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Abstract

Comparative studies of urbanisation can be characterized by their emphasis on the quantitative and visual aspects of urban growth, which is amongst other things reflected in the analysis of spatial patterns and rates of urban population growth. The visual aspects relate both to the spatial realisation of the demand for urban land use and its functional variation. This emphasis can be understood from the perspective of the ongoing process of urban industrial growth in the industrialised countries during the 19th and most of the 20th century. Most of the concept and models we use have been developed during this period of urban transition and relate to this experience. However, in the last quarter of the 20th century this process came to an end as the urbanisation process in its present form was completed. This leads to the following questions. First, to what extent are the concepts and models derived throughout this period still valid? Second, if this is not the case, to what extent do they need adjustment and third, what kind of new approaches are required?

In this paper the focus will be cities as part of an urban system and will deal with two issues, viz. the relation between spatial scales, i.e. vertical linkages and the relation between cities, especially focussed on their horizontal linkages or network characteristics. These two issues will be discussed against the background of the completion of three long-term developments: (1) the completed first demographic transition, (2) the completed process of industrialisation and (3) the completion of three infrastructural revolutions. This analysis will indicate the direction in which the environment has changed, the consequences of this change for the conceptualisation of the process of urbanisation and for the characteristics of the process it self.

The consequences of these changes will be discussed using empirical examples from the Netherlands and other parts of Europe both for models of internal urban structure and for the city system at large. The classical unity between territory, economic and social functions is broken up and has lead to a decoupling of functions both in a spatial and in a functional sense. The latter has resulted in a process of spatial rebundling of activities.

It will be argued that new rationalities are needed to understand the contemporary realisation of the spatial outcome of the demand for space use. In addition to this, it has also been argued that new and different types of uncertainties emerge. The latter are related to the increased importance of micro processes in the demand for space use. This in turn has consequences for spatial policy, as it will lead to considerable mismatches between national planning goals and actual realisations. It is suggested that a process approach is needed to deal with these uncertainties.

Introduction.

The present spatial structure of the European settlement pattern dates back to the 14th century[1] and shows over time considerable variations in the direction and speed of the development process. During the next three centuries the rate of (urban) population growth, with the exception of the late medieval period, has been rather slow. The total population of Europe, except Russia, has reached 79 million by 1340 to grow steadily to 120 million in 1750. The real rate of growth was somewhat larger than the figures suggest, as the popula-

tion declined to about 56 million around 1400, caused by the Black Death, to recover gradually again to 76 million in 1500.[2]

The majority of the people were actively engaged in agriculture and regional trade and were living in small villages and hamlets. The largest cities of Europe around 1350 were to be found in Southern Europe and where closely linked to the maritime economy of the Mediterranean basin. From a present day perspective these cities were rather small, although it was estimated that cities like Milan and Venice might have had already a population of about 100,000 at this time. Where in Spain cities like Barcelona, Cordoba, Seville and Granada had populations between 35,000 and 50,000. The only large cities in Northwest Europe in this period were Paris (80,000), London (40,000 and Cologne (40,000). Most other towns in Northwest Europe had a population that was far below 10,000 inhabitants.[3] An exception to this is Paris, which around 1400, counted a population of 275,000. It took about 3 centuries before its population had doubled to 530,000, whereas London, as the capital of the British Empire, had experienced a more rapid growth to 550,000 in 1700 (see table 1).

Rapid urbanisation started in most European countries in the second half of the 18th century. However, unlike Asian urbanisation, the process of European urbanisation has been closely linked to the dynamics of the industrialisation process. Most of the concepts and models we use today have been developed during this period of urban transition and relate to this experience. However, in the last quarter of the 20th century this process came to an end as the urbanisation process in its present form was completed. This leads to the following questions. First, to what extent are the concepts and models derived throughout this period still valid? Second, if this is not the case, to what extent do they need adjustment and third, what kind of new approaches are required?

In this paper the focus will be cities as part of an urban system and will deal with two issues, viz. the relation between spatial scales, i.e. vertical linkages and the relation between cities, especially focussed on their horizontal linkages or network characteristics. These two issues will be discussed against the background of the completion of three long-term developments: (1) the completed first demographic transition, (2) the completion of three infrastructural revolutions and (3) the completed process of industrialisation. This analysis will indicate the direction in which the environment has changed, the consequences of this change for the conceptualisation of the process of urbanisation and for the characteristics of the process it self. The consequences of these changes will be discussed using empirical examples from the Netherlands and other parts of Europe.

Long term developments.

Demographic transition

The first demographic transition is a well-documented process that is usually characterized by three stages describing the transformation in fertility and mortality of a population, from a situation of high birth and death rates, to one with low birth and death rates. The population explosion occurs during the second stage and has had severe implications for the size and number of cities, as wells as for the densities of the (urban) population (see table 2). Already towards the end of the 18th century, one could observe an increase in urban densities caused by the growth of the population within the city walls, which was soon thereafter followed by the physical expansion of the city itself. Cities grew not only because of natural population growth, but also because of rural-urban migration. It was especially the latter process that contributed to a redistribution of the population. In the second half of the 19th and early 20th century one could, for example in the Netherlands, observe a rather strong

concentration of the population in the three largest cities, both in absolute and relative terms. By 1920 nearly 26% of the total population was concentrated in these three cities (see table 2). This high concentration decreased thereafter as far as the relative concentration of the population is concerned. In absolute numbers the urban population of these cities continued to grow until the late 1960's. At the same time one can note the rise of the medium-sized cities both in absolute numbers as in terms of their relative importance. These cities will play an important role in the network society that will be developing in the next decades.

During the 1960's and early 1970's massive sub urbanisation reached its peak in the industrialized countries of Western Europe and as a process was completed during the 1980's. It created a pattern of dispersed growth that was strongly related to increased mobility and has, for the majority of the population, been linked to automobile dependency. Presently nearly 80% of the population of the industrialized countries lives in cities.[4] The physical process of urbanisation has been completed. The demographic and socio-economic developments however continue to change both the internal structure of the cities and their external linkages. The second demographic transition contributes not only to the aging of the population and to a changed aged distribution, but also to an absolute decline of the population itself. This process will start for most industrialized countries in the second quarter of the 21st century and its possible consequences for the future of the urban landscape are presently not well understood. Socio-economic changes are closely linked to the completion of the industrialization process and to technological innovations. These continue to play an important role in the transformation of our urban society.

Infrastructural revolution and network development

Economic growth and development is closely related to the development and availability of networks. The trading and maritime networks of the mediaeval period linked cities and regions together and were instrumental in the diffusion of innovations from the Mediterranean basin to Northwest Europe and vice versa. During the last decades one can observe an increased dependence upon networks that is partly caused by an increase in communication, improved communication technology and partly by a reduction in locational ties of economic activities because of this development. One of the consequences of this development is the improvement of local and regional ties. Cities play a key role in this process of functional and spatial restructuring. Network relations, as was indicated above, have always been important for the process of economic development. New however is the increase in size, intensity and degree of interconnectedness of the linkages. This increase in the number of connections can generate a disproportionately high increase in economic growth for specific cities, which depends upon their position within the networks they belong to and their specific combination of functions. Another important consequence of the dependency of operating within a network context is the increased demand for information and knowledge. This development emphasizes the role of cities as service centres and focuses upon the accumulation, transformation and production of information and knowledge.

Differentiation in transport and communication networks is directly related to the type of interaction, the communication mode and the transport technology selected. Investments in transport systems and transport technology are discontinuous over time and serve multi-objective goals. First, within the context of budget restrictions, a choice has to be made between investments in transport systems and associated networks and type of investments. Second, once the choice has been made to invest in transportation, a subsequent choice is required to decide upon a particular type of transport technology and its related transport system. The third series of choices involves the spatial location of the in-

vestment. Thus each infrastructural investment is characterized by a combination of financial, technological and spatial decisions, which lead to a spatially uneven development.

The discontinuity of infrastructural investments is closely related to the various technological breakthroughs during the industrial revolution. These breakthroughs have contributed to structural transformation of our society and thus of our economies. N. D. Kondratieff was in the 1920's one of the first authors to describe the relation between technological innovation and economic transformation. This concept was further developed by Schumpeter (1934).

In the 1970's a renewed interest in these ideas could be observed, not only in the economic relevance of the importance of fundamental innovations, but also in their cyclical character. Van Duijn (1979), Freeman (1982), Kleinknecht (1984) and many others have empirically demonstrated that during the industrial revolution these innovations cluster and have a periodicity of about 50 years, the so-called Kondratieff waves .[5]

The industrial revolution can be characterized by several periods, each of these relates to a specific techno-economic cluster (see fig.2). As was mentioned above technological innovations are not only related to new production technologies, but also to the introduction of new transport technologies. Although the number of new transport technologies has been limited compared to other type of innovations, they have been fundamental and have far reaching spatial consequences. The technological development of the steam engine during the first industrial revolution paved the way for the railway and shipbuilding revolution in the period 1830-1880. Less visible in a direct sense, but not less important is the development and application of the high voltage and transmission techniques to provide secondary energy supplies for industries. This enabled industries to locate near their relative immobile labour force, thus away from the coalfields and in or near the centre of the cities. In addition to this the development of the combustion engine created the foundation for the explosive growth of motorcars and air transportation in the next period 1930-1980. The fifth and last period, 1980-2030, is characterized by the introduction of microelectronics, which provided the basis for the development of telecommunication and it's associated digital communication networks and satellite connections.[6] At a macro level one can observe in the early part of the 19th century a tendency towards spatial de-concentration that was followed by a strong degree of spatial concentration during most of the industrial revolution and again a de-concentration only towards the end of the 20th century. The most recent wave of network development was generated by the rise of information technology. The networks thus created, duplicated in part the existing networks created by earlier technologies and partly created new structures (see fig.3). Cities as nodes in the networks play an important role in the combination of these networks and the support of new network structures. These combinations of networks enable the co-existence of selective processes of concentration and dispersal at the same time.

Completed industrialisation

In the last three decades there has been a large number of changes in the geographies of the developed and less-developed countries. Three major trends have exerted considerable influence in the direction of these changes: (1) the continued and since the 1960' s accelerated internationalisation of firms[7], (2) the transformation from an economy with a strong orientation on manufacturing to an economy in which the majority of the population is active in services[8], and (3) the application of information and telecommunication technologies within a large number of activities[9], thereby substituting traditional modes of spatial interaction and because of increased levels of interaction enhancing them at the same time.

These changes have led to an increased organisational coherence of different functions, such as R. & D., strategic planning and administration and production activities, which

are usually described by processes of horizontal and vertical integration. This increased organisational coherence has not only improved organisational flexibility, but as a consequence of this has also improved flexibility in the spatial organisation of activities.

In 1970 the share of the labour force employed in services in the OECD countries has risen from 49 per cent to 62 per cent in 1990. With the exception of Austria, Germany and Ireland, all other countries of the European Union have shares above the average and this increased to 70 per cent and above by the year 2000. Much of this growth can be related to the increased participation of women in the labour force, which occurred since the early 1970's. The explanation of the industrial and spatial dynamics of the service sector was surprisingly not predominantly based on the logic of the growth dynamics of the manufacturing industries as formulated in industrial location theory. Moulaert et al. (1997) argue that there seems to be a growing convergence in the principles governing the location of both services and manufacturing. Their argument is based upon the observation that there is a convergence in the organisational principles underlying both activities.

A central issue in the understanding of the dynamics of urban systems growth is the contribution of the role and impact of agglomeration economics and its related concepts, such as proximity and accessibility and the need for adjustments of these concepts when considering the location of contemporary industrial systems. It is therefore important to understand the nature and direction of change in the spatial organisation of an urban system and the role producer services play in this reorganisation process. This requires a discussion of the nature of the spatial pattern of contemporary industrial systems and the linkages within this system and with their environment. Proximity for example can no longer be measured and expressed as physical distance or in terms of transport costs alone. It also refers to techno-economic and cultural nearness. Techno-economic proximity between firms occurs, for example when they have similarities in their organisation of production, similar strategies or similarities in the technologies employed. This similarity does not imply that these firms produce the same goods. On the contrary it allows for specialisation and forms of cooperation.

Urban structures are constantly exposed to changes in their internal and external environment and are therefore in a continuous state of flux and adaptation. Some of these changes have only a temporal effect and do not give rise to major adjustments, while others have a more permanent effect on both the internal and external organisation of urban space. An example of the latter type of change is the transition of the economy from an industrial to a service economy concomitant with the introduction of new information and communication technologies. This development is not only reflected by a sectoral shift in employment, but also by a change in the organisation of economic activities, both in manufacturing industries and in the service industries. A very striking aspect of the coincidence of these exogenous changes is the increase in organisational and spatial scale of the activities, which is for example evident in the increased internationalisation of firms, as well as in the growth of a whole range of new producer services.

Thus, until recently the functional structure of the urban system could have been described as a hierarchical structure in which vertical linkages dominate. This form was the consequence of the process of urban-industrialisation that created most of the contemporary cities in the industrialised world except for their historic core. The changes in the spatial organisation of urban systems are not only caused by exogenous forces, but also by internal changes in work processes and the organisation of activities.

Fordism as the dominant form of industrial production is based on mass production, division of labour and its related economies of scale. Nowadays there are also other forms of industrial production, such as those characterised by flexible production systems. These

systems are considerably less dependent upon a hierarchical form of production organisation and display often-horizontal forms of product organisations. To understand the location pattern of these systems one has to get insight in the relative importance of the external linkages, in the ability to participate in networks and in addition to this, the role of the traditional location factors, such as the availability of resources or of low transportation costs. It is of strategic importance for the operation of a firm to have access to information and communication channels. For a multi–locational firm consisting out of a number of establishments, the positioning of its constituent parts on (information) networks that link them to the internal network is a critical location decision. This is also the case for the participation in external networks of the various plants of the firm that links them with other firms. There is not one unique solution to this problem as industrial networks can be generated in a large number of ways and are usually the result of a combination of specialisation, creativity and flexibility of the enterprises concerned. Thus changes in the linkage structure within the urban system are the result of both internal reorganisation within manufacturing and the growing importance of the service sector.

Producer services and urban development in The Netherlands

An analysis of the growth and location of the producer services should take into account both the spatial and the functional aspects of this development. The functional aspects of the location question refer to issues related to the kind of environment that is supportive for these types of activities (see section 3). As these aspects are interrelated, it involves not only an evaluation of the characteristics of a particular location, but also a view on the opportunities to operate at different spatial scales at the same time. The nature of the linkages within the service industry will be discussed in the next section. The discussion here will focus on the development of this industry in The Netherlands.

The Randstad as the economic core region of the Netherlands is located in the western part of the country and gradually expands in easterly and southern direction. The regions adjacent to this core can be considered as the intermediate zone or economic spill-over region. The remainder of the country is, from the core-periphery perspective, considered to be the periphery (see fig 4). In the early 1970's the share of producer services in total employment was rather small, viz. 3.5% (see table 3). This proportion more than doubled in the next 15 years to 7.2%. The majority of this employment was concentrated in the four largest urban agglomerations of the country located in the Randstad region. In addition to this there is a substantial number of service firms located in the smaller urban centres within this region.

The distribution and the growth in employment in producer services over these four types of functional regions, viz. core, which is subdivided into large agglomerations and other urban centres, intermediate zone and periphery, changes considerably over the 1973 –1988 period. The employment in the four largest centres nearly doubled, but it more than tripled in the other three zones. The fastest growth rates could be observed for the intermediate zone (43.5%) followed by the other urban centres (25.0%) and the periphery (29.3%). The growth of producer service employment in the other urban centres in the core region points already at an early de-concentration from the main urban agglomerations. This is however not the case for the spatial distribution of the number of establishments. These show a more or less equal share over the intermediate zone and the periphery, which remained fairly constant over the 1982-1993 period. The outcome of this process of spatial readjustment however is a continuing dominance of the four largest centres. The difference with the other zones in quantitative terms has remained and has even increased at the cost of the periphery.

The rapid growth in employment in volume and in number of establishments is however very recent, i.e. post 1980. This is also evident from a survey carried out in 1996 amongst 388 enterprises providing producer services. These are located in the 25 largest urban centres in the country, all having a population of over 50,000 inhabitants. It appears that about 75% of these firms have started since 1980 and nearly half of those since 1990! Most of these firms, about 65%, are still found at their first location (see table 3). The growth of the producer services in the intermediate zone and periphery is not the result of a relocation of these firms but the consequence of new firm formation. From the point of view of spatial mobility, it appears that both old and young firms relocate at the same rate.[10] The driving force for the young firms is that they have started as a one or two-person operation from a small workplace, usually home. When these grow in size into a two, four or more persons firm a move becomes necessary. Most of these moves are short distance moves very close to the original location.

Considering the age and type of activity it is not surprising to find that establishments of producer services firms are generally small. Large offices, i.e. offices with a large number of employees, within the service sector can be found as the headquarters of the traditional services, such as financial services and insurance. In 1995 about 70% of all firms in producer services are within the smallest size class, with 2-4 persons employed. The size distribution of all firms is, as one may expect, heavily skewed, with the next size class (5-9 employed) 80% smaller in number than the preceding one. There is rather little variation between the overall size-class distributions when this is compared across the four types of functional regions.

To get a better understanding of the complex structure of the urban economy and the role of producer services, it is necessary to consider the various branches within this sector. Nearly 60% of the 34121 establishments in producer services are engaged in knowledge-intensive services, such as accountants, computer services, engineering consultants and economic consultants. Within the largest agglomerations three type of functions dominate, viz. computer services, economic consulting and in addition to this of course government agencies. In contrast to this is the dominance of the number of establishments in accounting services and engineering consultants found in the intermediate zone. This indicates the different locational requirements of these activities compared to those in the larger urban centres.

Table 3 presents the 1996 location quotients for the four major activities within the producer services, viz. accounting services, computer services, engineering/architects and economic consultants, that provides a more detailed picture concerning the role of these cities. The hypothesis here is, that producer services have a disproportionate high presentation in the top of the urban hierarchy, especially in the largest cities, when compared to the spatial distribution of other economic activities. This still appears to be the case when the total number of firms is taken into account. Amsterdam clearly ranks first followed at some distance by Rotterdam, The Hague and Utrecht are in the tail. The difference between Utrecht and the city of Eindhoven is rather small. Interesting in this case is the recent (1998) move of the headquarters of the Philips Company to an office (Rembrandt tower) in Amsterdam. The effects of this relocation are not immediately evident; it may have negative consequences for the development of the producer services in the Eindhoven region and is dependent upon the degree in which these services have been externalised for this firm.

Another interesting feature is the rather high location quotients for the new towns, which are near to the large agglomerations, such as Almere (Amsterdam), Capelle a/d IJssel (Rotterdam), Nieuwegein (Utrecht) and Zoetermeer (The Hague) compared to those of the central cities themselves. The average score for all the cities together is 1.22

with Amsterdam (1.27) and Utrecht (1.33) above the score, whereas Rotterdam (1.04) and The Hague (1.17) have location quotients below the average.

These results suggest that it is no longer the central cities alone, which create the conditions for this development, but the city region as a whole, including the central city and its outlying (sub)urban centres. The latter have gained considerable economic independence, but on the other hand have become part of a much more complex structure of mutual interdependence at a larger urban scale. The large city regions within the Randstad, together with a large number of smaller urban centres have created a new core region in the era of the service economy.

This multifunctional structure demonstrates both complementarity and specialisation in functions, which are all components of a multi-centred network city.

Another question here is to what extent the growth and development of producer services follows a hierarchical diffusion process, down the urban hierarchy. At present there is a relative concentration of producer services, represented by location quotients larger than one, in the top of the urban hierarchy, which incorporates also the large medium-sized cities.[11] With an ongoing diffusion process one might assume that this is only a temporal situation that will disappear when the process is completed. This outcome is not very likely given the evidence presented here and the theoretical considerations about the particular nature of the location of producer services and knowledge intensive services in particular.

Thus it can be questioned to what extent the hypothesis about the spatial evolution of corporate command and control centres can be supported. The core of the argument put forward by Semple and Phipps (1982) and Semple (1985) is, following the argument put forward by Hymer that initially there will be a concentration in the top of the urban hierarchy. This structure will be gradually replaced by a decentralisation towards the regional centres after which a new economic structure reaches maturity. We may assume that a time lag of about 15 to 20 years exists for the Dutch economy compared with the evolution of the US economy into a service economy. If we take also into account the fact that the process of economic convergence has accelerated over time due to the process of internationalisation, then we can expect to have moved at least to stage two, viz. the era of dominant regional centres. Both at the national scale and the international (European) scale, there is little evidence to support this hypothesis. On the contrary we are still in the era of the dominance of the national centres and a limited number of cities co-operating in an international, i.e. global context. The rejection of this decentralisation hypothesis is based upon the argument that the presence of producer services in general is: (1) a prerequisite for the operation of the higher order functions supporting corporate command and control, (2) demanding a minimal critical mass and (3) in need for a global reach.

From the analysis presented above, two patterns emerged. One pattern was a decentralisation of producer services away from the core. The other was an increased concentration within the four main urban agglomerations of the Randstad. It appeared that the latter trend was stronger then the first, which reinforced the position of the core region and enhances its position as a dominant centre for the location of a (corporate) head quarter.

In this section the discussion was focused on the growth of producer services and their relation with the urban environment. In the next section the linkage structure within the producer services will be discussed to obtain a better insight in the nature, viz. orientation and size, of the functional economic linkages within the urban system.

Functional linkages and their spatial structure

It has been argued that service activities and especially advanced knowledge intensive services are an independent source of welfare generation for a region. Producer services are not only in demand to support activities in manufacturing, but also within the service sector themselves. Similar to the production structure in manufacturing there exist a complex structure of subcontracting and suppliers of intermediate services between producer services firms. This interaction pattern is based upon the micro economic behaviour of these firms and is by definition unique to the firm.

The question here is to what extent do similar firms in the same city or region express similar interaction patterns, which allow generalisations about the specific nature of these interactions between firms and at a higher level between cities or regions. The answer to this question will throw some light on three locational issues raised earlier. Firstly, to what extent service firms' cluster in space and what is the nature of this clustering? Is this geographical proximity (physical nearness), techno-economic proximity or cultural proximity? Secondly, where are these firms located within the urban region? Thirdly, to what extent is there a change in the position and the role of the medium-sized cities in the urban system as a whole, induced by the transformation of the urban economy into a service economy and by the technological change in communication and transportation?

Linkage structures between firms may vary within and between sub sectors of advanced producer services according to the size of the firm[12] and the nature of the relation between the firms. This relation can either be a forward (supplier) or a backward (outsourcing) linkage and can have various forms, such as sub-contracting, implying the deliveries of specific type of services, joint production through co-maker ship or general suppliers for non-specific service products. Another important feature of the linkage structure is the intensity of the interaction between firms, which can be expressed through the frequency of the interaction or by the share of the products in the total sales volume of a firm.

Data for this analysis is collected through a questionnaire survey amongst 388 firms in producer services (see above). These firms are all located in cities, which both have a relative overrepresentation of producer services firms and of employment in producer services, as expressed by the location quotients for this activity (see table 3) and all having at least 200 firms active in producer services. The latter size criterion allows the sample to be broken down into four subcategories of knowledge intensive services, viz. accountants, computer services, engineering and economic consultants. There are 56 cities with a population above 50,000. However a closer inspection reveals that amongst these cities there are 31 cities, which have all less than 200 firms in producer services and location quotients below 1.00 and therefore will not be considered here. It appears that out of these 56 cities 25 cities meet the criteria and that all these cities have a population of 50,000 inhabitants and above. The value of the location quotients for these cities together is 1.17 for the number of firms and 1.49 for service employment. This result supports the earlier observation that producer services are concentrated in the top of the urban hierarchy. Most of the cities included in the analysis are located in the core region and the intermediate zone, with the provincial capitals Groningen in the North and Maastricht in the South being the only exceptions (see fig. 4).

Outsourcing appears to be a very common practice amongst producer service firms. More than 70% of all firms are engaged in one or another form of outsourcing (see table 4.1). A closer inspection of this table reveals that there are considerable variations according to size. Large firms, i.e. firms with more then 50 employees, are more active in outsourcing than small firms, i.e. firms with less then 5 employees. However there is not a great difference between medium sized and large firms as far as outsourcing is concerned.

Thus size matters, but only in a certain degree. When specific types of supplier relations are considered sub-contracting on specification is the dominant form regardless of size as more than 94% of the firms are involved in this type of activity. This is not surprising regarding the fact that all the firms under consideration offer knowledge-intensive products, which are usually specific to a particular client. The delivery of non-specific supplies is not a common practice. On average only 15% of the firms are engaged in this. With respect to size, small firms appear to be somewhat more active in this than larger firms. An interesting result is the relative importance attached to joint product development (co-maker ship). More than 50% of the firms are involved in this and large firms more (65%) than the smallest ones (39%).

Not all types of knowledge intensive services display similar features as far as outsourcing is concerned. In (table 4.2) a distinction is made between accountants, computer services, engineering consultants and architects, and economic consultants. From the table it appears that accountants are less engaged in outsourcing (57.5%) than the other three types of producer services, where the largest share can be observed for economic consultants (83.9%). A similar but less striking difference can be observed for joint production (co-maker ship) of services, where accountants have a rather low share of only 35.4% compared to the overall average of 52.8%.

To get a full picture of the relative importance of outsourcing for knowledge intensive producer services one should also take into account the share of these activities in the total volume of production (see table 4.3). Although all producer services are involved in outsourcing this represents only a small proportion (less then 11%) of their total activities, with the exception of the activities of engineering consultants and architects. Specific supply relations remains the dominant form of interaction, however the value of general supplies is much higher than one would expect on the basis of the small share of this type of production (see table 4.2). Co-maker ship, with an 11-20% share in the total value of the production, is not an important activity for all sectors

One of the conclusions that can be drawn from the above discussion is that there exists a network (a cluster) of intermediate production within the service sector and especially within knowledge intensive producer services. Given the nature of these activities one may expect a spatial pattern that not only reflects the need for face-to-face contacts, but also for proximity to (large) clients. Thus given the structure of the city system, it is to be expected that there will be an orientation of the interaction patterns focused upon the largest cities. Less clear however, is the role played by producer services located in the medium-sized cities and the spatial pattern that emerges out of these locations. Will this be dispersed or also be focussed upon the largest cities in the system? In order to avoid a confused picture in which small flows occupy a dominant position, flows that contain less than 5% of a specific type of interaction are not taken into consideration. In addition to this, the 25 cities are considered within the context of their surrounding region. In this way allowance is being made for the sub-urbanisation of producer services across the city limits, but within the city region.

To facilitate this analysis here, the subdivision of the Netherlands in 40 COROP regions is used. These regions reflect to some degree the spatial structure of the urban labour market. As one can observe from fig.5**,** these areas are considerably smaller in the western part of the country, which is also the most urbanised compared to the remainder of the Netherlands and the fit might be less than perfect. The spatial interaction pattern that is visualised represents thus the outsourcing relations between the producer services firm in a particular city and the firms in a COROP region in The Netherlands. When no particular destination is given a distinction is being made between The Netherlands (left half of

the circle) and abroad (right half of the circle). The general picture appears rather complex, therefore the flows within the core region are considered separately. A number of conclusions can already be drawn. Firstly, the regions containing the four largest urban agglomerations, Amsterdam, Rotterdam, The Hague and Utrecht are dominant centres from which outsourcing occurs, with respectively 16.9%, 13.7%, 8.8% and 16.1% of all external relations. Thus, these four regions together, account for more than 51.5% of all the flows in the system. Secondly, intra regional linkages appear to be more prevalent than inter regional linkages. A second look at the map however indicates that geographical proximity; i.e. physical distance is important but only to a certain degree.

This is reflected by the two clusters that appear on the map: one in the Northern part of the Randstad around Amsterdam and Utrecht and one in the Southern part linking The Hague and the Rotterdam region together. Also one can note the effect of physical distance and techno-economic proximity, i.e. functional distance between the two provincial capital cities and the Randstad region. Specific supplier relations based upon subcontracting as the dominant form of external relations is represented in fig. 6 and 7. This spatial pattern shows a much stronger concentration within the Randstad region, when compared with the general structure of the outsourcing relations. In addition to this there are more linkages from cities in the core region than with cities in the intermediate and outer zone. This is also the case for specific deliveries abroad.

The non-specific supply relations show a different pattern (see fig. 8). First of all the linkages structure is much weaker than was the case for the two other types of relations and second the large cities do not dominate the picture, as was previously the case. It appears that this pattern has no strong origin-destination structure, but is in contrast rather diffused. This is also reflected by the relative increase in importance of the supply of producer services to The Netherlands at large and abroad, which is represented by the black half circles on the map.

Finally, the spatial pattern of joint production, co-maker ship (see fig. 9) is again different from the other three types, although some similarities are present, such as the relative importance of the four largest cities. Utrecht located in the centre of the country occupies a dominant position in this structure and provides links between the northern sub-core around Amsterdam and the southern sub-core around The Hague and Rotterdam. In addition to this one may also note a considerable degree off interaction between cities in the intermediate region and the core region. There is also a considerable amount of interregional linkages generated by the provincial capitals in the outer zone. This suggests that for a region with the size of the Netherlands, techno-economic proximity is becoming more important at the expense of geographical or physical proximity.

Urban systems a theoretical reappraisal

From Hierarchy to Network

From the previous discussion it has become evident that the central cities are no longer the makers and shapers of their environment, but that it is the urban region as a whole that participates in a global context. The urban region is in this sense an open system that consists of one or more central cities and their associated urban nodes. The latter have lost their dependence from the central city and have reorganised themselves in a social, economic and geographical sense, which resulted in new interdependencies that are no longer oriented towards one (central) city. This development can also be observed within the context of the large urban agglomeration of the Randstad and one can note the emergence of a limited number of new multi-functional urban regions. These regions are characterized by their

complementarities and by their specialisation. The various delimitations of these regions cut through different administrative structures at different spatial levels, such as municipalities and provinces. A recent initiative of 16 municipalities in the Randstad (Delta Metropolis) to come to administrative cooperation can be considered as an attempt to cope with the new reality.

It appears that a new empirical reality emerges, that leads towards the recognition of a city region with the characteristics of a poly-nuclear metropolis or network city. This raises questions about the validity of classical central place models as well as about the clarity of the network city concept. Classical central place models have been formulated by Christaller (1933) and Lösch (1943), who studied economic city hinterland relations.[13] Although the models they developed have a large number of similarities, they come from a different origin. The first is based on empirical observations in the 1920's on the spacing of market towns and their related activities in Southern Germany, while the second is a theoretical construct based upon the assumption of the minimisation of transportation costs. As was argued above transport costs alone are no longer a sufficient explanation for the organisation within an urban system. The common denominator in both studies is the development of a coherent hierarchical structure of a system of cities that can be used to explain their economic functions and their linkages (see fig. 10). The hierarchy is the result of the assumption or observation that similar cities in size have similar functions, the same spatial extent in terms of spatial interaction and have similar orientations towards the city that is in the next higher level of the hierarchy. One of the spatial consequences of this type of orientation is the generation of star shaped traffic patterns focussed on the next higher order city, thus creating a nodal flow system. As similar cities do not have a need to develop exchange relations, they do not generate reciprocal traffic flows. This conceptual model has been dominant in spatial planning throughout the 1980's.

As a consequence of the maturing of the industrial economy and the emerging service economy during the 1970's the urban economies have become more differentiated and have increased in complexity. This generated a discussion to adjust this classical model and to incorporate in it a number of new developments.[14] The number of lateral linkages increased at different spatial scales, which created city regions at the local and regional level, but the growing number of linkages were also linking scales together. The spatial consequences of these changes in functional relations are depicted in fig.11.[15] A multi nodal network model is replacing the single core nodal model, which lead to a spatial integrating of a much larger area. This change does not imply the complete disappearance of the hierarchy. The hierarchy has been adjusted; it is no any more a complete hierarchy and network elements have been added. The network elements, the horizontal relations, reflect the linkages between mutual comparable cities, as far as size is concerned, but that are functionally different with respect to economic functions.

Technological change is a powerful enabling factor to support and bring about such a change in the structure of the urban economy. Lahti (1990) pointed especially at the possible consequences and spatial effects of the changes in the technological triangle: energy, transport and information technology.[16] He identifies a number of different developments operating at different spatial scales:

1. A shift from hierarchy to networks at the national level;
2. At the regional level an expansion of urban agglomerations into urban zones, in which at the same time concentration and dispersal can be observed;
3. The combined effect of these changes implies at the local level a shift from a spatial differentiation between a limited number of zones to a complex mosaic structure.

The consequences of these developments for urban form are thus dependent upon the nature, the type of interaction and the direction of these forces. At present it is especially the latter two, transport and information technology, which exert the strongest influence on urban change. Different types of urban configurations may now appear, ranging from the mono-centric city with the corridor city as an intermediate stage to the network city. The differences between the two types of systems are summarised in table 5.

The changes in the spatial structure of the urban system are not only reflected in the different functional arrangements, but also in the different role of the cities in the system. It is especially the medium-sized cities, which have acquired new functional dynamic features. On

the one hand, these cities have become the location for manufacturing industries, which have shifted away from the large cities. On the other hand some of them developed national functions. Thus medium-sized cities in a network economy not only provide and support links between cities of different sizes, but fulfil a role for the surrounding regions.

The distinction made above is based upon two types of logic. The first is a spatial logic in which the territoriality of the city is emphasized. The second is a functional or cognitive logic, the network approach, where the city is considered as a node in a number of interlocking networks. This second type of logic reflects different rationalities in the behaviour of economic agents. This rationality may vary between perfect rationality under conditions of complete information and imperfect rationality under conditions of incomplete information and a considerable degree of uncertainty about alternatives. Instead of separating these two approaches as is stressed by Castells[17], who argued that there is a shift from "a space of place towards a space of flows", Camagni (2001) combines these two types of logic and identifies four related roles for global cities (see figure 1).

Planning strategies for urban development should recognise this changing role of the global cities and take into account their dual focus: on the one hand there is the orientation upon the improvement of long distance interaction, which reflect their national role and on the other hand there is the focus on the enhancement of the regional position of these cities. Another consequence of the changes in activity patterns discussed above is that these activities are no longer carried out predominantly on one level in the spatial hierarchy but on different levels at the same time, thereby linking these levels in a number of ways. This also has consequences for the locational pattern of the activities. For example, for financial services, there is an ongoing concentration in the top of the urban hierarchy focussed upon international participation and at the same time a deconcentration and dispersal representing the changes at the local and regional scale that fits in with a network approach to spatial organisation. This increased complexity of spatial organisation indicates that different types of explanations are required to explain the locational behaviour of these activities.

Spatial Networks

The network concept is often used as a metaphor, which only becomes meaningful when it is related to a specific context. An obvious context is to link networks with physical space, viz. distance. This already creates some complications, as distance in a network is no longer only related to the distance between two places, but to the distances between at least three places, as one needs three places to define a two dimensional network. Another complication arises with the enlargement of the concept of distance itself to incorporate techno-economic and socio-cultural proximity as was discussed earlier. This enlargement of the concept generates three different types of networks, viz. networks related to physical infrastructure, functional networks generated by economic ties and net-

works related to social interaction and communication. Clearly those networks do not all have a Euclidian character, which adds to the complexity of the concept.

One way to come to grips with this concept is to focus on the various contexts in which the network concept has been used in spatial planning. Four different types of context can be identified:

1. The network as a structuralistic concept, within the context of the network society.[18] The concept itself is not operational and has a symbolic value.
2. The network as a physical entity, based upon infrastructural linkages (see above)) and as such are dominant in physical panning documents.
3. The network as an organisational concept; in this way it becomes a relational entity reflecting functional linkages between activities operating at different locations.
4. The network as a framework for negotiations. Networks perform a role from a policy perspective and institutional relations, such as intergovernmental cooperation between local or regional authorities, determine its structure.

Thus networks are the outcome of a variety of human activities and are generated and repeated all the time, but the results may vary considerably over space and time. When variety in activities increases, the certainty of predictable outcomes and associated network structures decreases at the same time. The increase in spatial variety we observe in our society today is partly the result of the increased freedom of choice for the individual. This raises questions whether it is possible to influence spatial outcomes at all and if so at what level? Is this the national, the regional or the local level? A possible way to answer this question is to make use of the concept of self-organisation.[19] This concept shifts the focus from the outcome of a process to the structure of the process itself. It describes the way in which initially unorganised elements get linked together in such a way that an ordered structure emerges.[20] Although the process itself can be characterized as a random process, its repeated generated outcomes are different, but structurally similar. This result is interesting when dealing with networks that are recreated over and over again, as this can explain both the variations in outcome but also some of the structural stabilities that can be observed. Portugali (2000) using this concept of self-organisation demonstrates the applicability of this approach for a variety of social and economic situations and its potential to understand the emerging variety in spatial urban structures.[21] A result that is not possible to achieve when starting from classical central place theory. This outcome may provide some insight into a growing problem in spatial planning, viz. the increased incompatibility between national planning objectives and local goals. Although it is still possible to aggregate micro-level patterns into a macro picture, the reverse is becoming less and less the case. This suggests the need for a separation in focus as far as planning objectives are concerned. It implies that policy focus at the national level should shift towards process management of social and economic processes and shift the focus at the local and regional level, to the spatial realisation of the outcome of these processes.

Some tentative conclusions

In this paper we have discussed the structural and process transformation of cities within urban systems, placed against a background of three long term developments which are embedded in a European urbanization which is strongly linked to the dynamics of the industrialisation and technological processes. The first development concerns the completion of an urbanized demography in which 80% of the European population resides in cities, but where a subsequent transition emerges due to socio-economic developments, which is changing the internal structure and external linkages of cities, for instance the changing age distributions and an absolute population decline.

The second development concerns the increased socio-economic dependency of European cities on network infrastructure and technological breakthroughs, transforming from industrialization networks more specifically geared for the transport of goods, to information and knowledge networks which provide today's service oriented cities. At a macro scale this transformation has resulted in a shift from spatial concentration during most of the industrial revolution, towards a spatial deconcentration, towards the end of the 20th century. The rise of recent information technology in turn, duplicates in part the existing networks created by earlier technologies and partly creates new network structures. These combinations of networks enable the co-existence of selective processes of concentration and dispersal at the same time.

The third development concerns the completion of the industrialisation process over the last three decades due to an accelerated internationalisation of firms, a transition from manufacturing to service economies and the increased application of information and telecommunication technologies. These have led to the substitution of traditional modes of spatial interaction, through which an increased organisational coherence of different functions and spatial scales is apparent, and where agglomeration economics and its related concepts of vertical and horizontal hierarchies; and proximity and accessibility are challenged.

Following the three long term developments, a specific analysis on contemporary developments in The Netherlands is discussed, where it is demonstrated that central cities alone are no longer paramount to attracting and providing producer services, but that it requires the total city region (central city and peripheral urban centres), operating as a complex structure of mutual interdependence. The large city regions within the Randstad, together with various smaller urban centres have created a new complementary and specialised core network region in the era of the service economy, resulting in patterns of decentralisation and concentration of producer services. Leading from this, the paper discusses the locational patterns of producer services and the nature of their clustering, depending either on physical, techno-economic or cultural forms of proximity. In this case the relative importance of outsourcing for certain producer services is discussed. From this it can be drawn that there exists a network of intermediate production within the service sector, in which intra regional linkages appear more prevalent than inter regional linkages, and in which techno-economic proximity becomes more important at the expense of physical proximity.

The last chapter focuses on the theoretical reappraisal of urban systems, in which it appears that a new empirical reality is emerging, in which there is the recognition of the polynuclear metropolis or network city. In this sense questions are raised about the validity of classical central place models as well as about the clarity of the contemporary network concept.

A specialised multi nodal network model is replacing the single core nodal model, leading to the spatial integration of a much larger area, and a readjustment of nodal hierarchies within. This transformation of spatial differentiations into novel mosaic urban structures is strongly being enabled by recent transportation and technological changes.

From these observations it is concluded that planning strategies should recognise the changing role of global cities where it becomes important to understand the coherence of different scalar functions at the same point in time. This means a redefinition of the network city concept, which due to the addition of complexity, no longer requires a Euclidean interpretation. A complexity derived partly from the increased context of the network, the transitions of delimitations, the freedom of choice of individuals and the increased incompatibility between national planning objectives and local goals.

It is further suggested that studies on self-organisation of cities may lead the way to new methods of planning through an understanding of urban systems as flow structures, in

which for instance path dependencies may provide us an alternative form of urban intervention, or 'planning without a plan'. Furthermore, in an urban system of flows, the issue may not necessarily concern merely the change *from* a space of place *to* a space of flows, but the change to a space containing place *and* flows, whereby it becomes interesting to perceive a new model of European urban development, which can accommodate both of these functions. In this model it becomes necessary to be able to adequately measure the multileveled city, to understand the forms of control and self-organisation, new urban structures that will evolve, to understand the portals and different types of accessibility and who the gatekeepers will be. Finally, observing the preceding stages of pre-industrial to network city development, it is suggested that the predominant function of network cities will concern the profound development of creativity and innovation. European cities and urban systems will in future depend significantly on optimising their networks, accessibility, collaborations and the production of innovative services and technologies.

Table 1. The top ten cities in the European Hierarchy 1750-1950

	1750		1850		1950	
Rank	**City**	**Population**	**City**	**Population**	**City**	**Population**
1	London	676	London	2,320	London	8,860
2	Paris	560	Paris	1,314	Paris	5,900
3	Naples	324	St. Petersburg	502	Moscow	5,100
4	Amsterdam	219	Berlin	446	Ruhr	4,900
5	Lisbon	213	Vienna	426	Berlin	3,707
6	Vienna	169	Liverpool	422	Leningrad	2,700
7	Moscow	161	Naples	416	Manchester	2,382
8	Venice	158	Manchester	412	Birmingham	2,196
9	Rome	157	Moscow	373	Vienna	1,755
10	St. Petersburg	138	Glascow	346	Rome	1,665

Table 2. Percentage distribution of the urban population of the Netherlands by size class for the period 1840-1970

	1840	**1850**	**1860**	**1870**	**1880**	**1890**	**1900**
= 2,500	15.33	13.15	11.40	9.75	7.68	6.05	4.69
2,500-5,000	27.66	25.77	24.77	23.68	20.82	18.56	15.32
5,000-10,000	19.19	20.83	20.15	21.11	20.53	19.03	19.22
10,000-30,000	15.74	18.25	18.05	18.27	21.77	18.83	19.35
30,000-50,000	3.31	3.08	6.36	7.32	7.43	7.15	8.70
50,000-100,000	9.24	5.01	5.03	5.26	2.21	8.05	5.97
100,000-250,000	9.49	13.89	4.81	5.08	9.34	10.64	7.22
250,000-1,000,000	0.00	0.00	9.40	9.49	10.18	11.66	19.66
total population x 1,000	2,861	3,057	3,390	3,580	4,013	4,511	5,104
	1910	1920	1930	1940	1950	1960	1970
= 2,500	2.93	1.46	0.73	.034	0.02	0.00	0.00
2,500-5,000	13.67	11.90	9.83	7.75	5.39	2.79	0.00
5,000-10,000	18.56	17.94	16.69	16.86	14.64	14.30	13.18
10,000-30,000	19.80	20.63	21.37	20.31	24.94	26.76	29.29
30,000-50,000	8.64	6.29	6.97	8.82	8.43	6.51	9.86
50,000-100,000	8.75	13.41	12.89	13.80	11.18	13.15	15.38
100,000-250,000	2.39	2.41	5.66	7.27	12.44	12.70	12.31
250,000-1,000,000	25.23	25.93	25.81	24.80	22.94	23.75	19.96
total population x 1,000	5,856	6,831	7,832	8,834	10,027	11,417	12,958

Source: Van der Knaap (1980, p.38 and

Table 3. Location quotients of firms in producer services in 1996

Municipality	Number of firms	Total	Accountants	Computer Services	Engineering consultants	Economic consultants
Large urban agglomerations						
Amsterdam	2653	1.27	0.69	1.13	0.71	1.63
The Hague	1026	1.17	0.89	0.89	0.88	1.17
Rotterdam	1579	1.04	0.79	1.03	1.04	0.98
Utrecht	812	1.33	0.74	1.75	0.97	1.71
Other cities in the core region						
Alphen	223	1.35	1.08	2.10	0.84	1.67
Amersfoort	370	1.36	0.91	1.33	1.43	2.29
Amstelveen	282	1.58	1.08	1.76	0.78	2.17
Capelle	219	1.70	1.33	3.66	1.59	1.65
Delft	253	1.38	0.86	2.53	2.99	0.71
Gouda	229	1.32	1.10	3.04	1.52	1.11
Haarlem	426	1.13	1.17	0.85	0.87	1.20
Haarlemmermeer	469	1.21	0.90	1.74	1.00	1.35
Hilversum	331	1.24	1.28	1.14	0.76	1.60
Leiden	267	1.06	0.99	1.41	0.76	1.05
Nieuwegein	288	1.75	1.26	3.92	1.69	1.75
Zeist	231	1.45	0.94	1.55	1.11	2.69
Zoetermeer	249	1.60	1.28	2.60	1.87	0.91
Cities in the Intermediate Zone						
Almere	302	1.58	1.19	2.11	1.03	1.69
Apeldoorn	283	0.89	0.74	1.07	0.77	1.13
Arnhem	383	1.17	0.81	0.66	1.64	1.15
Breda	426	1.16	1.07	0.70	1.29	1.31
Den Bosch	403	1.34	0.57	1.82	1.47	1.51
Eindhoven	736	1.57	0.88	1.92	1.89	1.77
Cities in the Periphery						
Groningen	522	1.29	0.84	1.36	1.48	1.27
Maastricht	303	1.02	0.94	0.50	1.54	1.19
Total	**13265**	**1.22**	**0.88**	**1.35**	**1.11**	**1.34**
The Netherlands	**34121**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

Source: Databank VVK (Chamber of Commerce)

Table 4. Outsourcing and supply relations between service firms

4.1: For different size categories

Interaction	<=4	5-9	10-19	20-49	>=50	Total
Outsourcing	52 (53%)	51 (76%)	69 (77%)	59 (76%)	43 (80%)	274 (71%)
Specific supplying	93 (94%)	67 (100%)	89 (99%)	77 (99%)	51 (94%)	377 (97%)
Non-specific supplying	20 (20%)	7 (100%)	15 (17%)	11 (14%)	7 (13%)	60 (15%)
Comakership	39 (39%)	35 (52%)	50 (56%)	46 (59%)	35 (65%)	205 (53%)
Total	99	67	90	78	54	388

4.2: For different type of activities

	Accountants	Computer Service	Engineering consultants and architects	Economic Consultants	Total
Outsourcing	65 (57.5%)	52 (66.7%)	79 (76.0%)	78 (83.9%)	274 (70.6%)
Specific supplying	107 (94.7%)	77 (98.7%)	102 (98.1%)	91 (97.8%)	377 (97.2%)
Non-specific supplying	19 (16.8%)	15 (19.2%)	12 (11.5%)	14 (15.1%)	60 (15.5%)
Comakership	40 (35.4%)	46 (59.0%)	62 (59.6%)	57 (61.3%)	205 (52.8%)

4.3: For value of production

	Accountants	Computer Service	Engineering consultants and architects	Economic Consultants	Total
Outsourcing	<11%	<11%	<11%	11%-20%	<11%
Specific supplying	51%-60%	61%-70%	51%-60%	61%-70%	61%-70%
Non-specific supplying	21%-30%	31%-40%	11%-20%	21%-30%	21%-30%
Comakership	11%-20%	11%-20%	21%-30%	11%-20%	11%-20%

Table 5. Central Place versus Network systems

Central Place System	Network System, with Hierarchies
system features	
centrality	nodality
size dependency	size neutrality
tendency towards primacy and subservience	tendency towards flexibility and complementarity
economic features	
homogeneous goods and services	heterogeneous goods and services
vertical accessibility	horizontal accessibility
mainly one -way concentrated flows	two-way flows and diffuse structure
transport costs	information costs
perfect competition over space	imperfect competition with price discrimination
spatial features	
centralised and concentrated, separation between city and country side	decentralised and dispersed, integration of city and country side
hierarchies	networking
rough zoning and homogeneous land use	mixed or mosaic land use, fragmented
urban centres	urban corridors

source: adapted by the author from Lahti(1990,p107) and Batten (1995,p320).

Figure 1. The roles of global cities: a theoretical taxonomy

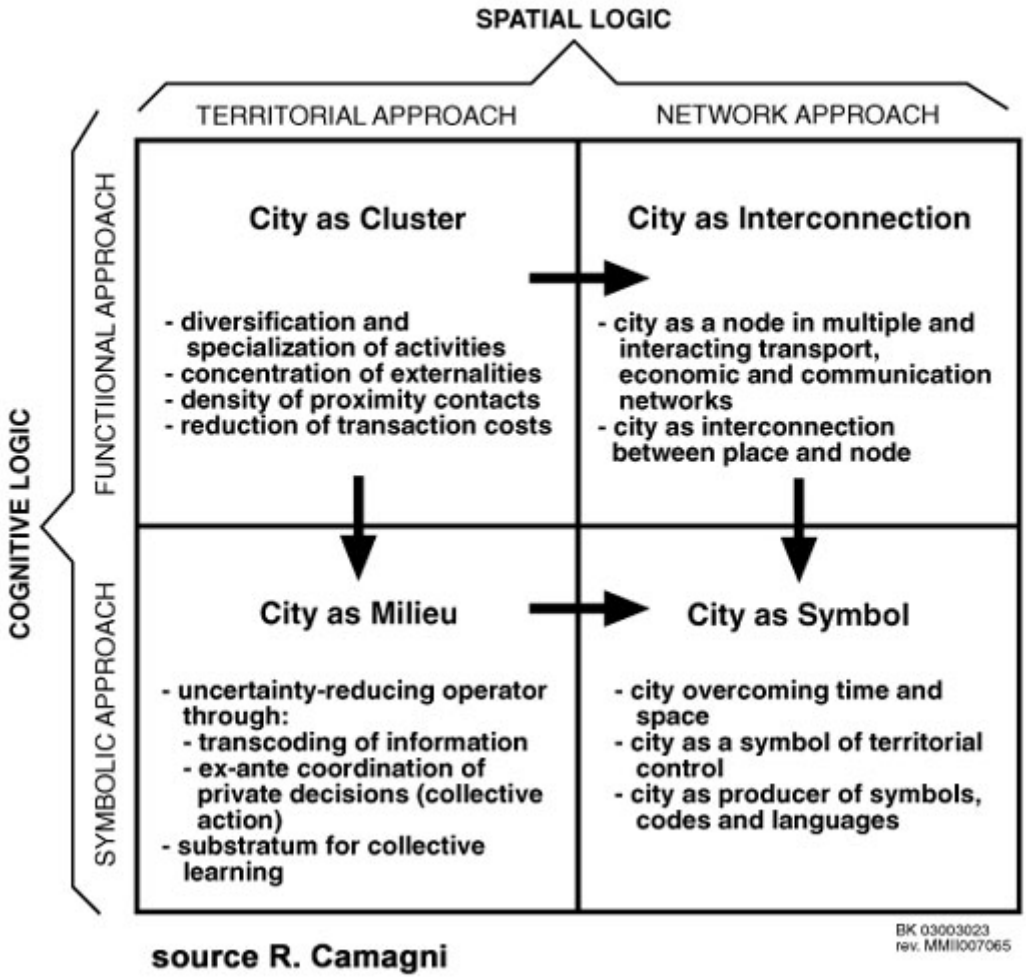


Figure 2. Long wave movements and techno-economical clusters (Dickens)

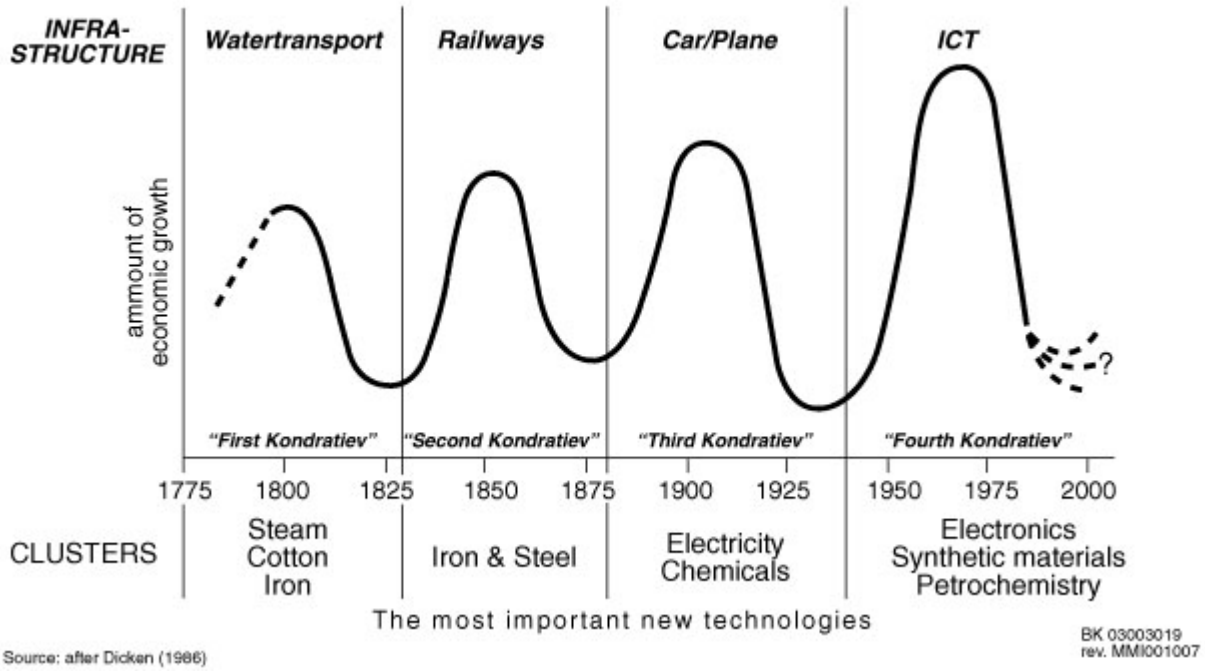


Figure 3. Multi-layered knowledge networks

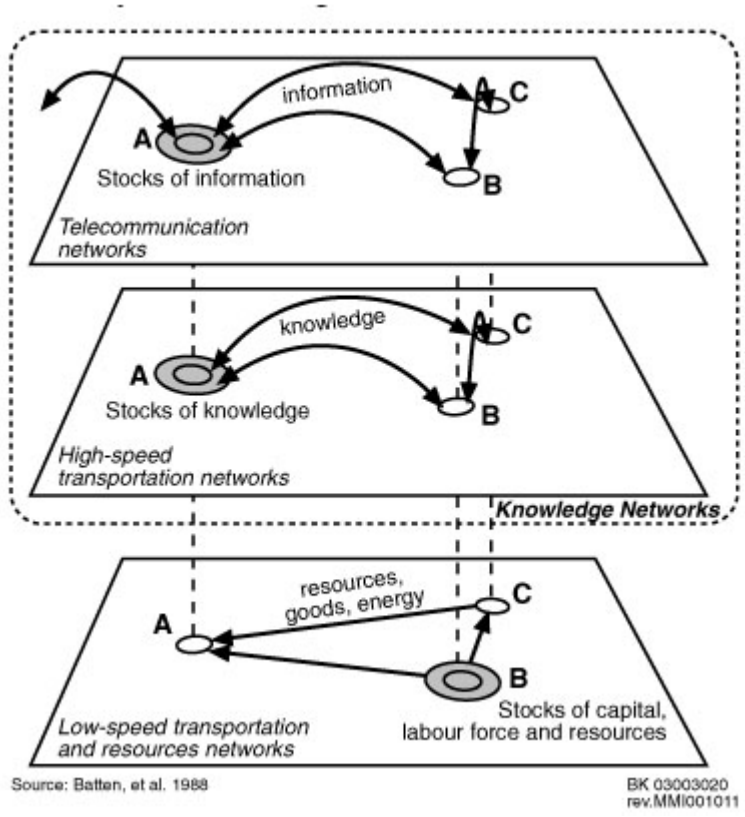


Figure 4. Core, intermediate and outer zones in the Netherlands

Figure 5. Direction and size of the supplier relations (municipalities versus Corops)

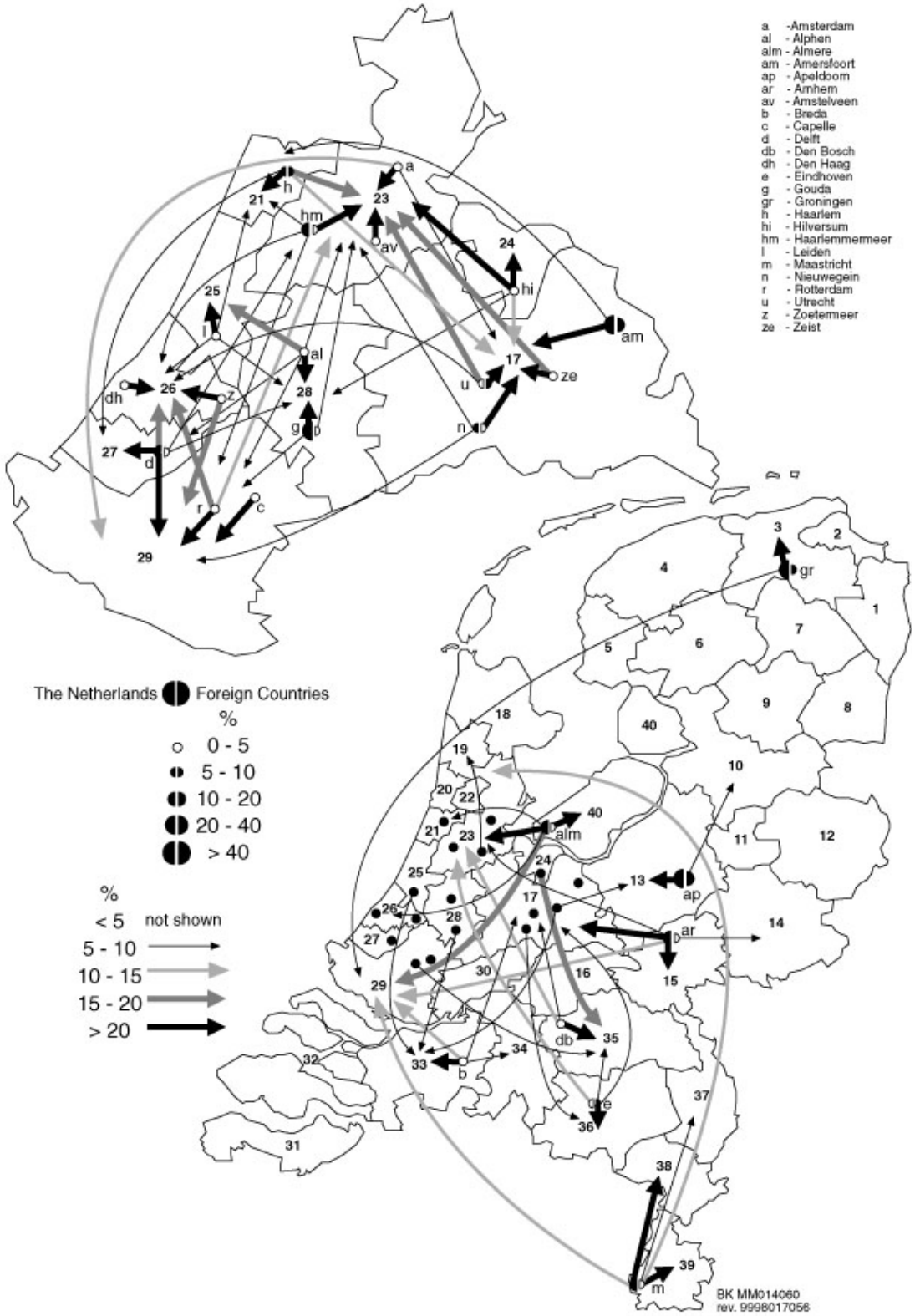


Figure 6. Directions and size of the specific deliveries (municipalities versus Corops)

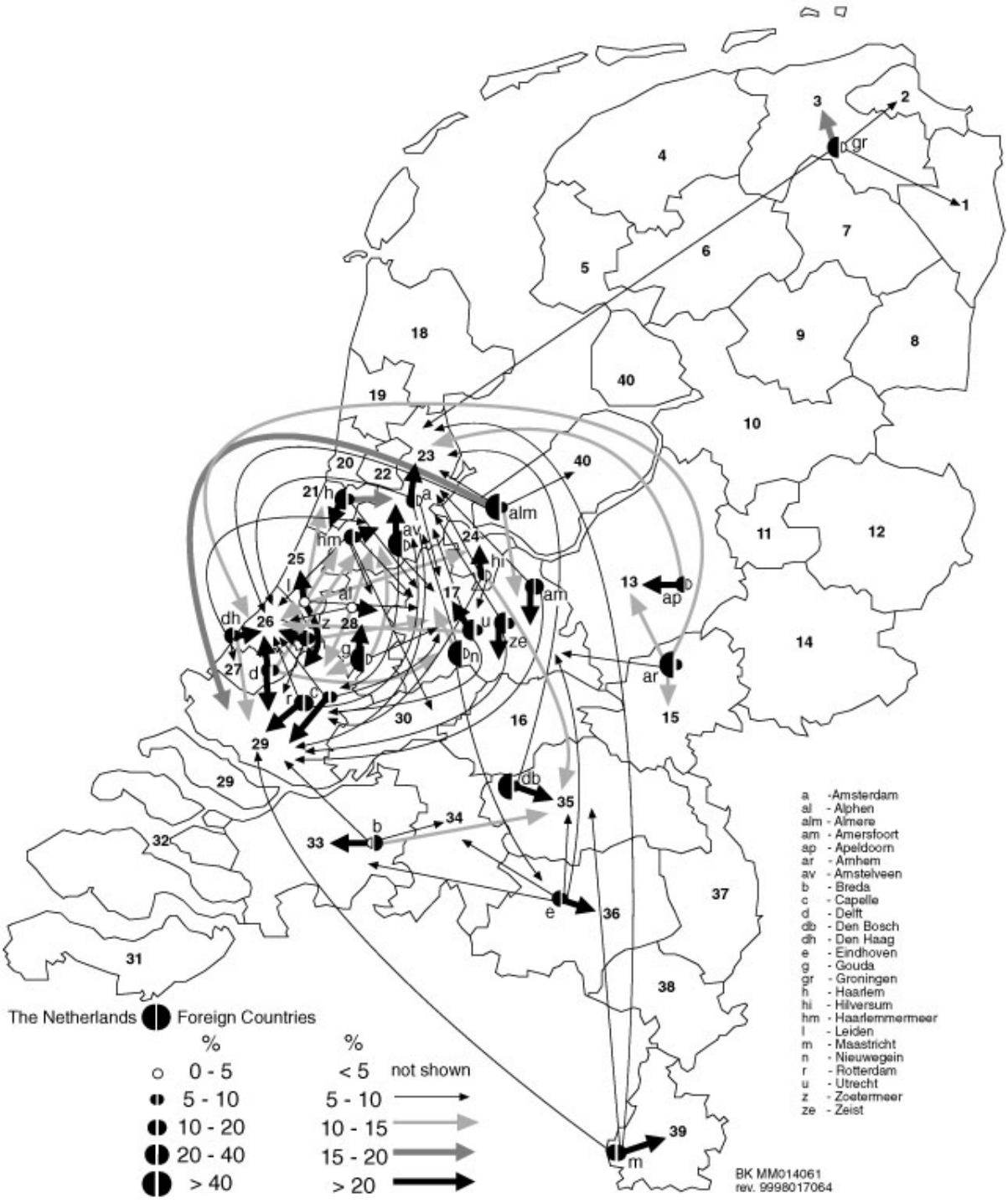


Figure 7. Direction and size of specific deliveries (Municipalities versus Corops)

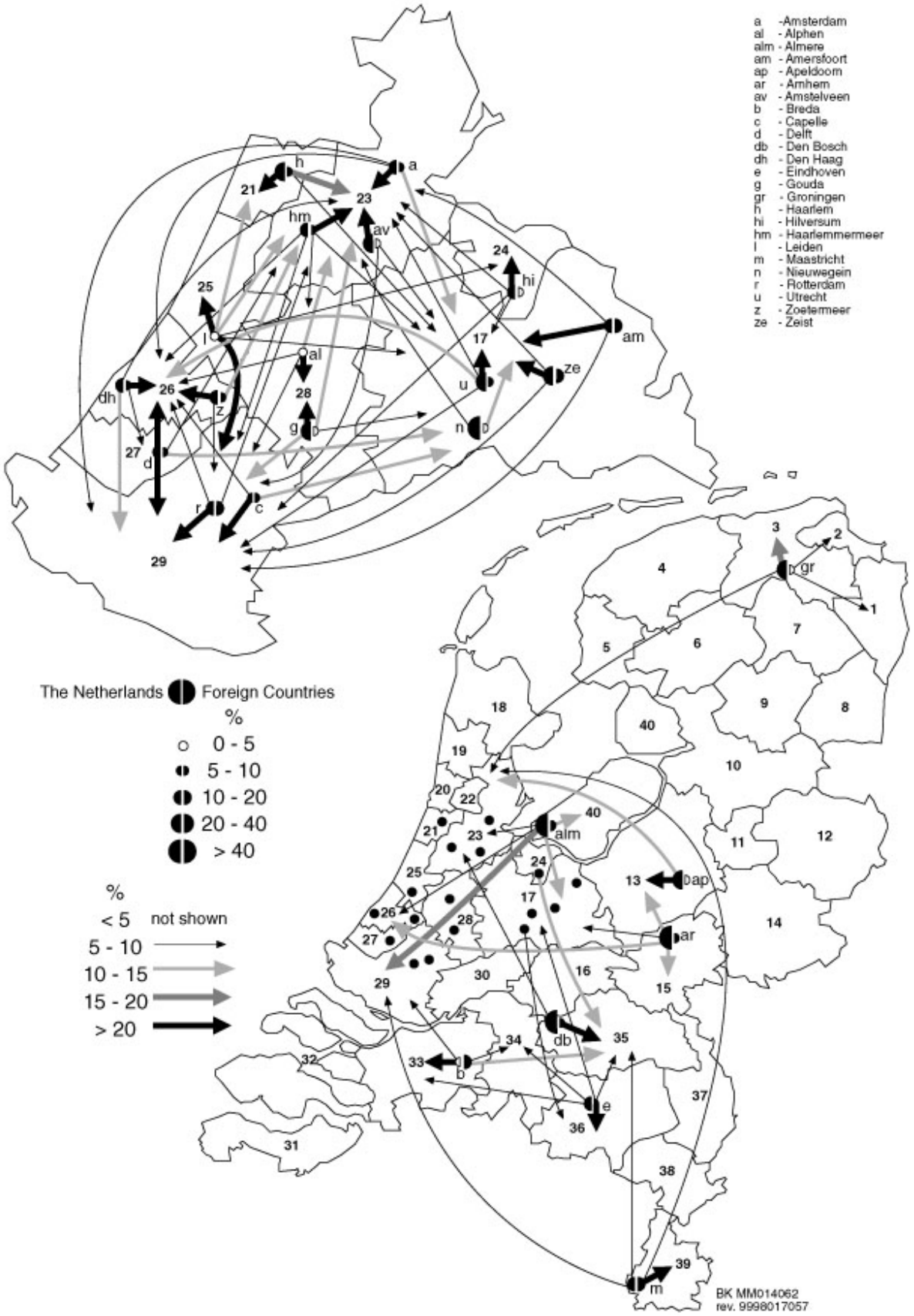


Figure 8 Direction and size of the non-specific deliveries (Municipalities versus Corops)

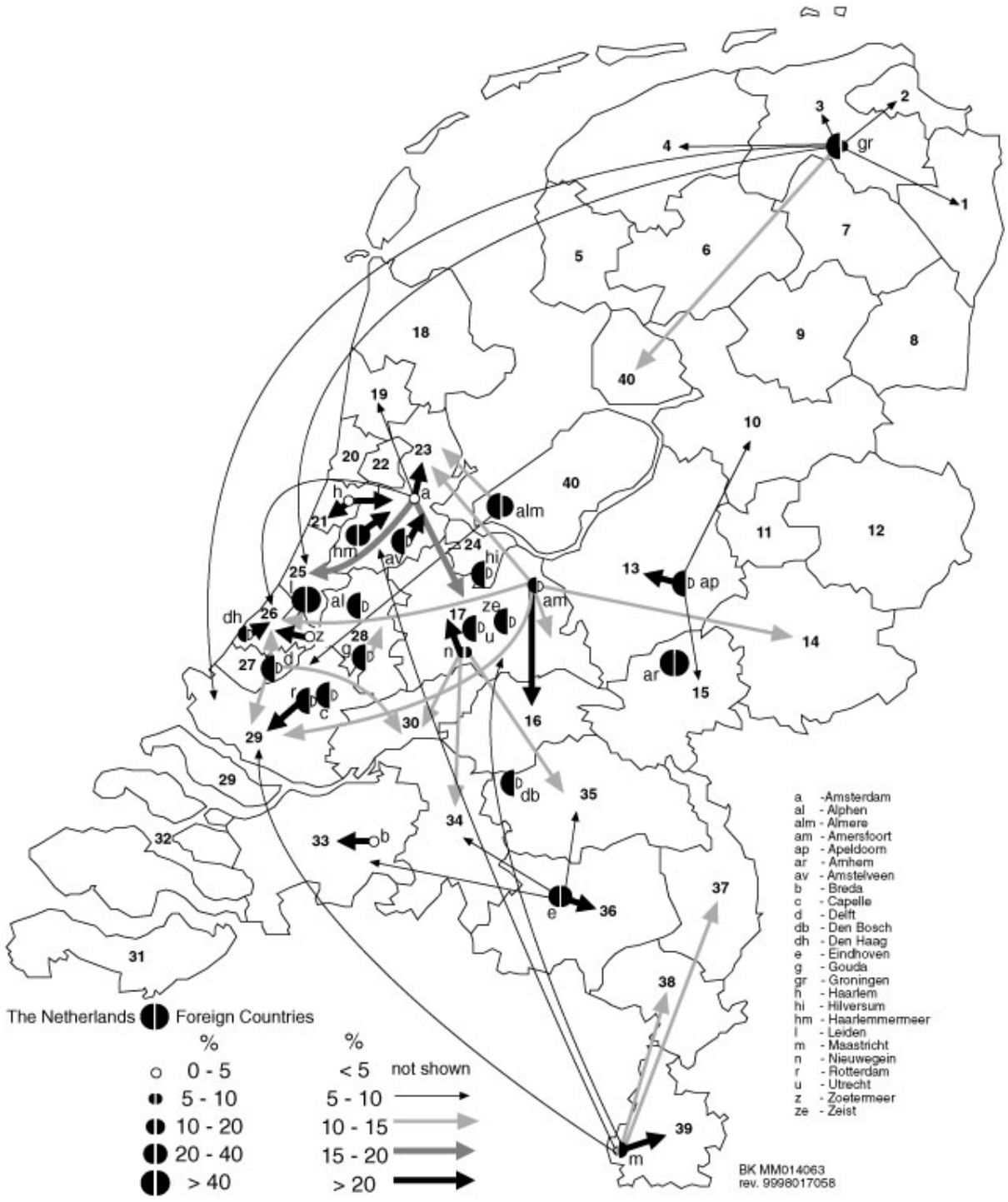


Figure 9. Direction and size of the comakership-relations (municipalities versus Corops)

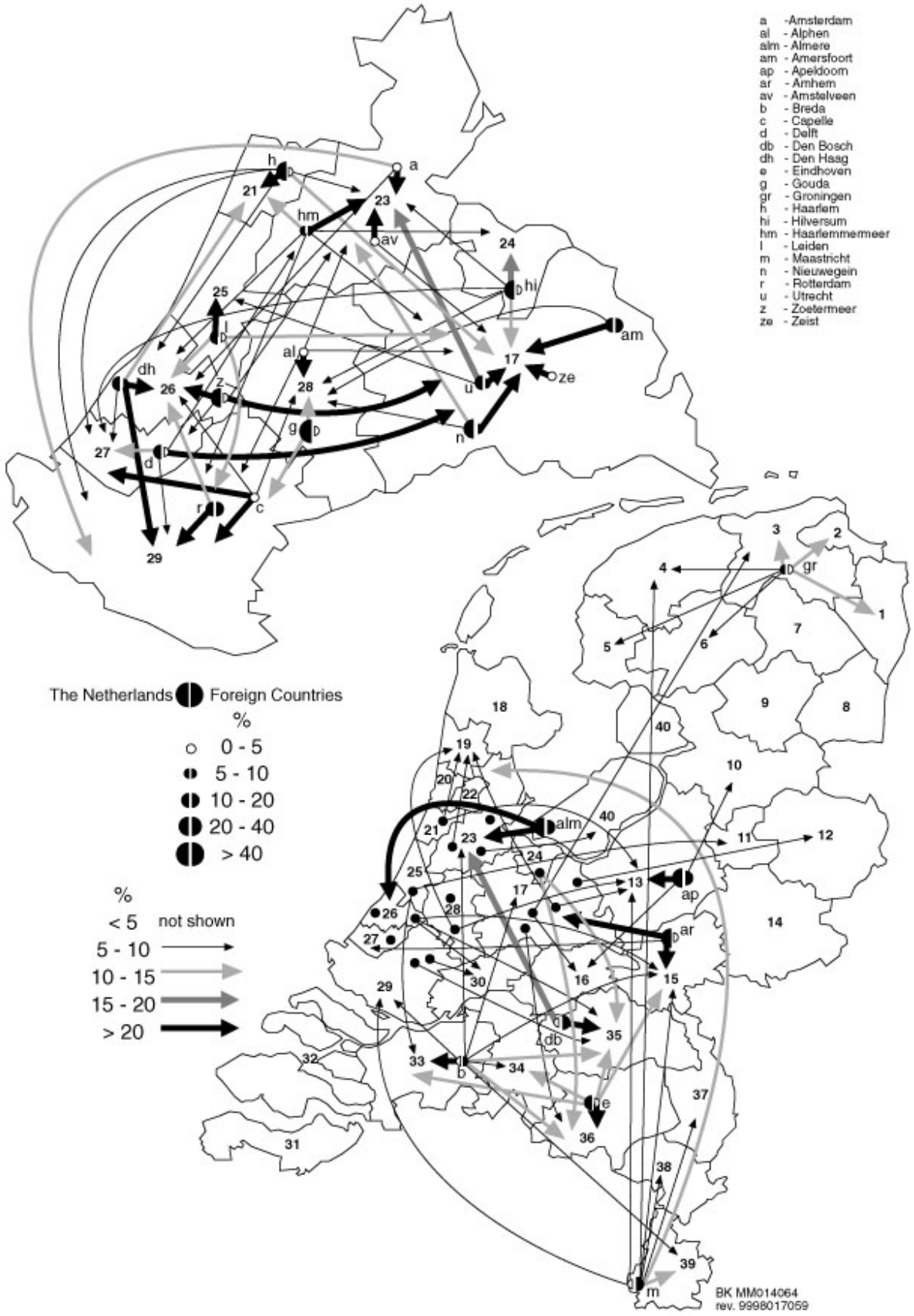


Figure 10. Three types of urban systems

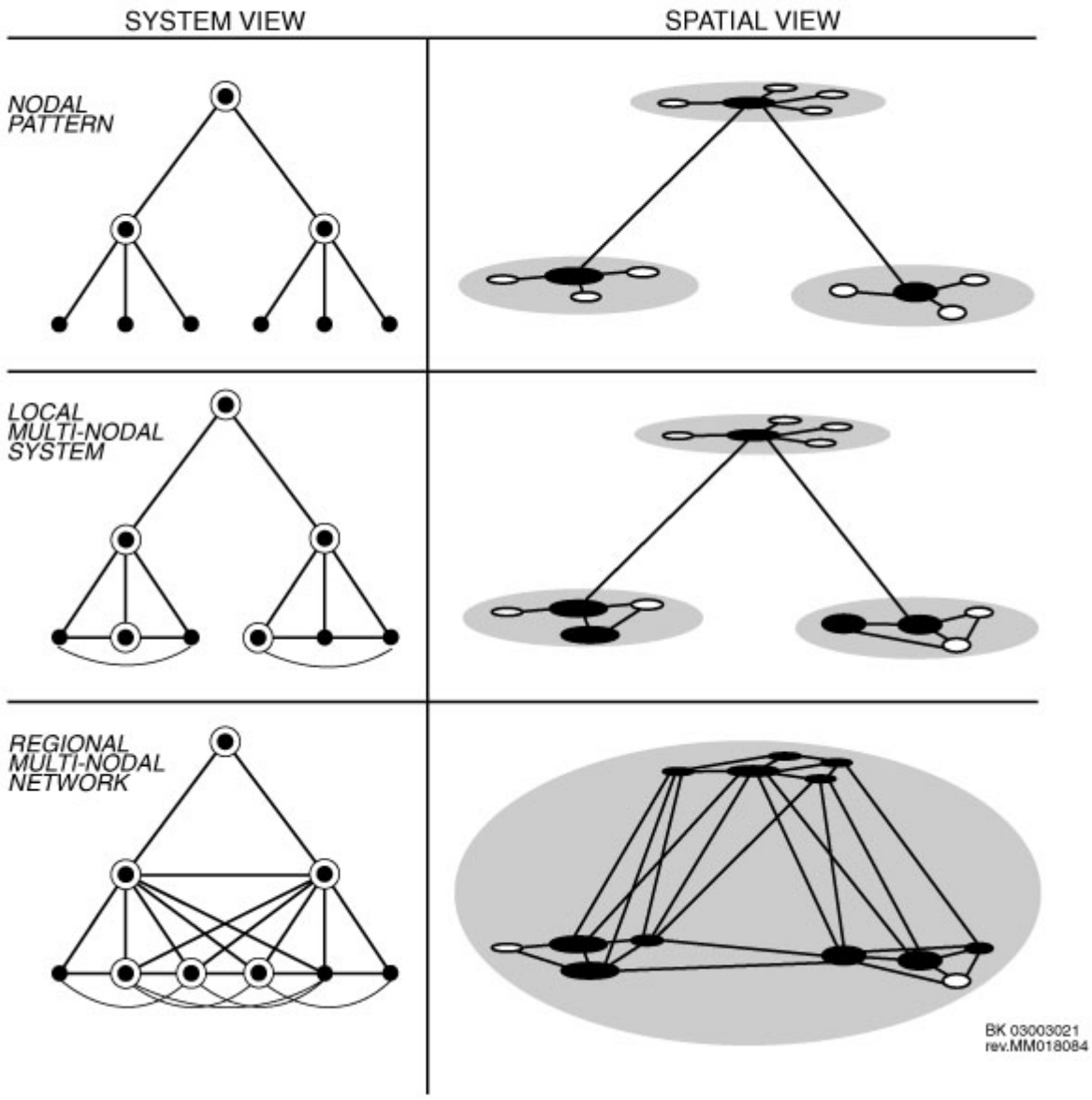
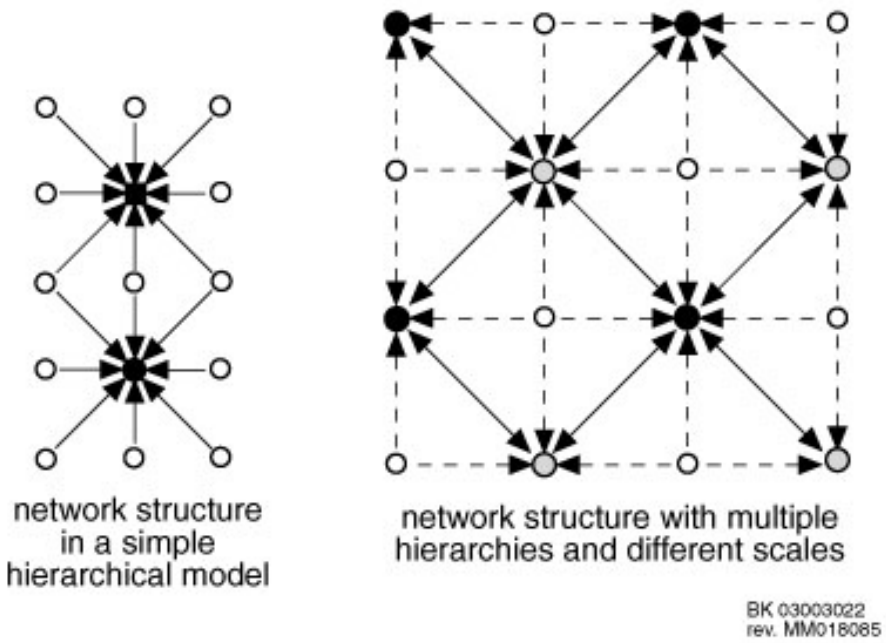


Figure 11. Inter urban linkages with multiple hierarchies



NOTES

[1] Smith, C. T., (1967), *An historical Geography of Western Europe before 1800*, Longmans, London.

[2] Bairoch, P. (1988), *Cities and economic development, from the dawn of history to the present,* Mansell publishing Ltd, London.

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