of that centre and its hinterland.

F.W. Green on the other hand has attempted to define the extent of the hinterlands by plotting bus routes on a map (3,8).

Lomas has shown that the size of the hinterland, as defined by Green's method and the theoretical population, do have, on first inspection quite a good correlation. (3,9).

However to conclude that the resolution of the problem is that simple would be wrong. There are serious drawbacks on theoretical grounds. The question of a hierarchy has been postulated and the evidence suggests that it does indeed exist. One of the consequences of this is that each centre in the hierarchy attracts certain categories of trade from those centres below it. The criticism is that the aforementioned methods do not give full recognition to this fact. As Lomas (3,9) points out else where in his paper the size of the population looking to the different centres varies with the type of good. Thus, to take Nottingham as an example, the total number of people looking to the city centre when purchasing furniture, is greater than the theoretical population, implying that furniture is a high order good with a catchment area wider than that indicated by the simplistic methods mentioned previously.

At this stage it is appropriate to introduce into the discussion the concept of potential and gravity models, as methods which subscribe to this philosophy have been used to calculate the potential sales of proposed shopping centres or the projected future sales of existing centres.

The earliest statements of this concept in mathematical terms, which related directly to retailing were given by W.J. Reilly, whose models became known as the 'Laws of Retail Gravitation' (3,10). The original law stated that 'Two centres attract trade from intermediate places approximately in direct proportion to the size of the centres and in inverse proportion to the square of the distances from these two centres to the intermediate place.'

In mathematical terms:- $$\frac{Ta}{Tb} = \frac{Pa}{Pb} \left(\frac{Db}{Da} \right)^2$$

where Ta, Tb = proportions of trade from the intermediate place attracted by centres A and B.

Pa, Pb = sizes of A and B

Da, Db = distances of A and B from the intermediate place.

Reilly further developed his techniques to calculate the boundaries (or breaking point) of the market areas of two competing centres. Thus the breaking point in miles from B is

$$= \frac{\text{Miles between A and B}}{1 + \sqrt{\frac{\text{Size of A}}{\text{Size of B}}}}$$

This is known as Reilly's second Law of Retail Gravitation.

Concerning the formula, Berry (2,9) points out that in heavily built-up urban areas there is no such thing as a breaking point as consumers are in a position to choose between a number of different centres. It is only as the density of population declines and the spacing of centres increase that consumers have less choice, so that in rural areas the arrangement of the central places almost determines

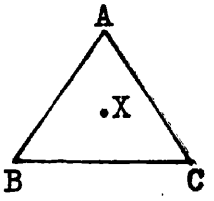
the shopping patterns. Thus Reilly's law concerning the breaking point is more appropriate to rural areas than to the heavily built-up areas.

In view of this, one must view with scepticism the resultant market area boundaries derived by the Haydock Study team in using Reilly's second law, albeit in modified form, in such a heavily built-up area as North West England (3,6). Using mean durable sales for the central areas of the main centres (as representative of size) the study deli ited boundaries appropriate to the Grade II level, and again at the Grade III level, where more centres were able to compete, thereby increasing the number of market areas, but at the same time reducing their size.

Attractive as these results appear to be at first sight, the reasoning on which the validity of the calculations rests can be faulted. A more appropriate calculation might have been one which employed Reilly's original law of retail gravitation, which seeks to measure the <u>proportion</u> of trade, competing centres attract from intermediate areas. It thus avoids the faults of the Haydock Study team's method which attempted to define non-existent market area boundaries. Gerald A.P. Caruthers has suggested that it should be feasible to portray such measures for a set of 'market areas' as developed by Christaller (3,11). This method could quite logically be applied to both rural and heavily built-up areas and so help to overcome the dichotomy between the two different kinds of environment.

Huff has clarified the concepts involved by pointing out that consumer behaviour in a heavily built-up area, such as North West England, subscribes to probabilistic principles, and not deterministic ones as an acceptance of definite market area boundaries would imply (3,12).

For example, in the hypothetical situation illustrated by the diagram below, A, B and C are competing centres of equal status, arranged so that they form the three points of an equilateral triangle. A consumer living at the mid-point, X, thus has a choice of three equal centres.



The probability of his visiting either would be given as 0.33 or 1 in 3.

However if the assumed place of residence was shifted towards A and thereby away from both B and C, the probability of the consumer visiting A increases while it correspondingly decreases as regards B and C.

Although the validity of the Haydock Study's methods have been questioned, it can justifiably claim to have made a conceptual advance over other studies in that it did explicitly base its reasoning on a hierarchy of centres and their related market areas.

What would appear to be needed now is a study recognising that the calculations of retail trade areas must be made to reflect the different levels of the hierarchy, but at the same time utilizing the more promising probabilistic approach.

However, in this context it is possible to foresee one possible drawback and that is the question of whether it is justified in assuming that every individual's behaviour is both equal and constant. For example, will not different classes of people travel different distances for the purpose of shopping or entertainment? Likewise will those people who are in the habit of using their car for shopping develop different patterns of behaviour than those who rely on public transport?

It is necessary to obtain some idea of the exponents for these different categories to check whether or not any wide variation in behaviour does in fact occur. A survey by Kent County Council on the 'Influence of Car Ownership on Shopping Habits' revealed that the regular use of a car did affect both the distance travelled and the variety of centres used. Class also affected shopping habits (3,13).

Probability Theory therefore should not be adopted without prior investigation to this phenomena.

To turn to the question of threshold populations necessary to support certain levels of facilities, or conversely, the level of facilities appropriate to a population of a certain size. This aspect has not been extensively investigated, certainly where planning studies

are concerned. Often the existing levels of provision in a similar sized city is taken as indicative of the level of facilities a city is likely to need or succeed in attracting. In some instances an estimate of the total population of a centre together with its hinterland is made. This is essentially the approach used by the consultants engaged for the study of the Central Lancashire New Town (3,14).

In the case of smaller centres it is necessary to take into account the loss of trade to larger centres close by. Thus Cumbernauld compared itself (as it would be when fully developed) with various similar sized cities at an equivalent distance away from a city which compared with Glasgow (3,15.)

However, these methods are of low theoretical content and the results suffer accordingly. It is extremely unlikely that the table of thresholds for different facilities as given in the Proposals for the Central Lancashire New Towns are of any real value (3,14). Many towns below the 300,000 - 500,000 threshold have theatres, art galleries and reference libraries, and many towns above the 60,000 - 80,000 threshold do not have nightclubs or bowling alleys.

Conclusion.

At the beginning of this Chapter, it was stated that the aim was to investigate the possibilities of stating more precisely some of the more basic variables and the relationships between them. Some progress has been made, but only of a limited kind. It has proved

difficult to devise adequate measures of even the most basic variables. In part this is because it has not been possible to devise means of assessing the accuracy of the different measures applied. This has in turn encouraged the different researchers to devise their own measures to suit their own particular circumstances and prejudices. Hence the confused picture existing at present, notably over the ways and means of measuring the finer points of the hierarchy.

This Chapter has also suggested that some theoretical models have been wrongly applied as the reasoning contained in some mathematical equations used is contradicted by the findings of empirical studies operating in similar situations. If this illustrates nothing else it does show the danger of applying quantitative models before the conceptual relationships are fully understood.

It would seem that the first task is to find acceptable techniques of measuring the hierarchy. May-be the answer lies in pressing for the Census of Distribution to extend its coverage to smaller centres.

Secondly, it would seem that progress in obtaining more meaningful information on the general questions of the ranges of goods and services, and the variations involved due to the effects of class and the motor car, is a necessary pre-requisite for making progress in the field of assessing market areas and threshold values. In view of the difficulties encountered here it is pertinent to suggest that attempts should be made to measure the nature, extent and size of a centre's hinterland

by making more use of questionnaire techniques. This method has been used by Berry to illustrate his book (2,9) and by Kent County Council for their studies of the impact of a town expansion scheme at Ashford and the effect car usage is having on shopping habits (2,6) (3,13).

The basic problems however remain. How are the planners to know if they have arrived at the 'right answer'? After all they cannot experiment with a controlled environment in the manner of the physicist or chemist, and trial and error could prove to be costly and dangerous.

Techniques which could help in evaluating the accuracy of different methods are needed, but are nowhere in sight. Until then it seems that the planner will have to rely on intelligent guesswork and the quality and consistency of his reasoning.

But this is not to say that quantitative methods should not be used. In some cases, even though they are not completely accurate, they are sufficiently exact to be of value. The outstanding case is in assessing future reail trade patterns. Physical planners will need to have an idea of the floor space requirements for different centres, and commercial interests will require to know the likely composition of the trade in these different centres.

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Chapter Four. Some General Considerations.

The first three Chapters of this dissertation concentrated on the nature of Central Place Theory and the progress made towards verifying that theory. It has been argued that the socio-economic organisation of space is carried on through a number of central places which are arranged in a hierarchy to reflect their different status.

This Chapter exists largely in order that a number of basic observations linking Central Place Theory and planning can be made.

The first point is that Central Place Theory can only be used as a form of static analysis. The theory alone cannot predict the future arrangement of Central Places, nor the future means of organising space.

In the long run .... 'all quantitative results will be historically contingent: the peculiarities of spatial structure appear as a function of both time and space. They will vary with changes in technology, economic and social development, cultural values and geography.' (4,1).

The Haydock proposals illustrate this point well. (2,13). If the proposals to build a large out-of-town regional shopping centre, which would have offered a wider range of goods than any other centre in North West England, apart from Manchester and Liverpool, had been carried out, the pattern of shopping in that area would have been drastically altered. The point to be taken is, that because the

possibility of fast personal movement over a wide area now exists, it is possible to propose a system whereby retailing is no longer restricted to the traditional central places.

The growth of the mail order trade, where the distribution of goods avoids the traditional retailer and thereby the traditional centres, is another example of a development which could have significant repercussions on the Central Place method of organising socio-economic space.

Because of this and other similar developments, some writers on cities and planning have argued that the traditional city is dying, and that its place is being taken by a form of dispersed settlement with no dominant nodes which bear comparison with the present central areas of cities. (4,2). It is significant that many such prophets are Americans and that the process of dispersion of central area functions, such as the development of out-of-town centres, has proceeded farthest in the U.S.A. Perhaps then we should look to the American examples to see if these offer any suitable guidelines?

To return to the theory, it is possible to argue that because Central Place Theory permits only static analysis, the theory has only a limited value in planning, because planning itself is essentially concerned with the future.

However, in the short run at least, the methods used by the Haydock Study (2,13) demonstrate that it is possible to avoid this problem by simulating the likely pattern of (say) retailing for a given date in

the future, by which time it is assumed that the proposed new development would have taken place.

For the purpose of such an 'experiment' it would be necessary to assume that the possibilities of other technical, social, economic and cultural change had been frozen, unless it was explicitly stated otherwise. However, it is possible to make some tentative forecasts of the size, distribution and structure of the future population, at least in the short run.

In this particular instance, a comparison of the then present pattern of retailing with that forecast for 1971, on the basis of existing and foreseeable trends, and again for 1971 on the assumption that the Haydock Proposals had been implemented, illustrated the likely impact of the proposed centre quite well. The objective of the exercise was thus achieved.

However it is necessary to point out that, as it is acceptable to project existing trends for a short time period only, this process of simulation can only be used in short term analyses.

It is worthwhile, at this point, to restate that Central Place Theory is a general theory of spatial organisation. Its value is not restricted to retailing alone. As yet it is not possible to state with any degree of certainty, exactly how some of the postulated relationships vary; certainly it is proving hard to build quantitative models to express these relationships in more specific terms. Robinson has made the point in her paper (4,3) ... 'Thus so far Central Place

Theory has been able to provide a framework of reference into which problem points of interest can be placed. The relationships put forward by the theory are the important asepcts of the theory...'

This statement serves as an apt conclusion for ChpatersTwo and Three. But in addition, it is worth emphasising that although the theory does offer a framework for relating different but related phenomena, other theories and techniques will have to be developed, or borrowed, before the exactness of the relationships put forward by Central Place Theory can be explored further. Reilly's 'Laws of Retail Gravitation' (which have been borrowed from Social Physics) and Huff's 'Probability Models' are examples of the type of work needed. These techniques need not be restricted to retailing. Boudeville, for example, suggests that Potential and Gravity models can be used in the field of regional economic planning because economic activity, in its widest sense, is of a polarised nature and therefore revolves around a hierarchy of centres. (4,4).

The greatest asset of Central Place Theory is that it offers a logical and consistent framework to which planning problems of various kinds can be referred, be they attempting to assess the effect of proposed new retail developments or in providing a basis for rationalising an existing settlement pattern.

Richardson's comment forms an apt conclusion. (4,5). Despite its drawbacks, 'the value of Central Place Theory is multiplied ... because no other theory stresses as much the interdependence between a city and the region in which it is situated.'

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Chapter Five. Retailing and Central Place Theory.

The object of this Chapter is to comment on the utility of Central Place Theory in the field of retailing by way of discussing some planning problems in which retailing is a consideration, albeit one of many. As the previous Chapters have indicated, Central Place Theory has frequently been used to study patterns of retail development, and as a result a fairly substantial body of evidence relevant to this topic now exists. It is therefore possible to argue by drawing upon this source of knowledge as well as on the theory itself. The two approaches should not however be regarded as mutually exclusive, but as complimenting one another. For example, in Chapter Three it was noted that the range of attraction of goods and centres may vary with the nature of the custom. Further information on this phenomena would be valuable to the theory as it could lead to the development of more accurate distance exponents which might be applied in the testing of gravity models.

To begin with, it is advisable to have some idea of the nature of the problem field, The following examples will serve as an outline. The selection of problems included are not hypothetical but have, at some time or other, been faced by different planning authorities.

Problem One: How much retail trade will a new town of a given size and at a given location, generate? For example, Cumbernauld Development Corporation (3,15).

Problem Two: In a rapidly growing area in which there exists a lag between the demand for and the supply of retailing facilities, what level and what kinds of retail provision should be planned for. Further, what is the best form of city wide spatial deployment of shopping areas to meet this growing demand, bearing in mind a host of current trends, especially the growth of car ownership? (Coventry C.B.C.) (5,1).

Problem Three: What amount of floor space would be required to meet the volume of retail trade generated by a new town? (for example, Livingston) (5,2).

Problem Four: How much additional trade will be generated by the planned expansion of an existing town; what form of development can best accommodate this increase, and bearing in mind that because of the size of the planned expansion the town will become a sub-regional centre in its own right, what will be the impact upon the surrounding area? (Kent County Council in relation to the proposed expansion of Ashford) (5,3).

Problem Five: What effect will the development of a regional out-of-town shopping centre have on the other shopping centres of that region? (Lancashire County Council in the case of the Haydock Proposals) (5,4).

In seeking to answer problems such as these it is important to bear in mind the complex nature of the environment in which the planner will operate. An ideal solution to any problem involving a retail component is unlikely to be realised without due reference to criteria

other than those concerned with retailing alone. For example, shopping centres are responsible for generating their share of traffic and thus what might seem at first to be an ideal site for a shopping centre would, if it were implemented, give rise to problems of traffic management. In such cases it might well be proper for the shopping centre to be developed at another site, albeit in retailing terms alone a sub-optimal one.

However the point to be taken is that by referring the retail considerations to a wider logical framework, as is provided by Central Place Theory, the impact upon the retailing sector of the different strategies put forward, can be illustrated in fairly certain and lucid terms. Further, if the implications for the retailing sector of the different strategies proposed are known, then the possibility of using this knowledge in an overall evaluation procedure is thereby increased. Such a procedure would no doubt consider traffic management alongside the other considerations which might be relevant; for example, questions concerning conservation, amenity and regional strategies.

To return to the more basic questions, it is reasonable to hold the view that the first step in the understanding of any problem is to have a thorough and penetrating understanding of the existing situation. To illustrate this, and for the purposes of simplicity, it is proposed to postulate an imaginary region. What could an analysis, utilising Central Place Theory, tell us about the regional retailing pattern?

First of all, it would be possible to recognise the basic hierarchy by the simple expedient of ranking the main centres.

Secondly, by making use of those relationships which exist between these centres, their hinterlands and their populations, it is possible to break down the basic data, (which might be found, for example, in the Census of Distribution) and outline the approximate market hinterlands or the potential catchment areas of these different centres, and then go on to construct the net flows of trade, per category of good, between these different centres. Thus the basic pattern can be identified.

Examples of this method appear in the "Report on the likely Impact of a Regional Out-of-town Shopping Centre at Haydock" (5,4) and, in a more general way, in the study by Kent County Council on the impact of the proposed expansion at Ashford. (5,3).

The degree of exactness with which these relationships can be calculated will of course vary with the type of problem, the overall environment and the nature of the raw data, which might in some cases not be available. In this context it is important to stress the main conclusion of Chapter Three, which argued that the degree of exactness should be regarded in a critical light, although the general nature of the relationships are fairly certain.

Thus additional data or material is nearly always useful to have around. The questionnaire technique is a good example. However, although such techniques may allow a more penetrating understanding of existing situations, they cannot always be resorted to. For example, some idea of

the likely levels of trade a given new town will generate will need to be obtained at an early stage of the planning process. In addition, questionnaires are often costly in terms of time, money and other resources and thus from this point of view it may also not be practical to employ such techniques. Hence it is useful to be aware of the appropriate statistical methods, although in some cases these may only offer rough estimates.

The degree of confidence the various studies will display will naturally reflect in part the degree of confidence the authors will have in their raw data and the nature of the environment in which they are working. Invariably the most confidence is displayed by those studies operating at the regional or sub-regional level and particularly in rural areas. This is in keeping with the conclusions of Chapter Two. Thus the report prepared by Development Analysts Limited for Devon County Council concerning the shopping needs of South Devon (5,5), was confident enough to produce maps showing a complex breakdown of the flows of retail trade between various major centres of South Devon.

But this confidence seems to evaporate or take a serious knock once the question of retailing provision at the intra-urban scale is considered. Certainly the existing patterns exhibit little semblance of ordered relationships. Perhaps the lack of confidence by the planner is a reflection of this. Dunning's observations on the way the different new towns have approached the problem illustrate this point quite well (5,6):-

"Thus while Stevenage and Harlow are building a cluster of main

neighbourhood centres with 25-30 shops in each and a group of sub-centres of 5 to 8 shops at strategic points - a 3-tier system, Crawley and Hemel Hempstead have preferred to divide their residential areas into a large number of smaller zones with 10-30 shops in each, a 2-tier system. Basildon has adopted the latter policy, but has also recognised the additional needs for groups of 3-4 'pantry shops' in those parts of each neighbourhood farthest removed from the main shopping centre. Bracknell is deliberately leaving a number of corner sites vacant in case the demand for extra shops should arise."

Theoretical calculations based on the concept of hierarchical arrangement of shopping centres, as is the case with models which are based on Central Place Theory, are, almost by definition, not going to produce results which resemble the present organic patterns of retail development, with their host of unplanned corner shops and ribbon developments. Thus before adopting Central Place Theory as a basis for constructing models of planned shopping centres in urban areas, consideration should be given to the suitability of developing such centres in a hierarchical fashion.

A consideration of this question raises the further question of the criteria which ought to be used in planning the future patterns of urban retail trade. Should the criteria relate primarily to business efficiency and the convenience of property developers, or should the dominant concerns be for amenity and traffic management, or should the policy be one of

encouraging the unplanned development of individual or small groupings of shops to supplement a number of planned suburban centres?

A full consideration of these centres would of course take the problem out of the realm of Central Place Theory, for the Theory assumes that a hierarchy of centres is the accepted norm. In this context the comments made beforehand concerning the evaluation of alternative strategies might be useful.

However the question which remains to be answered is, are models of urban shopping centres which accept the principle of a hierarchy of centres the correct ones, or does this privilege belong to models which do not necessarily accept this. Central Place Theory itself does not provide the answer, but it does pose the question.

On the basis of the hypothetical region which was postulated earlier in this chapter, it was argued that by using Central Place Theory it is possible to analyse the basic shopping pattern of a region as it exists at a given moment in time.

In the long run, and as was pointed out in Chapter Four, this pattern does not reflect a steady-state or equilibrium situation. If this was the case then it would be reasonable to expect to find evidence for a regulatory mechanism to preserve the existing situation. However this is not the case. The evidence supports Friedman's contention that the dominant means of organising socio-economic space is a function of technology, social and economic organisation and culture. (4,1).

It is thus appropriate to discuss these dynamic trends which make the validity of any analysis of retail patterns dependent upon the time factor. Considerations which would be valid here would include the growth of car ownership, the means of organising retail trade, the growth of the mail order trade and changes in patterns of consumer spending.

For example in the case of the means of organising retail trade, it is generally acknowledged that in Britain this trade has, and still is, undergoing a profound re-organisation. The changes have been amply documented elsewhere (5,1) (5,3) (5,7) and so need not be discussed here. Similarly abroad ... "In Scandinavia new shops are financed on a very short term basis because of the belief that retailing is undergoing a revolution, the outcome of which cannot be predicted." (5,8).

Imponderables such as are involved in the changing nature of the organisation of the retail trade may be outside the control of the planner but they cannot be ignored as they often have an important bearing on questions upon which the planner may be required to pronounce, For example what amount of retail floor space ought to be allocated to a given new town centre?

Floor space requirements are normally calculated using a conversion factor, whereby a given measure of retail trade turnover is taken to indicate the need for a given amount of floor space. (5,9).

The calculation of floor space requirements is thus basically dependent upon the accurate assessment of the likely retail trade turnover, a procedure in which Central Place Theory can play a valuable role.

However the calculations will also require a knowledge of the floor space requirements for the different kinds of retail outlets, and the trends in these. The ratio between floor space and sales turnover is not a constant one; the turnover per unit area will vary according to the type of shop and the efficiency with which it is run.

Perhaps the most basic of all the dynamic trends is the growth of car ownership, the implications of which are perhaps more readily grasped.

There exists the widespread belief that the car will allow the shopper a less restricted choice of centres and that this will naturally lead the shopper to concentrate his attentions on the major centres at the expense of the smaller ones (5,3). Furthermore fears have been expressed that the development of large out-of-town centres and hypermarkets might prejudice the status of existing town centres, including the largest ones. For Birmingham the chairman of the redevelopment sub-committee has recently gone on record as warning that ... "Shopping hypermarkets could prove expensive for ratepayers in the long run. As a result of redevelopment Birmingham's capital debt was £300 m... We've got to get that back in rates and ground rents ..." (5,10).

Out-of-town centres developed originally in the U.S.A. and Canada largely as a result of the early lead those countries took in the high levels of private car ownership.

"The Regional out-of-town centre is now an established part of U.S. life. There were 10,275 centres in Canada and the U.S.A. at the end of 1966, accounting for 36.8% of the total retail trade ... It is anticipated that by 1970 45% of the total retail trade will be done by shopping centres ..." (5,11).

The largest of these out-of-town centres provide the full range of retailing facilities ranging from department stores and specialist shops on the one hand to supermarkets and convenience shops on the other. In addition many centres provide more than just shopping facilities. For example, cinemas, hotels, skating rinks, professional services (including doctors), cultural complexes, and light manufacturing in association with retailing (e.g. bakery, repair of electrical goods) are sometimes provided by or are attracted by the shopping centres. (5,12).

This form of redevelopment has not been without its repercussions; a notable example is provided by the traditional 'downtown' shopping areas, many of which are suffering instances of commercial blight due to competition from the out-of-town centres. Berry, for one, points out that the market is merely adjusting to the changed conditions between the supply of and demand for retail goods and services. He argues that Central Place Theory provides an ideal framework within which the changes in both the supply and demand, including their spatial components, can be studied and measured. (5,13). In such a situation a planner is faced with a choice, either "to remove excess capacity causing commercial blight or to change the nature of the changing market that is causing the blight". (2,9).

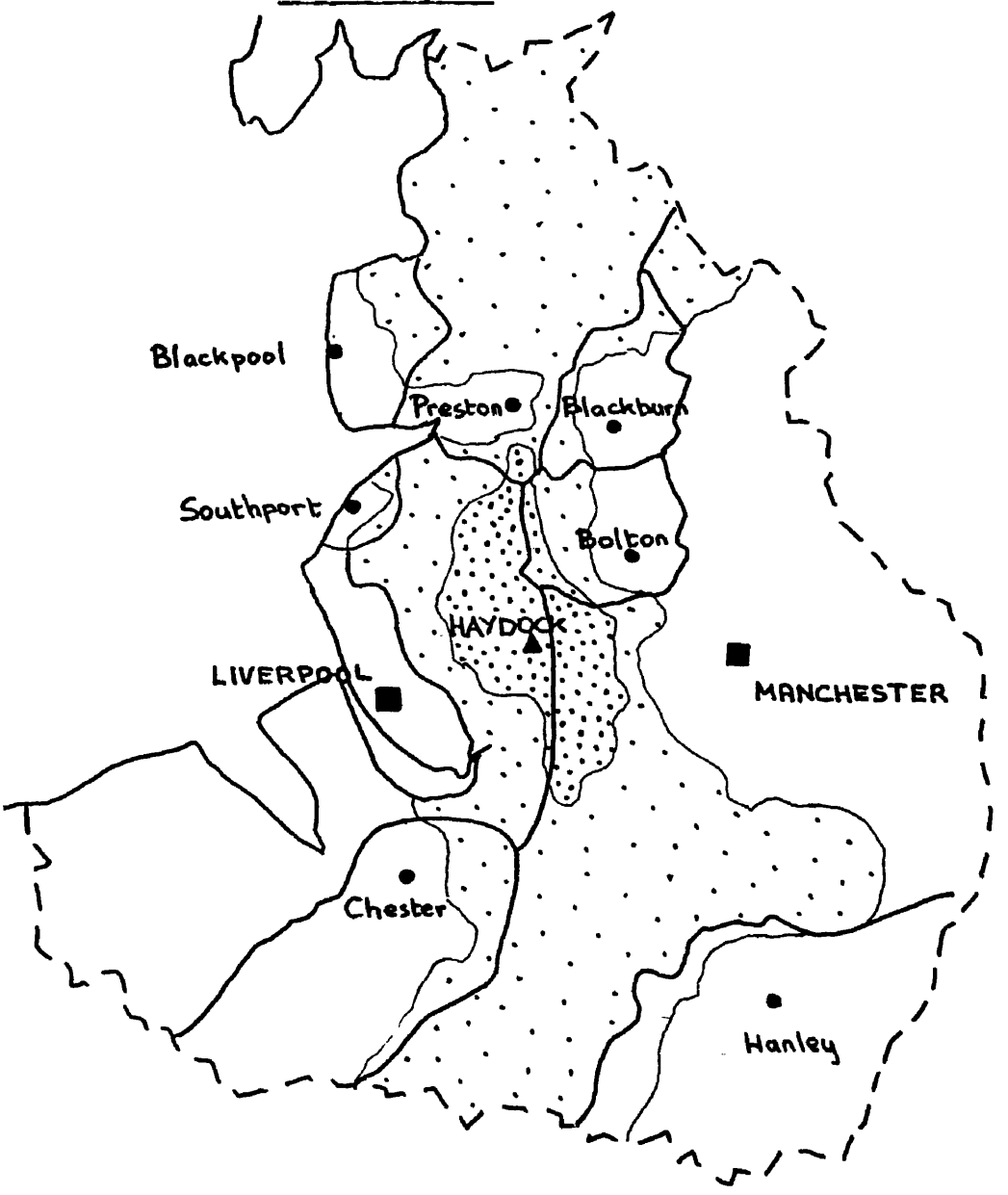
Conditions in Great Britain are by no means the same as those found in North America and so it is not possible to infer that such situations will ultimately arise here. The institutional frameworks are different. But perhaps of more fundamental importance, the car, which was the basic element in making out-of-town shopping centres feasible propositions in North America, does not yet posses the same significance.

The Haydock Proposals however (5,4) do not offer much comfort to those who think along these lines. The study of the proposals undertaken by Manchester University considered that if the centre were to be a feasible proposition it should aim at attracting those shops which, together, would generate a total annual turnover of around £50 m., the bulk of which would be spent by shoppers using private cars. This figure compares with the turnover of the central areas of both Liverpool and Manchester, which stood at £61.93 m. and £57.10 m. respectively and far exceeds all the other major (2A) centres of the North West (1961 figures).

The study correctly points out that more than just a shopping centre would result. A growth point of regional significance would have been created; the demand for labour by the retail trade alone would be great, but in addition the likelihood of other functions being attracted, for example, cinemas, hotels and some housing developments, has to be considered a possibility.

By using Central Place Theory, the study showed that some nearby existing centres would suffer. St. Helens, Wigan and Warrington would be particularly badly hit. The calculated effects on the trade of these three

DIAGRAM 5.1.



Key

■ Grade 1 Centre

• Grade 2A Centre

▲ Proposed Haydock Centre

Extent of Haydock Hinterland

Maximum Sized Centre

Minimum Sized Centre

The calculated hinterland of the Haydock Centre superimposed on Grade 1 hinterlands, 1971.

centres are shown in the following table, while the likely areal extent over which the proposed out-of-town centre would have had an impact is shown on the accompanying map.

	1971 Index of Retail Trade - 1961 = 100		
St. Helens.	106	98	70
Wigan.	150	136	89
Warrington. *	278	253	148
	No centre at Haydock.	Minimum Sized centre.	Maximum Sized Centre. ie turnover = £50m.+

* Note: The case of Warrington is not straight forward as it is to be developed as a new town. The increase in population will therefore greatly alter the situation, but it is clear, assuming that the figures contained in the table are sound, that a large centre at Haydock would severely affect its development, especially as regards the higher order goods.

Should large scale out-of-town centres in which the retail trade may be only a part of the total become commonplace, then the present pattern of organising the distribution of goods and services is facing a change of revolutionary significance.

At present the danger exists that in the absence of any stated policy or objective guidelines, the question may be left to resolve itself. There are at present several outstanding applications for permission to

develop hypermarkets which would be situated outside existing centres, but well placed in relation to the load network to attract trade from these. For example, there is one application to develop a hypermarket near to Newcastle-under-Lyme which would have an annual turnover of around £6m. p.a., which is approximately equal to that of Newcastle itself. (5,10).

Such applications raise a number of basic questions which are of national interest. For example, what will be the consequences for existing centres if such developments are allowed? What role ought out-of-town centres to play? Will these centres, either on their own or in conjunction with other developments which they might attract, be responsible for spawning new residential developments? If so is there not a danger that large zones of contiguous urban development will result, perhaps even in a manner comparable to the spread of industrial settlements in the nineteenth century?

If pursued to their logical conclusion these trends in retailing offer a number of intriguing choices, the consequences of which range far beyond the bounds of retailing. It may be that Hermansen is correct in identifying the growth of the service industries, of which retailing is a major part, as being the most potent force for changing the existing settlement patterns. (5,14). However these consequences have not, on the whole, been adequately considered, although some prophets have hazarded guesses as to the possible end result, for example Melvin Webber. (4,2),

On its own Central Place Theory cannot offer any adequate answers as to the consequences of the growth of out-of-town centres apart from assessing the likely impact upon the trade of existing centres. However it does offer this possibility and it ought to be used when considering applications for the development of out-of-town centres or hypermarkets.

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Chapter Six. Regional Planning and Central Place Theory.

During the past couple of decades or so regional planning has come to play a more explicit role in many different societies. Two basic problems and the responses to these have largely been responsible for this development in Great Britain.

In the first instance, the problems facing the physical planners working in the heavily built-up connurbations have been responsible for spawning overspill agreements and the development of new towns. Town planning therefore has found itself operating beyond the confines of its traditional boundaries so that a kind of super-town planning has evolved. The realisation that these activities will in some way affect the spatial distribution of economic development has followed, almost as an afterthought.

Secondly, the problem of regional economic inequalities has attracted increasing attention. Traditionally economics has tended to ignore any regional or spatial considerations. (6,1) (6,2). Economic objectives for regional planning have therefore often been of a general kind and indeed have been characterised by not being exclusively economic. Reducing regional unemployment and promoting regional economic growth can be valid political and social objectives as well as economic ones.

Isard (6,1) has termed this omission 'the Angle-Saxon bias' and has noted that most of the theoretical work in regional economics has originated from German writers. Keith has argued that, in general, economists have little knowledge of the specific nature of functional economic linkages

within regions (6,3). This is especially true of intra-regional linkages.

However just as the physical planners have the notion that their proposals will somehow affect the pattern of economic development so too the regional economists are beginning to develop the reciprocal notion that economic development will have repercussions for the settlement pattern. Some techniques recently developed to help promote regional economic development attempt to come to terms with and even exploit this. For example both threshold analysis and the growth-centre idea operate through the medium of the settlement pattern.

But it is only slowly that attention is being directed to the important consideration of the linkages which bind settlements to their hinterlands and with the wider network of settlements. Berry has put the point quite strongly; "where an existing system is an integral part of the social and economic life of an area it must be considered in any re-planning efforts or the efforts are doomed to failure." (6,4).

Isard has posed the ultimate question ... "given a network of centres and corresponding pattern of land use along what lines should change in the structure of this network be fostered in order to attain a situation closer to the optimum." (6,1).

Christaller conceived of Central Place Theory as being concerned with the study of settlement structures at the regional level (1,1). Losch had similar views although he placed more emphasis on the patterns of economic activity. (1,2). There are therefore respected precedents for approaching regional planning and development through the medium of the

settlement pattern.

The objective of this Chapter then is to investigate the relationships between the settlement pattern and the patterns of economic activity, with the purpose of assessing whether or not Central Place Theory offers a framework for relating these two phenomena and thereby has the potential to provide a link between physical and economic planning at the regional level.

To consider first those developing countries which do not have an appropriate network of centres. The dominant regional problem in such countries is to integrate the local and regional socio-economic systems into the national one. Berry believes that in order to fulfil this goal .. "regions with insufficiently developed networks may find the establishment of new centres a priority activity." He cites Ghana, India and Israel as examples of states where such an approach has been pursued. (6,4). Venezuela is another case in point. (6,5).

It is not surprising that the different states have sought objective guidelines concerning the pattern that this proposed network should take, and not unnaturally a Central Place approach is often accepted.

In the case of Ghana, Grove and Huszar have argued that an appropriate settlement structure could be constructed by using Central Place Theory (6,6). In this instance it is not only advocated that ~~kkkk~~ services be distributed according to the theory but that manufacturing industry should be dovetailed into this structure where it is appropriate to do so. Thus, "Footloose factories that are able to operate economically almost

anywhere in a given region ... should be located in the service centres - the larger and more complex factories in the higher grade centres." Alternatively, "Places with rooted industries such as mining and Hydro-Electric Power Stations should, so far as is possible, be developed as service centres for their areas."

Grove and Huszar justify this approach by arguing that "the art of regional planning is to balance all the factors so that the optimum pattern is achieved." A correct hierarchy of centres will play a major role in achieving this goal. Economies of scale will be achieved by allowing specialisation at the appropriate levels in the hierarchy. At the same time the alternative evil of excessive concentration in a few centres is avoided. Further, "a proper distribution of service centres can create a new sense of social and political unity in the country's various regions by preventing the drift of the most energetic and ambitious people to the big cities and making maximum use of resources." Dickinson's view that "It is the cultural leadership of the major centres that sets the pace of progress for the regions" is endorsed. (6,7).

Finally Grove and Huszar invoke the argument that a recognised hierarchy allows a proper economic distribution of infrastructural investments to take place, for example in roads, water and other basic services, according to a set of rational priorities.

In Western societies examples of explicit uses of Central Place Theory seem to be restricted to aiding the rationalisation of settlement patterns in the hope of countering regional decline. This is especially

true of rural areas. Berry quotes the use of Central Place Theory for such purposes in rural Iowa and Saskatchewan (6,4). Nearer to home Northumberland County Council have formulated policies to counter decline in the rural areas of that county by making use of Central Place Theory. (6,8).

Berry has analysed data that is available from North America and suggests that although the range of goods and services (in the classical Central Place sense) is greater in less densely populated areas it is normally not sufficient to provide thresholds of equivalent size to those in the more thickly populated areas. Hence towns in the less densely populated areas tend to have a smaller sized market and consequently a narrower range of goods, and as a result of this smaller economic base, the population of the towns themselves are much smaller. (6,4). To pursue the case further, the attraction of these centres for purposes of economic development is low. The basic elements of a whole social and economic system are at the same time both dependent upon each other and are geared to supporting one another. Basic to this is population size. Thus as the level of population falls it becomes progressively more difficult to justify the provision of a full range of supporting functions which help to provide external economies to firms operating from those settlements. For example good transport connections for freight and passengers, technical colleges for training skilled labour, professional services and an adequate ~~sized~~ labour force. Moreover, these centres invariably find themselves at the end of the queue for modern infrastructural developments, for example S.T.D. telephone services.

When Northumberland County Council resolved to combat the declining population of their rural areas they correctly recognised that the ~~xxxx~~ various facets of the problem were closely linked together, (6,8), and that once decline became entrenched, then the downward spiralling effect would be all that harder to arrest. An approach to the problem through the medium of the settlement pattern was decided upon as this was considered the most effective way to tackle the problem.

Full recognition was given to the indispensable roles that the market towns play and would continue to play in the future economic and social life of the region. These were the lynch-pins in the whole socio-economic network of the region. Of all the existing centres they alone were capable of providing satisfactory locations in which to concentrate efforts to attract industry by virtue of their size, and actual and potential range of facilities, including labour. Moreover, these points provided the best locations from which contact could be made with the wider system of centres and the linkages which bind these together. It is not an understatement to argue that without these centres the whole region would cease to function efficiently.

Accordingly the four market towns of the region (plus one other strategically located settlement) were designated as 'major' growth centres or 'anchorage points' to which industry should be primarily, though not exclusively directed. At the same time they would continue in their traditional roles as market centres. To maintain the wider fabric in the more isolated rural areas further 'support points' were chosen from among

suitable villages. The function of these centres was to supply the more frequently demanded goods and services, for example Post Office, primary schools and grocers. Thus the hierarchy was complete.

The opposite extreme to the problem of declining rural regions is the problem of excessive dominance by one or a few large centres. The Barlow Commission was of the opinion that this was the case with Great Britain and so it argued that the concentration of economic activity, especially in the case of London, should be lessened. (6,9).

Despite successive attempts to achieve this aim, albeit somewhat half-heartedly, it is a common feature to see large cities increasing their share of a nation's total population. The following table illustrates this.

	c. 1950		c. 1960	
	Population (millions)	% of national total.	Population (millions)	% of national total.
London	10.95	22.4	11.55	22.5
Paris	6.74	15.7	7.81	16.8
Tokyo	9.0	10.9	13.63	14.6
Moscow	5.6	3.3	7.88	3.8

Source: Hall, P. 'World Cities'. (6,10).

A better example than the case of Hungary would be hard to find to illustrate how potent this force for continued concentration of activities is, once the process has begun. Hungary is a good example because of the existence of both an excessive concentration of activities in one city,

Budapest, and a government committed to reducing this concentration.

In almost every field of economic, social, cultural and political activity, efforts were historically concentrated in Budapest, while the provinces have largely been neglected. The present distribution of population reflects this. In 1960 over 20% of Hungary's total population resided in Budapest, a figure which accounted for half the national urban population. Budapest was more than twelve times the size of the next largest town. (6,11) (6,12) (6,13).

The spatial pattern of industrial activities is one typified by the concentration in the provinces of industries which require few constant contacts with other economic units. Examples are the food industries, craft-type industries, the processing of natural resources (coal, bauxite and limestone) and the manufacture of simple finished products or standard component parts, mainly for assembly in Budapest. In contrast Budapest contains those industries which require constant access to a wide variety of other economic activities often of a specialised character, for example technical research which would not be as readily available in the provinces. Thus industry located in Budepest enjoys valuable external economies, and is able to concentrate on the production of more complex and sophisticated goods. In 1960 Budapest had 46.8% of Hungary's industrial labour force, yet produced 52% by value of the national industrial output.

Thus Isard's question as to what steps need to be taken to steer change so that a settlement structure closer to the optimum results, would seem to be very relevant to Hungary. To promote further industrial

development in the regions could well place the industries concerned of being in the position of having to bear excessive costs relative to a location in the Metropolis. The existing structure of the settlement pattern runs counter to an ideal resolution of two stated aims of economic policy; those of promoting maximum economic growth and allowing each region its fair share in the growth.

This is a particularly sticky problem at the moment. The past couple of decades has seen the industrial balance altered in favour of the provinces, but this has been largely on the basis of expanding the processing of basic resources at their source. The potential for further expansion in this field is very limited. The future growth of Hungarian industry is to be built around a specialisation in engineering, an industry which is characterised by its requirements for close linkages with other spheres of economic activity.

In general terms, Dickinson has argued that ... "the stronger the interlinkages of a concern the stronger does it seek for a place in the economic system, whereas concerns with few needs for such regular contacts .. can well be sited on the periphery or even right outside the urban system." (6,14) Ceasar has noted that the need to assemble and distribute large numbers of component parts is a dominant characteristic of modern manufacturing industry. In this context Ceasar, with reference to Britain, lays emphasis on the transport pattern which, as it exists, favours the existing large centres, particularly the English 'coffin', i.e. that area about the London-Manchester axis so called on account of its shape. (6,15).

Accordingly those centres outwith this area will suffer from an economic disadvantage. Thus if the location of economic activities is left to the 'free market', then the area known as the 'coffin' will tend to benefit at the possible expense of outlying areas.

This conclusion is very much in line with that of Perloff et al, who, with reference to the U.S.A. conceive: of a heartland of economic activity in the North East, which is linked to the rest of the country, its hinterland, by inward flows of food and basic commodities and outward flows of sophisticated manufactured goods and services (6,16). Ullman has documented this pattern in some detail and has shown how innovation, decision making, the control and shaping of ideas are all concentrated in large centres, primarily in the North East, but with a small number of lesser centres, such as for example San Francisco dn the West coast and Houston in the South West (6,17). The comparison with Hungary is obvious even though the two states operate on vastly different scales and on the basis of equally different institutions.

In general, one message of these examples is clear. Footloose industries (and other forms of economic activity) maybe footloose within the bounds of certain constraints, but assuming that maximum profit is a goal then the larger cities, by virtue of the greater external economies they can offer, are more likely to attract these industries. Thus it is fair to conclude that the nature of the settlement structure does deserve further attention, particularly for the purpose of regional planning and development.

Friedmann, writing in a similar vein, argues that it is possible to assert some empirical generalisations 'whose validity has been established reasonably well.' (6,18). These are:-

a) "The structure of human settlements can be defined as a system of nodes and functional linkages.

b) Nodes are arranged into a loose hierarchical structure which is internally differentiated by function.

c) Surrounding each node is a 'density field' of functional interaction, the densities declining with increasing distance from the centre.

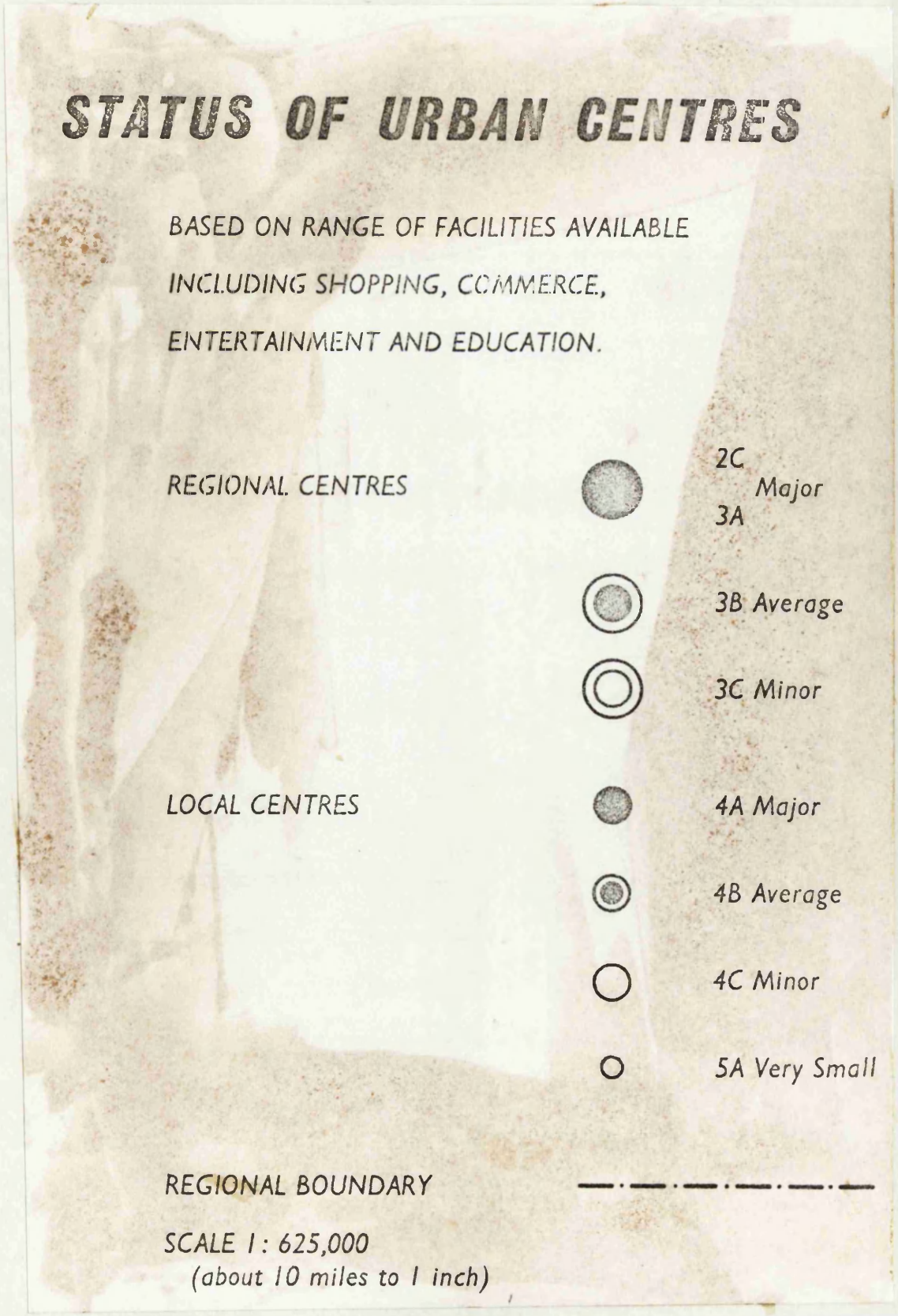
d) The cost of overcoming distance exerts a pervasive influence on the distribution of activities in space as well as on the level of activity at any given location."

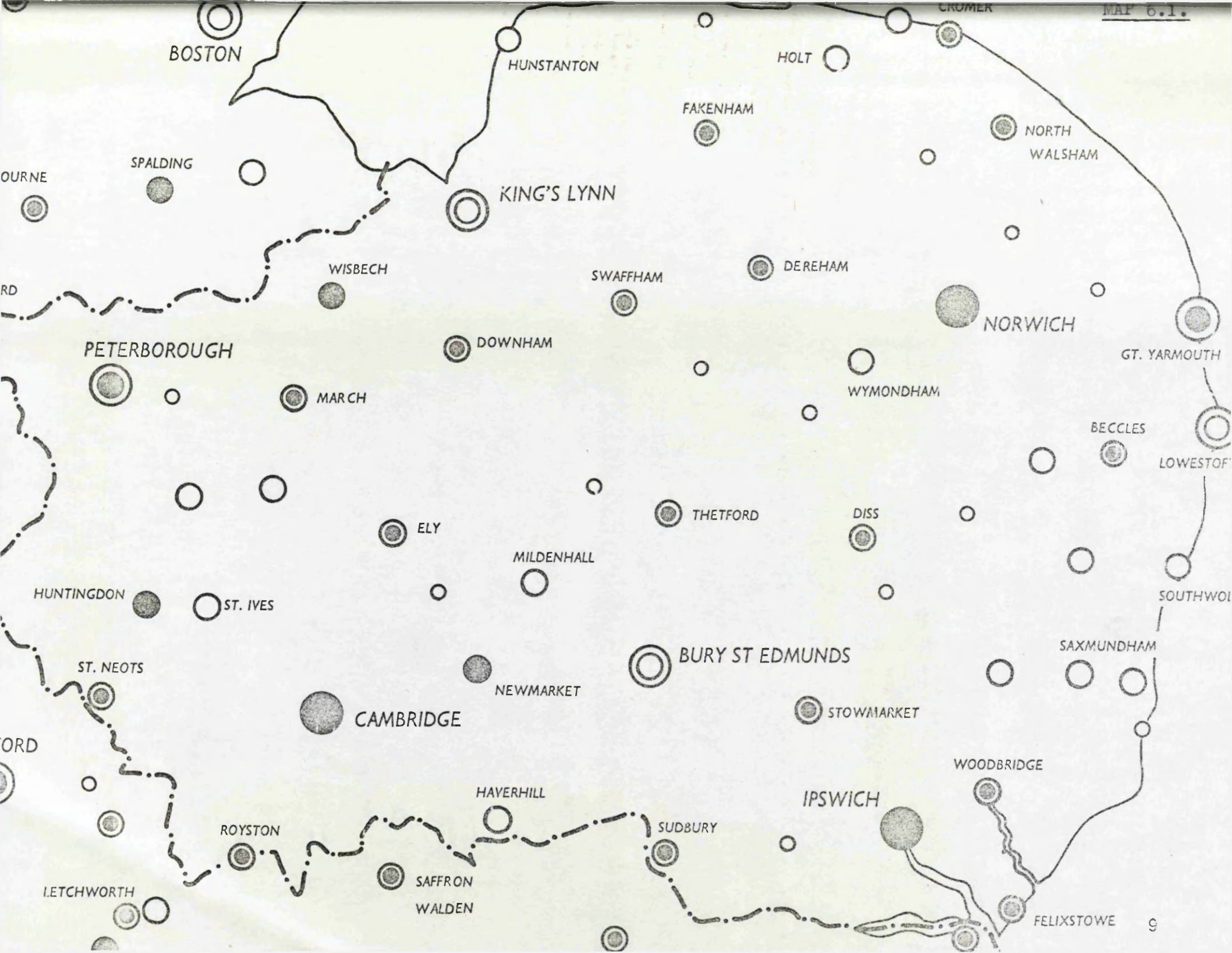
Friedmann points out that, "although these generalisations do not constitute a systematic body of theoretical propositions, they do strongly suggest that there is a certain regularity and order in the structure of space as it is shaped by human activities ... These propositions are capable of mathematical formulation; moreover, the results of any density distribution can be mapped."

Maps 6.1 and 6.2 illustrate this in relation to East Anglia. Map 6.1 shows the settlement hierarchy, defined according to classical Central Place Techniques, while map 6.2 shows a set of density fields about a number of different sized nodes and a set of linkages existing between these.

MAP 6.1.

A hierarchy of settlements in East Anglia. (Source: East Anglia - a Regional Appraisal. East Anglia Consultative Committee.



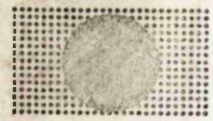

BOSTON
HUNSTANTON
CROMER
HOLT
FAKENHAM
NORTH WALSHAM
SPALDING
OURNE
KING'S LYNN
WISBECH
SWAFFHAM
DEREHAM
RD
NORWICH
PETERBOROUGH
DOWNHAM
GT. YARMOUTH
MARCH
WYMONDHAM
BECCLES
LOWESTOF
THETFORD
DISS
ELY
MILDENHALL
HUNTINGDON
ST. IVES
SOUTHWOL
SAXMUNDHAM
BURY ST EDMUNDS
ST. NEOTS
NEWMARKET
CAMBRIDGE
STOWMARKET
ORD
WOODBRIDGE
HAVERHILL
IPSWICH
ROYSTON
SUDBURY
SAFFRON WALDEN
LETCHWORTH
FELIXSTOWE

MAP 6.2.

The system of nodes and linkages in East Anglia. (Source: East Anglia - a Regional Appraisal. East Anglia Consultative Committee.

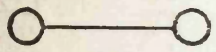
DOMINANT AND INTERMEDIATE AREAS

SCALE 1 : 625,000
(about 10 miles to 1 inch)



DOMINANT CENTRES

INTERMEDIATE CENTRES

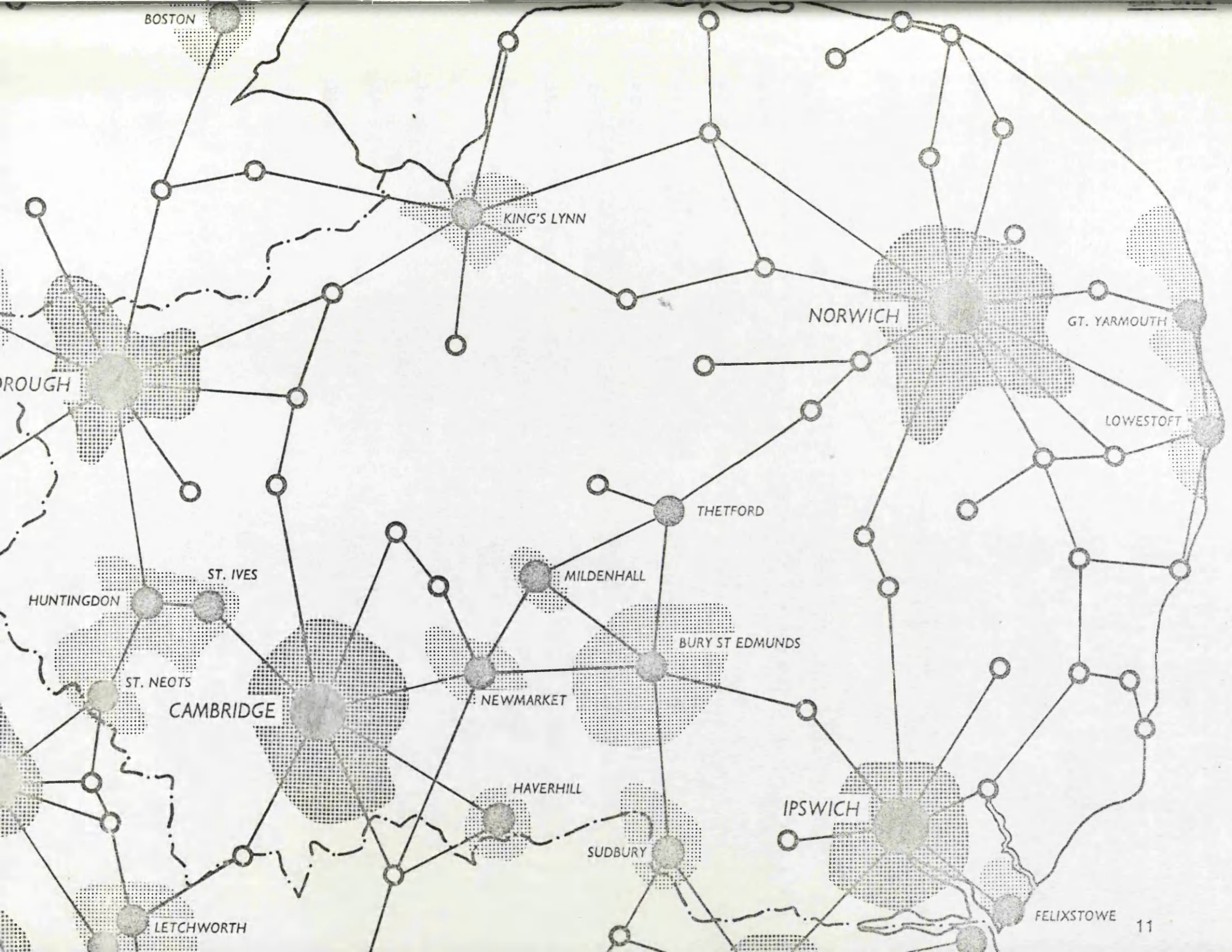


ASSOCIATED TOWNS (Main Linkages)

THE SHADED AREAS CONTAIN MOST OF THE SUBURBAN SETTLEMENTS AND ACTIVITIES CLOSELY ASSOCIATED WITH EACH MAIN CENTRE.

This diagram is derived from available information and is intended to convey a broad indication of the overall situation.

REGIONAL BOUNDARY


BOSTON
KING'S LYNN
NORWICH
GT. YARMOUTH
LOWESTOFT
ROUGH
THETFORD
MILDENHALL
ST. IVES
HUNTINGDON
BURY ST EDMUNDS
ST. NEOTS
CAMBRIDGE
NEWMARKET
HAVERHILL
IPSWICH
SUDBURY
FELIXSTOWE
LETCHWORTH

Although, as Friedmann suggests, it should be perfectly feasible to construct mathematical formulae to express these relationships, it is another matter to deduce realistic quantitative measures to test these relationships. Thus map 6.2 is merely an impressionistic picture of the generalisations expressed above. Its value lies in helping to clarify the concepts involved.

Any examination of the relationships between patterns of economic activity and settlement networks (and this Chapter does not attempt to give a comprehensive review of these) reveals that they are extremely complex. But one obvious point to emerge from this hitherto wide-ranging discussion is that the settlement pattern and the pattern of economic activity are not unconnected. The settlement pattern does not merely reflect the pattern of economic activity, but is a factor conditioning it. It is therefore a suitable subject for further study. As Friedmann has suggested it should be capable of a more rigorous theoretical formulation.

So even at this stage it is self-evident that any rigid division between the process of regional physical and regional economic planning is artificial. A policy designed to direct change in the overall settlement pattern along certain pre-determined courses and according to stated objectives, would appear to be a viable policy for regional development. Thus the policy adopted for rural Northumberland (6,8) and as advocated for Ghana (6,6) would seem to be valid ones. Similarly the concept of the growth pole, whether as a tool for reviving a declining area or as a countermagnet to overconcentration, would seem tc be conceptually valid.

Success in these endeavours would however depend on the selection of suitable 'nodes' to be developed. Attention must therefore be paid to the pattern of existing socio-economic networks as Berry has so strongly argued (6,4).

But still, as Friedmann admits, there is as yet no widely accepted body of theory which satisfactorily relates all the considerations involved, and which therefore could be of help in allowing the choice of suitable locations to be made on a more scientific basis. However there are many obvious parallels with Central Place Theory, especially if Friedmann's four points are taken as the essence of the problem. Certainly for rural areas the patterns of economic activity revolve around a set of nodes whose overall structure can be explained in terms of Central Place Theory. In this case a suitable selection of centres can be made with some certainty. The example of Northumberland showed this.

A further justification for arguing that Central Place Theory may provide a basis for relating the settlement pattern to the distribution of economic activity is provided by Clark (6,19). Clark notes that the historic development of an economic system can be typified as having passed through a number of stages. Viewed simply, the first stage is predominantly agricultural; secondly there is the industrial stage; and thirdly there is the post-industrial stage where the tertiary sector of economic activity becomes dominant in terms of employment and value of output.

As Clark suggests, the location of tertiary activities is closely related to the distribution of population. On the basis of Central Place

Theory, the development of the tertiary economic sector would tend to work in favour of those centres which are in the most advantageous position as regards access to the population. In Central Place terms, the central cities.

Clark does produce evidence to show that the ... "principle function of the (larger) city is now the provision of goods and services, rather than manufactures, and will be so to an increasing degree in the future." This is a key point as it is virtually repeating Christaller's contention that the 'raison d'etre' of cities is to act as centres for the distribution of goods and services. (1,1).

Under these conditions Central Place Theory would provide the ideal framework with which to identify the existing socio-economic networks. On such a basis key settlements for the purpose of promoting economic growth could be identified and accordingly subjected to a programme of development designed to increase their attractiveness to the type of industry which would be appropriate. Thus change in the structure of the settlement pattern could be steered with a reasonable expectation that, all other things being equal, it would condition the pattern of economic development in accordance with stated policy objectives.

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Chapter Seven. Some Concluding Remarks.

This paper has been written around a review of some actual and potential contributions that Central Place Theory is able to make to Town and Regional Planning.

As originally conceived by Christaller, the theory was supposed to offer an explanation of the number, size, location and spacing of settlements and was based on the belief that the main function of settlements was the provision of goods and services, or in Christaller's own terminology, the provision of Central Place Services.

However, subsequent use of Central Place Theory has concentrated on the analysis of the location of commercial services, in particular retailing, as a subject worthy of consideration in its own right. As a result, central place theory has been interpreted and re-written with this in mind. Christaller's original aim of developing a theory to explain the overall settlement pattern has therefore often been relegated to a secondary role.

It is thus apparent that there are two levels of Central Place thought - the macro level concerned with the overall settlement pattern, and the micro level which deals with specific service industries.

Despite the emphasis placed upon the micro aspects of the theory, this paper has argued that Central Place Theory is able to make a valuable contribution to the study of settlement patterns, even though

a complete analysis of many examples would require consideration to be given to other factors in addition to those Christaller took into account.

Chapter Six was built around the theme of Regional Economic Development, but it should be noted that for the purposes of developing models of an optimum settlement pattern, objectives other than that of economic development will need to be considered. If this is not the case then the model cannot claim to be an optimum one. Von Boventer and Clark have both made suggestions concerning these additional objectives. (7,1) (7,2).

Von Boventor considers that 'one of the measures to be taken by public policy in the field of regional planning is the equalisation of marginal private and marginal social costs.' In effect Von Boventer is saying that the actions of private enterprise should not, ideally, lead to a situation where excessive costs are placed on the local authorities or government, the converse of this also being true.

A case in point may be the excessive concentration of offices in Central London, which generates a need for a tremendous investment in public transport to cater for peak period travel, but which at other times has only marginal utility.

A second objective is advanced by Clark, who formulates a working definition of what he considers to be an optimum settlement pattern. (7,2). He suggests that 'a city cannot be said to be of optimum size

unless it can provide its own inhabitants and the inhabitants of the surrounding region with at any rate all but the most specialised of services.' Clark therefore seems to be suggesting that the provision of social, cultural and other facilities are suitable considerations for planning. In contrast to macro theory, micro Central Place Theory, as a body of consistent and comprehensive thought, is quite well developed. So too are a number of practical, including quantitative, techniques which have been developed to aid the practical application of micro Central Place Theory.

The main problems of micro theory appear to be in this latter field, and over the question of applying Central Place Theory in an urban environment.. Chapter Three outlined the outstanding questions which are of concern to the practical application of micro Central Place Theory.

In essence, Central Place Theory, at both the macro and micro levels, constitutes a consistent body of thought which provides an objective framework for relating the spatial dimensions of various kinds of human activity. It therefore offers a basis for developing models to co-ordinate these spatial considerations so that the maximum advantage can be achieved with the minimum of cost and inconvenience. Central Place Theory, seen in this light, thus has a valuable role of play in both Town and Regional Planning.

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APPENDIX A.

The list of indicators used to rank centres in the North West of England by the Haydock Study. (3,6).

		Source
a) Banks	Lloyds Bank Ltd.	Telephone Directory 1961.
	Midland Bank Ltd.	" " "
b) Variety Stores	Marks and Spencer Ltd.	" " "
	British Home Stores	" " "
	Littlewoods Store	" " "
	F.W. Woolworth & Co. Ltd.	" " "
c) Department Stores	As found in 'Stores and Shops Retail Directory, 1963.	
d) Chain Stores	H. Samuel Ltd.	Telephone Directory 1961.
	Radio Rentals	" " "
	G.A. Dunn Ltd.	" " "
	Curry's Ltd.	" " "
	Montague Burton Ltd.	" " "
	Singer Sewing Machine Co.Ltd.	" " "
	Wm. Timpson Ltd.	" " "
e) Markets	Type: Size in Square Yards Days of Week.	Markets Year Book 1963.
f) Theatres, etc.	Rank Circuit	Kine Weekly Year Book 1963
	A.B.C. Circuit.	" " " " "
	Total Number of Theatres	Stage Year Book 1963
g) Building Societies	Totals of Head Offices, Branches and Agencies for all Building Societies.	) Building Societies) Year Book 1963.