

places	waste); Omaha NE (the '800' phone exchange centre); Detroit and Flint MI (cars)	credit card bills), some located near a natural resource (e.g. mining centre) or government function (e.g. Social Security main office in Baltimore MD)
Third World entrepôts (warehouses)	Border cities such as San Diego CA; Tijuana, Mexico; Miami FL	Trade and financial centres for importing, marketing and distributing imported goods, including illegal goods such as drugs and pirated music; major labour centres because of their large numbers of low-paid workers in sweatshop manufacturing and tourist-oriented jobs such as hotel maids
Retirement centres	Tampa FL; Sun City AZ	Home to growing numbers of ageing Americans. Range: affluent towns that maximise services to less affluent cities dependent on pensions, social security and other public programmes to support the local economy
Leisure-tourist playgrounds	Tahoe City CA; Las Vegas NV; Atlantic City NJ; Disney World FL; Williamsburg VA	Range: theme parks, sport resorts, spas to gambling meccas, historical places, and cultural capitals
<p><b>Sources: adapted from J.Logan and H.Molotch (1987) <i>Urban Fortunes</i> Berkeley CA: University of California Press; E.Phillips (1996) <i>City Lights</i> New York: Oxford University Press</b></p>		

with a major reformulation proposed by Losch (1943).<sup>12</sup>

## CENTRAL-PLACE THEORY

Christaller's spatial-equilibrium theory is fundamentally economic in approach and sets out to predict how, through competition for space, an optimal pattern of settlement will emerge. Like all models, central-place theory represents a simplification of reality and is predicated on a number of assumptions (Box 6.2).

### Economic principles and geometry

Christaller's theory applied to those settlements that are predominantly concerned with serving the needs of the surrounding area. The significance of this service role cannot be measured simply by the population of the place. While population may be

#### BOX 6.2

Assumptions underlying Christaller's central-place theory

1. There is an unbounded uniform plain in which there is equal ease of transport in all directions. Transport costs are proportional to distance and there is only one type of

transport.

2. Population is evenly distributed over the plain.
3. Central places are located on the plain to provide their hinterlands with goods, services and administrative functions.
4. Consumers minimise the distance to be travelled by visiting the nearest central place that provides the function that they demand.
5. The suppliers of these functions act as economically rational human beings, that is, they attempt to maximise their profits by locating on the plain to obtain the largest possible market. Since people visit the nearest centre, suppliers will locate as far away from one another as possible so as to maximise their market areas.
6. They will do so only to the extent that no one on the plain is farther from a function than he or she is prepared to travel to obtain it. Central places offering many functions are called higher-order centres; others, providing fewer functions, are lower-order centres.
7. Higher-order centres supply certain functions that are not offered by lower-order centres. They also provide all the functions that are provided in lower-order centres.
8. All consumers have the same income and the same demand for goods and services.

a measure of absolute importance it is not a measure of a settlement's *centrality*. Centrality is the degree to which a place serves its surrounding area, and this can be gauged only in terms of the goods and services offered. Clearly, there are different orders of goods and services: some are costly, bought infrequently, and need a large population to support them (e.g. furniture, jewellery); others are everyday needs and require a small population (e.g. groceries). From this two concepts emerge:

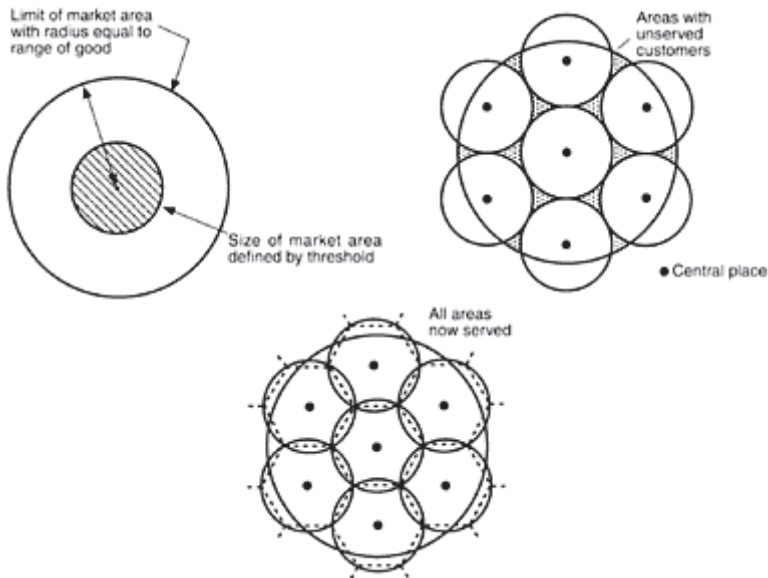
1. *The threshold population*. The threshold is defined as the minimum population required for a good or service to be provided that is, the minimum demand to make the good or service viable.
2. *The range of a good*. This is the maximum distance which people will travel to purchase a good or service. At some range from the central place, the inconvenience of travel as measured in time, cost and effort will outweigh the value of or need for the good.

From these two concepts an upper and a lower limit can be identified for each good or service. The lower limit is determined by the threshold, the upper limit by the range. Ideally each central place would have a circular trade area. It is obvious, however, that if three or more tangent circles are placed in an area, unserved spaces will exist. In order to eliminate any unserved areas the circular market areas must overlap and, since people in these overlap zones will choose to visit their nearest centre in keeping with the assumption of minimum movement, the final market areas must be hexagonal (Figure 6.1). The resulting hexagonal pattern is the most efficient way of packing market areas on to the plain to ensure that every resident is served.

Christaller started by identifying typical settlements of different sizes in southern Germany. He then measured their average population, distance apart, and extent of their hexagonal tributary areas. Christaller also stated that the number of central places at each level of the settlement hierarchy follows a fixed ratio (the K value) from the largest

*Landeshauptstadt* (regional capital) to the smallest Marktort (hamlet) (Table 6.5). In its simplest terms, therefore, Christaller's model proposed that settlements with the lowest level of specialisation (*Marktort*/hamlet) would be equally spaced and surrounded by hexagonally shaped hinterlands. For every six hamlets there would be a larger, more specialised central place (*Amtsort*/township centre) which would be located equidistant from other township centres. The *Amtsort* would have a larger market area for specialised services not available in the hamlet. Further up the hierarchy even more specialised settlements would also have their own hinterlands and would be located an equal distance from each other.

In the basic model the smallest centres would be spaced 7km apart. The next higher centres would serve three times the area (and therefore three times the population) of the lower-order centres, and would be located  $\sqrt{3} \times 7 = 12\text{km}$  apart. Similarly, the trade area of centres at the next higher level of specialisation would again be three times larger (Table 6.5). This kind of arrangement is called a K-3 hierarchy; in it the number of central places in the settlement hierarchy follows a geometric progression: 1, 3, 9, 27, etc. Thus lower-order centres, in order to be provided with higher-order goods and services, nest within the tributary areas of higher order places according to a definite rule (the K value).



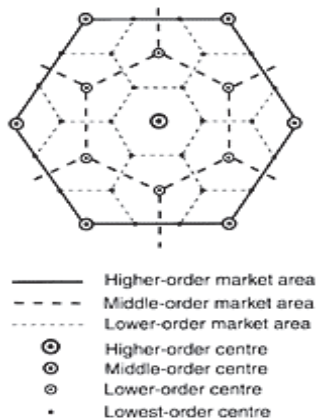
**Figure 6.1 Deriving the hexagonal pattern of market areas for central places**

**TABLE 6.5 CHARACTERISTICS OF CENTRAL PLACES IN SOUTHERN GERMANY**

Place	No. of places	Distance apart (km)	No. of complementary regions	Range of region (km <sup>2</sup> )	Area of region (km <sup>2</sup> )	No. of types of goods offered	Typical population	
							Place	Region
Marktort	486	7	729	4.0	44	40	1,000	3,500
Amtsort	62	12	243	6.9	133	90	2,000	11,000
Kreisstadt	54	21	81	12.0	400	180	4,000	35,000
Bezirksstadt	18	36	27	20.7	1,200	330	10,000	100,000
Gaustadt	6	62	9	36.0	3,600	600	30,000	350,000
Provinzhauptstadt	2	108	3	62.1	10,800	1,000	100,000	1,000,000
Landeshauptstadt	1	186	1	108.0	32,400	2,000	500,000	3,500,000

**Source:** W.Christaller (1933) *Die zentralen Orte Suddeutschenland* Jena: Fischer, translated by C.W.Baskin (1966) *Central Places in Southern Germany* Englewood Cliffs, NJ: Prentice-Hall

A settlement pattern with these features exhibits what Christaller has called the *marketing principle*. In this, the major factor influencing settlement distribution is the need for central places to be as near as possible to the population they serve. Thus the K-3 hierarchy and nesting pattern produce the



**Figure 6.2 Hierarchical and spatial arrangement of central places**

maximum number of central places in accordance with the notion of movement minimisation (Figure 6.2).

By applying the economic principles in conjunction with the geometric properties of the theory plus the simplifying assumption of an isotropic surface, Christaller derived his general model of the location, size and spacing of settlements.

### **An assessment of central-place theory**

The main criticisms directed at central-place theory are the following:

1. The theory is not applicable to all settlements. Being limited to service centres, it does not include some of the functions, such as manufacturing industry, that create employment and population.
2. The **economic determinism** of the theory takes no account of random historical factors that can influence the settlement pattern.
3. The theory makes unrealistic assumptions about the information levels and mental acumen required to achieve rational economic decisions, even if profit maximisation were the only goal of human behaviour.
4. The notion of a homogeneous population ignores the variety of individual circumstances.
5. Christaller's model assumed relatively little governmental influence on business locational decisions, whereas today national and local governments play a major role in influencing business locations by, for example, offering grants to attract electronics firms into Scotland's 'Silicon Glen' or the lobbying by US sunbelt city mayors to attract investment to their cities.
6. Central-place theory is a static formulation that relates to the distribution of service centres under assumed conditions at one point in time. A particular level of mobility is implied by the assumption that consumers look to their nearest central place to satisfy their needs. Levels of personal mobility have increased greatly since the model was proposed. Consumers do not always visit their nearest store, and multipurpose shopping trips often result in low-order centres being by-passed for low-order goods, thus leading to their decline. Even in the classic field-study area of Iowa, economic restructuring and improved transportation infrastructure have undermined the 'nearest neighbour' travel patterns of earlier generations. Also, in many advanced countries, today telecommunications and 'tele-shopping' have further eroded the 'frictional effect' of distance on consumer behaviour.

Christaller (1966 p. 84) was not unaware of the temporal limitations of his theory, pointing out that:

the stationary state is only fiction whereas motion is reality. Every factor which adds to the importance of the central place regional population, supply and demand of central goods, prices of the goods, transportation conditions, sizes of the central places and competition between central and dispersed production of a good is subject to continuous change.<sup>13</sup>

Unfortunately, he did not translate these qualifications into a dynamic model of the functional and spatial dimensions of the urban system. Accordingly, the relevance of central-place theory in explaining current settlement patterns is limited. However, recognition of the limitations of central-place theory is not the same as rejecting it. Even as an ideal, the theory is useful. Study of where theory and reality diverge can lead to explanation. Kolars and Nystuen (1974 p. 73) suggest that the main contributions of both Christaller and Losch 'have been as much to stimulate further geographical thought as to give us any absolute explanations of the real world'.<sup>14</sup> While there is little evidence of a complete central-place settlement structure emerging in the real world, the theory has stimulated much work in relation to retailing and consumer behaviour, and, as we see below, in the fields of physical and social planning.

### Applications of central-place theory

Central-place ideas have been employed widely in regional-planning schemes in the USA, Canada, Africa, India, Europe and the Middle East." For example, an Israeli settlement on the Lakhish plains to the east of the Gaza Strip was based on a three-level hierarchy of:

1. 'A' settlements of various types (including protective border kibbutzim) housing immigrant settlers and serving as agricultural centres containing facilities used daily;
2. 'B' settlements (rural community centres), each planned to serve four to six 'A' settlements and to supply facilities and buildings used by them once or twice a week;
3. 'C' settlements (regional centres), towns roughly at the geographical centre of their region, providing administrative, educational, medical and cultural facilities, and with factories for crop-processing.

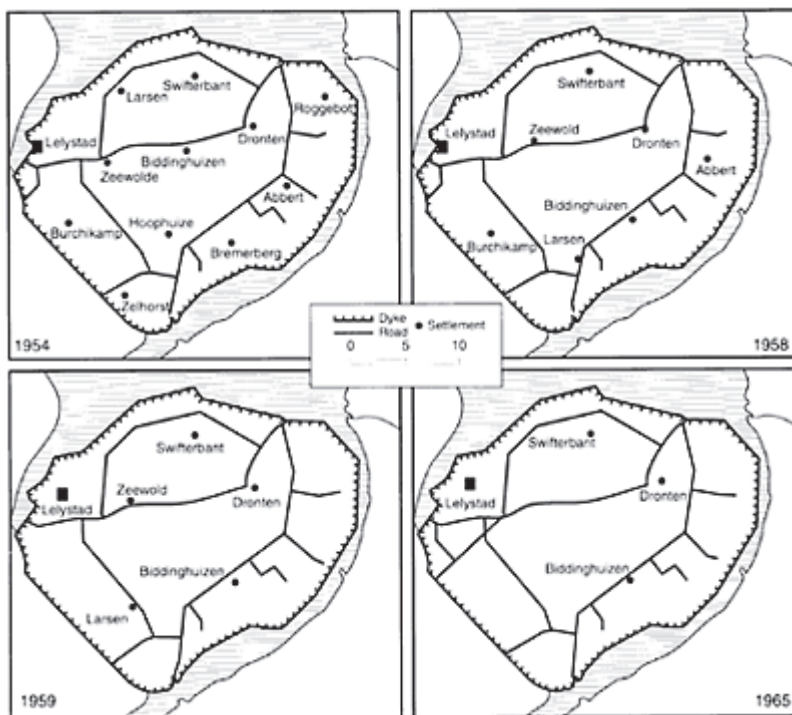
The most clearly articulated application of central-place principles has occurred in the Dutch polder-lands.<sup>16</sup> The increasing importance attached to a planned settlement pattern can be seen by tracing the development of the Wieringermeer, drained in 1930, and the north-east and east Flevoland polders, drained in 1942 and 1957 respectively.

In the first polder the location of the villages (service centres) was not successful. The settlement pattern did not conform to any model distribution, with the planners expecting that a spontaneous process of settling would lead to certain clusters at road intersections. As a result, the three regional villages of Slootdorp, Middenmeer and Wieringerwerf were clustered in the middle of the polder, which meant they had overlapping trade areas and that people living well away from the villages were inconvenienced by long journeys. The lower than expected population growth on the polder exacerbated the problems, with small villages incapable of providing a satisfactory level of service.

In the second, north-east, polder a settlement pattern was carefully planned in an attempt to avoid the mistakes of the Wieringermeer. Since it was one of the few places in the world where no historical or physical obstacles frustrated the realisation of a theoretical spatial model, Christaller's hierarchical system was applied with some modifications. In the middle of the area a regional centre, Emmeloord, was founded (with a target population of 10,000), with ten surrounding villages as local service centres each with target populations of 1,000-2,000. Despite this careful planning, however, the settlement pattern quickly demonstrated a number of shortcomings. Because of

agricultural mechanisation and the reduced demand for labour, the populations of most villages did not reach the target (threshold) figure and this made it difficult to keep the services feasible and the community viable. Paradoxically, Emmeloord grew more rapidly than anticipated. This was due to the increased **accessibility** to the rural population of the varied services in the regional centre, largely as a result of the general increase in mobility engendered by the spread of the motor car in the 1960s.

Experience gained in the first two polders was applied to the settlement of East Flevoland. The initial settlement plan had been similar to that of the north-east polder, with ten 'A' centres having a local-service function surrounding a single 'B' or district centre, Dronten. A 'C' centre, Lelystad, the capital of the polder's province, was planned at the junction of the four polders but in the western corner of East Flevoland (Figure 6.3). Because of the diminishing importance of farm employment and the increasing affluence, aspirations and mobility of the population, this pattern was reduced to only four villages in 1959 and eventually to two by 1965 (Figure 6.3). The declining significance of agricultural employment over the course of the development of the first three polders also influenced the location and population composition of settlement in the later southern Flevoland and Markerwaard polders, with less emphasis on placing villages to serve the needs of farming, and the introduction of commuters and other non-agricultural workers from Randstad Holland. The fact that in Southern



**Figure 6.3** The changing settlement pattern of East Flevoland

Flevoland, an area within the sphere of influence of Randstad Holland (see Box 8.3), no thought was given to a system of service centres set up according to a hierarchically arranged pattern of villages suggests that in such pressured Durban” areas classical central-place theory is of limited relevance.

### Reconstructing central-place theory

The highest central place in Christaller’s model is the regional capital (*Landeshauptstadt*) of 500,000 people and regional population of 3.5 million (Table 6.5). The omission of higher levels in the settlement hierarchy reflects the model’s basis in southern Germany. Since the time of its inception, globalisation has increased the importance of world or global cities (see Chapter 14), meaning that a modern reconceptualisation of Christaller’s model would incorporate at the apex of the hierarchy:

1. *global cities*, typically with 5 million or more people within their administrative boundaries and up to 20 million in their hinterlands (for example, New York or London);
2. *subglobal cities*, typically with 1 million to 5 million people and up to 10 million in their hinterlands (for example, national capitals as well as commercial capitals that are not global cities, such as Milan or Barcelona).

As a consequence of increased personal mobility, places at the lower levels of Christaller’s hierarchy have declined in significance as central places having lost any service functions (such as a village store) to become mainly residential villages. Only the *Bezirkstadt*, with a population of 10,000 and service hinterland of 100,000, retains a significant service function (with, for example, a superstore and limited range of national chain stores). Some of the most significant changes have affected settlements at the next two higher levels, typically county market towns found across much of Southern England, Southern Germany and most of France. Many of these have grown because in depopulating regions they have attracted population outflow from surrounding rural areas, and in more prosperous regions have attracted much of the out-migration from major cities.

### DIFFUSION THEORIES

As we have seen, one of the most serious disadvantages of Christaller’s theory is its static nature, which does not enable it to respond easily to changing social and economic conditions. This has led some writers to suggest that attempts to understand ‘natural’ as opposed to planned settlement patterns in terms of spatial equilibrium theory are of limited value. An alternative, which explicitly acknowledges the importance of the time dimension and historical perspective, is to examine the processes by which settlement spreads across a region from the initial point of colonisation. A number of models have been devised.