The Functions of Danish Towns

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Abstract.

The minimum requirements approach to the urban economic base is applied to Danish towns, and a number af points concerning the theory and practice of this method are discussed. It is suggested that through this method an improvement is possible, not only in the analysis of the composition of employment, but also in other classical fields of urban analysis, such as functional classification and measurement of centrality. In the course of the application of these ideas to the Danish data, the geographical nature (in terms of occurrence and range) of economic activities are treated.

1. Introduction

Among the tasks assigned to the Danish National Planning Committee is the provision and evaluation of information on the geographical distribution of population, employment, communications and other economic factors, as well as the analysis of their mutual relationships. In this connection, the analysis of the economic functions of the towns is evidently important.

It should be admitted that a valid understanding of the economic structure of a town could never be reached through a statistical analysis alone, as the statistical material has many defects and pitfalls. The statistical analysis forms a necessary, but not a sufficient condition for the understanding of towns.

This paper is concerned with the *methods* of statistical analyses of the functions of Danish towns. The results of the calculations are mapped; but it is not the purpose of this paper to discuss the economic structure of the individual towns.

2. Statistical sources

The sources available are:

A. The 1960 census of population. At this census, the population was registered at the residence. The returns have been published for towns and urban settlements delimited according to the actual extension of the contiguous built-up areas (irrespective of admin-

istrative borders). For statute towns and their suburbs, employment data have been published according to a break-down into 55 economic activities. (Towns with town rights are referred to as "statute towns". Most towns of more than 3000 inhabitants are statute towns. The majority of them are of medieval origin). For other urban settlements, data are only available according to a break-down into 7 classes.

B. The 1958 census of industries. This census only covered manufacturing industries, trade, and a few other service activities. The number of persons employed, payroll, turnover, and other data were registered at each establishment. The information has been published according to a detailed break-down into branches, for statute towns of more than 10.000 inhabitants. For smaller statute towns and other urban settlements, less detailed data have been published. For the present analysis, the Statistical Department has communicated a detailed break-down for statute towns, suburban communes, and communes with other urban settlements of more than 2.000 inhabitants, to the National Planning Committee. The geographical unit for this census was the commune. There may be a discrepancy between the actual extension of the built-up urban area and the extension of the one or several communes involved. For towns of more than 10.000 inhabitants, such discrepancies are always of little relative importance. For towns of 3–10.000 inhabitants, they may often be considerable; as most establishments are placed within the actual urban settlement, it is still possible to use the data for the analysis of the urban settlement. However, for urban settlements of less than 3.000 inhabitants, the extensions of the actual urban areas and the administrative communes are often so very different that the data of this census are of little use.

C. The Ministry of Fisheries annually registers the number of fishermen operating at each fishing port. For 1960, these data have been made accessible for the present analysis. The statistics of fisheries distinguish between persons with fishing as their main activity and persons with fishing as an accessory activity. For the whole of Denmark, the number of fishermen registered at the census of population corresponded to all main-job-fishermen plus $^1/_5$ of the accessory-job-fishermen registered in the statistics in question. So for each port, the number of main-job-fishermen plus $^1/_5$ of the accessory-job-fishermen has been used for this study.

D. The Office for Sailors' Taxes monthly registers the number of sailors employed in long-distance traffic (i.e. more the 50 nautical miles) on Danish ships, according to their commune of permanent residence. For August 1963, these data have been communicated to the National Planning Committee. Experts estimate that about $^5/_6$ of all Danish sailors employed in long-distance traffic are employed on Danish ships. So the data in question have been multiplied by $^6/_5$. It is of little importance that sailors in long-distance traffic were registered as late as 1963, since the number and geographical distribution of these persons is remarkably constant. (A control was possible for inland towns, as for these towns persons registered in the "shipping" class of the 1960 census of population were nearly all sailors in long-distance traffic).

E. Annually, the total personal income of the population living in each commune is published. For the above-mentioned reasons only if the town has more than 10.000 inhabitants, this information is adequate for the characterization of the actual town.

3. What to analyze

Several data could be considered for the characterization of the importance of each productive function of a town: Its value added, its turnover, its payroll, its employment (see e.g. *Andrews,* 1953–56). From § 2 it appears, however, that the employment is the only information available for all activities. Necessarily, we must base the analysis on employment data.

Two definitions are possible of the economic functions of a town: Either the activities of the population living in the town, or the activities performed in the town. Considered in the context of the understanding and future planning of the economic-geographic structure of Denmark, there can be no doubt that this analysis should be based on the latter definition and be concerned with the activities performed in each town. Therefore, the employment data used should be registered at the place of work.

For fishing, quarrying, manufacturing industries, trade, trucking, hotels & restaurants, and personal services the census of industries and the statistics of fisheries provide employment data at the place of work. (Construction firms are often active in many regions, employing local labour. However, at the census of industries, the whole staff is registered at the head-quarters. So for the present study, the census of population was applied, since it tells more about the ac-

tivities actually performed in each town. The same applies for some of the big power companies). For market-gardening, finance and insurance, transport (minus sailors in long-distance traffic – this activity having nothing to do with the home town – and minus trucking), public services, and professional services the census of population is the only source available. Fortunately, commuting seems to be rather limited for persons employed in these activities, so the number of persons living in a town should not be very different from the number of people working in it. According to studies carried out by the National Planning Committee, in-commuters often form 10–30 % of the total number of persons working in a town, but a considerably smaller share of the employment in transport activities, public services, etc. Altogether it is possible to apply a break-down into 35 activities for the analysis.

Thus the information used is heterogeneous as regards time of registration, place of registration, and way of registration (the census of industries only counts persons actually employed, while the census of population mentions the main source of income of each person, even if he was temporarily absent at the date of the census). The sum of persons working in each town (according to these sources) amounts to 90–105 % of the total number of gainfully employed persons living in the town (according to the census of population, which includes persons not stating their jobs). This percentage was lower in some towns which are well-known for their great out-commuting, namely Helsingør, Fredensborg, Hillerød, Roskilde, and Skanderborg. For these towns, it was necessary to subtract the estimated number of out-commuters in the activities for which the census of population was our source of information. The percentage was higher in commuter-attracting towns (e.g. Frederiksværk). It was also very high in all towns with sugar-mills (with seasonal employment fluctuations), indicating that some persons must have been counted twice. As it was unknown in what activities these persons worked, *all* employment ciphers were reduced by 3 % (Nykøbing F., Nakskov) or 5 % (Assens, Maribo, Sakskøbing, Stege).

The analysis should include all settlements that can be regarded as urban. A close study of the urban or rural character of every single settlement would demand too much work. In practice, the only possible definition of "urban" must be a certain size. Clearly, the definition used by the Statistical Department, 200 inhabitants, does not correspond to any change in the character of Danish settlements. Another limit must be found.

The question was approached in two ways: (A) As the regional service function is the most general urban function, it seems reasonable that only settlements with some central functions should be classified as urban. According to previous studies of Danish central places (*Illeris,* 1960), most settlements of more than 900 inhabitants (1960) and 40 % of the settlements of 700–900 inhabitants have some regional service functions. (B) Another general characteristic of urban settlements is the absence of agriculture. For 1960, the average agricultural population was calculated for settlements of 5–600, 6–700, 7–800 ... etc. The size-classes below 700 inhabitants had 13–14 % employed in agriculture, while all brackets from 700 to 1400 inhabitants had 8–9 %.

As a conclusion, 700 inhabitants have been chosen as the lower limit of the urban settlements analyzed. (As regards the upper limit, see § 5).

As mentioned in § 2, the census of industries can only be used as a source for towns with more than 3.000 inhabitants; and for smaller urban settlements, detailed employment figures are not available from the census of population.

So the analysis of urban settlements of 700–3000 inhabitants must be rather rough; instead of 35, a breakdown into only 6 activity-classes can be applied. As the imformation must be drawn from the census of population (supplemented by the statistics on fisheries and on sailors in long-distance traffic), settlements with a great out-commuting must be excluded from the analysis or pooled together with the proper commuter-attracting settlement. Excluded were the following settlements: Bording, Guderup, Gug, Hammerum, Hellebæk, Herfølge, Hinnerup, Hjerting, Hornbæk, Hørning, Malling, Munkebo, Nordby, Otterup, Stige, Stilling, Strøby Egede, Sunds, Svenstrup, Thurø, Tjæreborg, Tommerup St., Vodskov, and all settlements closer to Copenhagen than Helsingør–Hillerød–Slangerup–Roskilde–Køge. Pooled together were the following settlements: Ølby og Ølsemagle Lyng–Køge, Harboør–Thyborøn, Havnbjerg–Nordborg, Skrydstrup–Vojens, Kølvrå–Karup.

12 urban settlements of more than 3.000 inhabitants were not statute towns; so for transport and public administration etc., a detailed break-down was not available from the census of population. Ciphers were estimated on the basis of the information for transport as a whole and public administration etc. as a whole.

4. The urban economic base and the minimum requirements approach

The most elementary method of analyzing the economic structure of a town, is the calculation of each activity's share of the total employment. However, the expressions thus gained could hardly be called satisfactory. Anyone acquainted with the economic geography of Denmark knows that e. g. the textile industry is the absolutely predominating activity of Ikast, and that the steel industry is a very important factor in the economic life of Varde. Still, only 52 % of the total employment at Ikast were in the textile and apparel industries, and only 15 % of the employment at Varde in metal manufacturing.

It is easy to explain why these expressions do not show what would be considered the essential features of the towns in question. In each town, much of the total employment is engaged in supplying the town itself. However, if we want to recognize the raison d'être of the town, we have to concentrate on the activities performed for the rest of the world. These activities are decisive, too, for the entire character of the town, economically, demographically, sociologically, etc.

The idea of analyzing only activities that sell their products or services outside the town, is very natural, therefore. Actually this idea has been conceived in a number of countries all over the world (*Boesler,* 1960). Many terminologies have been invented to characterize the two categories of activities. According to the most widespread one, the export activities form the "economic base" of the town, while those working for the town itself are called "non-basic".

Now arises the question, how to distinguish between basic and non-basic activities. No data published contain such information, and for this study it is not possible to use the empirical method of asking every single firm how much it sells inside and how much outside the town.

Several approaches have been devised, the most wide-spread one being the so-called location quotient, which may be defined as a given activity's share of the total employment of a given town, divided by the activity's share of the total employment for the whole nation. If the quotient is above 1, the employment above the national average is counted as basic. – It is questionable, however, whether national averages should be brought into the picture, as they do not represent anything well defined. A town with an employment composition very similar to the national average could easily be

imagined; according to the method described, such a town would have almost no basic employment. The total national employment in a given activity (and hence also the national average) depends on whether the nation exports the products of the activity. However, for the analysis of the activity in one individual town, it is irrelevant whether the same activity in other towns sells outside the country or not. For example, if the Swedish provinces of Scania, Halland, and Blekinge were incorporated into Denmark to-morrow, all Danish national averages would change. In a given town, the expressions of the basic activities would all change, although no *real* changes happened.

Only these latest years a short-cut method has been invented which appears to yield usable results without a too enormous amount of calculation work, namely the so-called minimum requirements approach. The procedure is to calculate, for each town, each activity's share of the total employment. The figures are arranged in a table like this

	activity I	activity II	activity III etc.	total
A-town	2 %	17 %	9 %	100 %
B-town	5 %	12 %	2 %	100 %
C-town	0 %	30 %	2 %	100 %
etc.				
Minimum	0 %	12 %	2 %	

Now, it is assumed that the minimum-percentage occurring for each activity signifies that the activity is only selling within the town in question and does not sell anything outside it. Furthermore, it is assumed that for all other towns, a share of the total employment corresponding to this minimum-percentage is necessary to supply the town with the goods or services of the activity in question. Any excess beyond the minimum-percentage, on the other hand, may be supplying the rest of the world. Resuming the example used, the excesses are arranged thus:

	activity I	activity II	activity III etc.
Minimum	0 %	12 %	2 %
Excess A-town	2 %	5 %	7 %
– B-town	5 %	0 %	0 %
– C-town	0 %	18 %	0 %
– etc.			

It is most important to notice that the definition of non-basic and basic employment is not quite the same as the definition of minimum

and excess employment. The former terms are defined according to where the activities *actually sell* their goods and services, the latter ones according to what activities *are necessary* to supply a town. As an example a small part of the motor-car industry of Detroit should be called non-basic (as some cars are sold to citizens of Detroit). But the whole industry should be called an excess activity, as it is not necessary for a city to have any motor-car manufacturing. The terminology of these concepts is big already; but in order to avoid confusion, the terms minimum and excess will be used in this paper.

Most of the objections raised against the economic base concept as a tool of analysis vanish if the minimum/excess concept is used instead. (The criticism raised against the economic base as a tool of population forecast (through the use of location multipliers) seems more justified). Much better than the national average, the national minimum represents an actual fact. The problem of linked activities (firms selling to other firms in the same town, but the latter ones selling outside) is solved, as the first firms are no more necessary than the final ones. *Blumenfeld's* (1955) principal criticism was, that it was not clear whether the non-basic/basic analysis tried to establish the balance of payments of a town, or to study the branches of production from the point of view of their criticality, as determined by the extent of the area of potential competition (i.e. by their geographical range). The aim of the minimum requirements analysis clearly is to answer the latter question. For the purpose of this analysis, *the functions of a town are defined as the economic activities performed in it for the rest of the world.*

This definition means that not all aspects of a town's life and structure are characterized thorugh the minimum requirements analysis. Pensioners and other persons not gainfully employed often form an important part of the population of a town. Pensions and other capital flows not paid for goods or services may heavily influence the balance of payments of a town; but the minimum requirements analysis does not deal with these flows. Neither does the minimum requirements analysis show industrial linkages, which in some cases are important and characteristic of a town's economic structure (e.g. fishing port – fish conserves manufacturing – fishing boats' repair – wholesale trade with fish etc.) However, a close study of the excess activities shown by the method may reveal activities tending to coincide geographically (and therefore presumably linked).

Certain theories and assumptions inherent in the minimum re-

quirements approach should be stated explicitly. As in all comparative studies of this kind, the area studied is assumed to form a homogeneous universe with a similar standard of living, a similar composition of consumption, and similar distribution techniques. It is hardly possible – as sometimes suggested – to make one minimum requirements analysis for all Scandinavian countries, but Denmark alone should be sufficiently homogeneous. (For telephone traffic, the assumption of similar techniques does not hold, as in 1960 only a small number of Danish telephone exchanges were automatic. At the fixation of the minimum employment for telephone traffic, the automatic exchanges were left out of consideration).

The notions "requirement" and "necessary" rest on the idea that certain activities have a limited range and therefore (since a homogeneous pattern of consumption is assumed) *must* occur in certain towns. (For instance, that the service of hair-cutting cannot be sold over a distance). Seen from the point of view of such industries, the local market is decisive for their location. The range of activities and the minimum requirements of towns may change in time, as technology changes.

It should also be mentioned that the analytical framework is static, and that the character of the study is descriptive.

5. Questions concerning the application of the minimum requirements method

A number of problems must be solved, a number of modifications made, when the minimum requirements analysis is carried out. One question was what basis the individual activities of a town should be seen in relation to. As the investigation is into the activities necessary to meet the requirements of a town, this basis should be an expression of the consumptive power of the town. The total income should have been the adequate expression (especially if the payrolls had been chosen to express the activities); however, as mentioned in § 2, such information is only available for towns of more than 10.000 inhabitants. The number of inhabitants is another possible expression; but some towns contain a large number of inhabitants with a very low consumption (e.g. patients at large mental hospitals). So the number of gainfully employed persons residing in the town was chosen as an expression of the consumptive power, being at the same time a suitable denominator at the calculation of the relative employment in each activity (although the sum of the activities will not make exactly 100 %, as mentioned in § 3). For some

activities, the entire population are not customers, but only certain groups (for business services, other firms; for construction, mainly the population growth). It would be difficult not to use the same denominator for all activities, however.

The very definition of the minimum requirements of a town shows how essential it is that the towns analyzed are clearly and meaningfully defined. On the whole, the delimitation of statute towns + suburbs and of other urban settlements, used at the census of population, is satisfactory, as administrative boundaries are not followed. However, the statute town communes are always considered entirely urban by the Statistical Department, although some of them do include large rural areas. In order to exclude these areas, all persons employed in agriculture and forestry (but not in market gardening and fishing) were left out of consideration both as producers and as consumers. – As regards the activities where the information has been drawn from sources registering only whole communes, suburban communes with more than 50 % urban population (according to the census of population) have been included in the study.

According to central place theory, the inhabitants of a smaller town could only cover a minor part of their needs within their own town, while the rest must be provided at major towns. On the contrary, the inhabitants of a major town could cover all their requirements within their own town. Consequently, we may assume that the minimum activities engage a smaller share of the total employment of a minor town than of a major town. In that case, a minimum requirements analysis is not meaningful for towns of different sizes; individual minimum percentages must be found for individual size-classes of towns. Logically, the basis for the division into size-classes must be the employment in central activities, not the number of inhabitants of the towns.

A size-class must comprise a reasonable number of towns; if not, it is not possible to assume that for each activity, a town with no outside sales is found among them. In the case of Denmark, the paramount national capital of Copenhagen and the unquestionable regional capitals of Århus, Odense, and Ålborg must be kept outside the analysis. Thus the 75 Danish towns of 3–60.000 inhabitants were divided into the size-classes I, II and III, while the 200 towns of 700–3000 inhabitants were divided into the size-classes IV and V. The basis of the division was the number of people employed in retail trade and personal services (a priori, these activities could be

considered central functions). The employment in each town was marked at a logarithmic scale, which was divided into equidistant intervals:

Size-class I	1500–(about 4000)	persons
– – II	650–1500	–
– – III	(about 250) – 650	–
– – IV	150–(about 250)	–
– – V	(about 50) – 150	–

The minimum-percentages found for each activity, in each size-class, were modified in several ways for the calculations of the excess employments. The modifications for the size-classes I, II, and III (for which 35 activities were analyzed) were different from the modifications for size-classes IV and V (for which a break-down into only 6 activity-groups was used). First let us consider size-classes I, II, and III.

Like *Alexandersson* (1956), before fixing the minimum-percentage used (the "k-value"), we eliminated the extreme towns with the lowest percentages, in order to avoid the influence of quite exceptional or abnormal phenomena. For each activity and in each size-class, the lowest fifteenth of the towns was left out of consideration. The minima thus found as the 6⅔'th percentile were further modified, since in a country with a settlement pattern like Denmark's, it is not realistic to assume that the minima express that only the town itself is supplied. For service activities at least, towns with no outside sales could hardly be found. This remark concerns the middle-sized towns more than the small urban settlements. In order that they may really express what is necessary for the towns, the minimum-percentages were reduced by 30 % (for size-class I), 25 %, and 20 % (for size-classes II and III). These reductions were not chosen arbitrarily, but in such a way that a ranking of the towns, according to the excess employment in service activities (central functions), corresponded as closely as possible to the ranking of the towns according to central place studies, carried out by completely different methods (Illeris 1960).

For each activity, it should have been desirable to use a regression line through the minimum-percentages of the individual size-classes, instead of the minima actually found (and modified as mentioned above) (*Ulman & Dacey*, 1960). However, as only 3 size-classes are used, it is not possible to construct such regression lines,

especially since the minimum-percentages found through the calculations vary in a rather irregular way.

The minimum-percentages found for the 35 activities of size-classes I, II, and III were (modified as described):

Market gardening		0,3–0,4 %
Fishing		0 %
Quarrying		0 %
Food, beverages, and tobacco manufacturing		2,3–3,1 %
Textile	–	0–0,1 %
Apparel and footwear	–	0,3–0,9 %
Wood	–	0–0,1 %
Furniture	–	0,2–0,3 %
Paper	–	0 %
Printing		0,2–0,5 %
Chemical	–	0 %
Stone, clay, glass	–	0,1–0,2 %
Iron & metal	–	0–0,2 %
Machinery	–	0,2–0,4 %
Electrical machinery	–	0–0,1 %
Transportation equipment	–	0,4–0,6 %
Leather, rubber, and other	–	0–0,3 %
Construction		4,7–5,8 %
Public utilities		0,2–0,3 %
Wholesale trade		1,3–2,6 %
Food retail trade		3,9–4,7 %
Non-food retail trade		3,0–4,2 %
Finance & insurance		1,1–1,2 %
Railways & buses		0,7–0,9 %
Trucking & taxis		0,6–0,9 %
Short-distance shipping		0 %
Port etc. services		0,1 %
Telephone system		0,4–0,5 %
Post & telegraph services		0,5–0,6 %
Public administration		1,4–1,7 %
Education		1,8–2,0 %
Medical & social services		2,9–3,0 %
Professional services		0,6–0,8 %
Hotels & restaurants		1,2–1,6 %
Personal services		1,4–1,7 %

In this study it was found that for some activities the minimum-percentages were smaller in minor towns than in major towns, thus confirming our assumption. But for other activities the opposite turned out to be the case. Thus, the total minimum employment for size-class I made up 35,3 %, for size-class II 36,3 %, and for size-class III 33,4 %. No explanation has been found for this irregular

tendency which is contrary to the findings of *Ullman & Dacey*. Possibly the explanation may be (as suggested by professor *C. D. Harris*) a higher level of consumption in big towns than in small ones, which would be contrary to the assumption of a homogeneous universe. Or the irregularity may simply be due to the small number of towns analyzed. It also seemed a possible explanation that the activities with large minimum employment might be more rationalized in large towns than in small ones; but this is not the case. For activities registered at the census of industries, e.g. retail trade, the turnover per person employed does not vary by town size.

The irregularity may be an argument in favour of making only one minimum requirements analysis for all towns, irrespective of their sizes, like *Alexandersson*.

For size-classes IV and V too, the minimum was fixed at the 6⅔'th percentile, for each activity-group and in each size-class. Next, the minima were reduced by 15 % and 10 %, respectively. A third modification was necessary because of the poor break-down into activity classes. In each of the size-classes I, II, and III, the sum of the minima of the individual manufacturing branches (minimum of food industries + minimum of textile industries etc.) was about 50 % lower than the minimum of manufacturing as a whole. This is logical, since the minima of the individual branches are not liable to occur and actually do not occur in the same town. We may conclude that *the minimum-percentages are heavily dependent on in what detail the statistical break-down of the employment is.*

To make the results for the size-class IV and V comparable to those for size-classes I, II, and III, the minimum for manufacturing as a whole group of activities (and modified as explained above) was reduced by 50 %. In the same way, the minimum for transport as a whole had to be lowered by 33⅓ %. The minimum for trade as a whole was lowered by 5 % only, for public administration etc. by 10 %, and for the group "hotels, restaurants, & personal services" by 10 %, as the minima (or percentages close to the minima) of the individual activities within each of these groups often coincide in the same town.

For size-classes IV and V it *was* possible to use regression lines instead of the minima found, since the regression lines could be based on the 5 minimum-percentages of all 5 size-classes, for each activity-group. It was even more desirable, as the minimum-percentages found in the above-mentioned way showed very large variations between the size-classes. If these minima had been used for

calculating the excess employment, it should hardly have been possible to compare the results from one size-class to another. So the minimum-percentages read off from the regression line were used instead, for each size-class and each activity. The minimum percentages used for the 6 activity-groups of size-classes IV and V were:

Fishing	0 %
Manufacturing	12,0–12,5 %
Trade	10,2–10,6 %
Transport	2,8 %
Public administration etc.	5,8– 6,1 %
Hotels, restaurants, personal services	3,1 %

6. The geographical nature of activities

To make the results obtained through the calculations of the excess employment usable, they must be summarized in some way. From analysis, we must move to synthesis.

Now the question arises, how the individual activities should be combined into groups of activities. The International Standard Industrial Classification of All Economic Activities, which is applied by the Danish statistics, is based on an economic character of the activities, namely their place in the production chain. However, for the functional structure of a town it is less decisive *what* activities are performed than *for whom* they are performed, that is where the products or services are sold. Actually, the distinction between non-basic and basic activities is the first step towards a classification of activities based upon their ranges. A second step of such a spatial or geographical classification would be a division of activities selling outside their town into a) those selling everywhere in the country or in the whole world (unlimited range), and b) those selling only within a larger or smaller hinterland (limited range). Accordingly, the basic employment should be divided into what might be called "regional" and "extraregional" components. (Dutch terminology on economic base questions is able to express the ranges flexibly. The distinction is not only between basic ("stuwend") and non-basic ("verzorgend"), but between "lokaal-verzorgend", "lokaal-stuwend, regionaal-verzorgend", "regionaal-stuwend, provinciaal-verzorgend", etc.).

In order to classify the individual activities according to these principles, diagrams were constructed showing the importance of each activity in the 63 statute towns analyzed, similar to the dia-

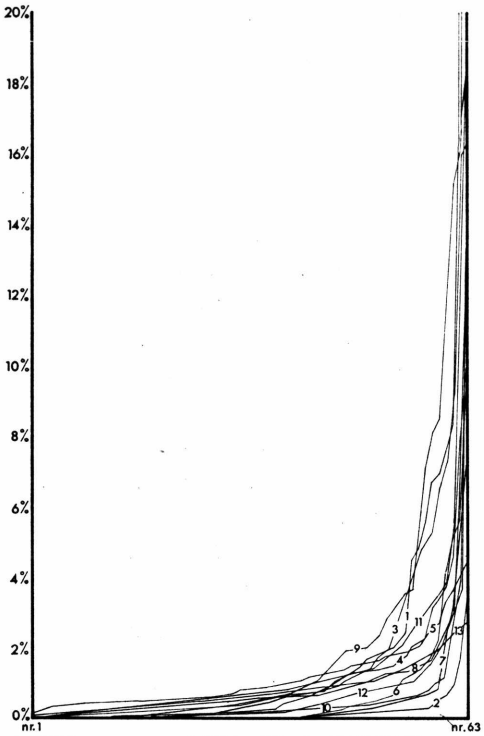
grams constructed by *Alexandersson*. Because of the small number of towns in the individual size-classes, the diagrams had to comprise all towns of size-classes I, II, and III, – even if differences may exist between the size-classes (as *Morrissett* (1958) showed for American towns). (12 urban settlements of size-class III, which are not statute towns, were excluded as information on some activities was lacking). Three types of activities could be discerned:

A. Sporadic activities (shown in fig. 1), being absent in many towns (minima were 0,2 % or less). Assuming similar patterns of consumption everywhere, it is clear that the range of these activities must be unlimited or at least very large. Of course they would sell a bit within their own town and its hinterland; but the local market is not an important factor for their location. It would be natural to classify their total excess employment as "extra-regional".

B. Ubiquitous activities which are rather equally important everywhere (shown in fig. 2). It is typical for these activities that they are found to some degree in all towns, and their maximal relative importance is never more than 2–3 times larger than their minimal relative importance. This may be illustrated by the so-called employment ratio, defined as $\frac{\text{the 95th percentile}}{\text{the 50th percentile}}$ (*Morrissett,* 1958). For B-activities the ratio is below 2. This upper limit for the importance of these activities must be due to a limit in their geographical range. For each activity and each town, the total employment has been divided into minimum and excess in the previous paragraphs. For all B-activities, the excess employment is well correlated (towns with much excess retail trade also have much excess banking etc.). Though they may sell a bit outside the hinterland (e.g. to by-passing tourists), it is clear that the hinterland sales are decisive for the importance of these activities, and the total excess employment should be classified as "regional".

   Skagen seems to have particularly important retail sales to tourists, so a part of the excess employment in retail trade is not counted as regional, but as extraregional (connected with transport and hotels). For Maribo, not all excess employment in personal services could be considered regional, due to the existence of a large laundry (which explains the steep slope at the end of line 9 in fig. 2.). The estimated extraregional employment in personal services is counted as manufacturing. Similarly

ERHVERVENES ANDEL AF DEN SAMLEDE BESKÆFTIGELSE I KØBSTÆDER (INCL. FORSTÆDER) MED 3000 - 60000 INDB. 1958/60.
A. ERHVERV DER IKKE FOREKOMMER I ALLE BYER.

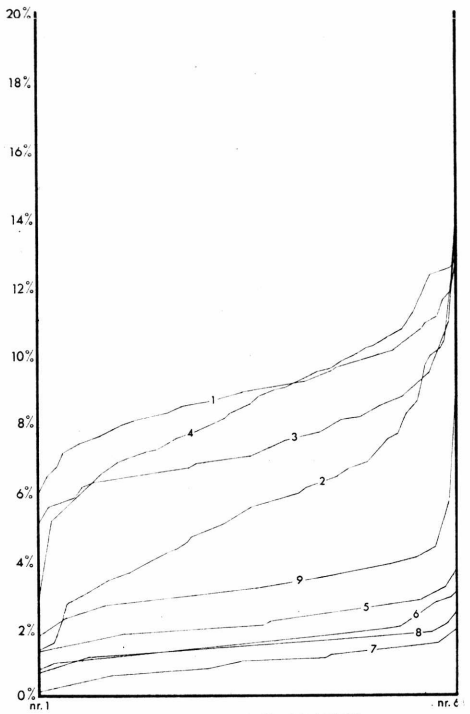


1. FISKERI
2. MINEDRIFT
3. TEKSTILINDUSTRI
4. TRÆINDUSTRI
5. MØBELINDUSTRI
6. PAPIRINDUSTRI
7. KEMISK INDUSTRI
8. STEN-, LER- & GLASINDUSTRI
9. JERN- & METALINDUSTRI
10. ELEKTROMEKANISK INDUSTRI
11. LÆDER-, GUMMI- OG ANDEN INDUSTRI
12. FÆRGEFART
13. HAVN m.v.

Landsplanudvalgets sekretariat, juli 1964

FIG. 1

ERHVERVENES ANDEL AF DEN SAMLEDE BESKÆFTIGELSE I KØBSTÆDER (INCL. FORSTÆDER) MED 3000 - 60000 INDB., 1958
B. ERHVERV DER FOREKOMMER I ALLE BYER, ALTID I BEGRÆNSET OMFANG.



1. BYGGE- & ANLÆGSVIRKSOMHED
2. ENGROSHANDEL
3. DETAILHANDEL MED NÆRINGS- & NYDELSESMIDLER
4. ANDEN DETAILHANDEL
5. PENGEINSTITUT m.v.
6. VOGNMÆND
7. TELEFONVÆSEN
8. LIBERALE ERHVERV
9. FORSKELLIG SERVICE (FRISØRE

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FIG. 2

Fig. 1. Individual activities' shares of the total employment, in towns of 3000-60.000 inhabitants, 1958/60.
A. Sporadic activities. 1. Fishing. 2. Quarrying. 3. Textile manufacturing. 4. Wood manufacturing. 5. Furniture manufacturing. 6. Paper manufacturing. 7. Chemical manufacturing. 8. Stone, clay, and glass manufacturing. 9. Iron and metal manufacturing. 10. Electrical machinery manufacturing. 11. Leather, rubber, and other manufacturing. 12. Short-distance shipping. 13. Port services etc.

Fig. 2. Individual activities' shares of the total employment, in towns of 3000-60.000 inhabitants, 1958/60.
B. Ubiquitous activities, being rather equally important everywhere. 1. Construction, 2. Wholesale trade. 3. Food retail trade. 4. Non-food retail trade. 5. Finance and insurance. 6. Trucking and taxis. 7. Telephone system. 8. Professional services. 9. Personal services.

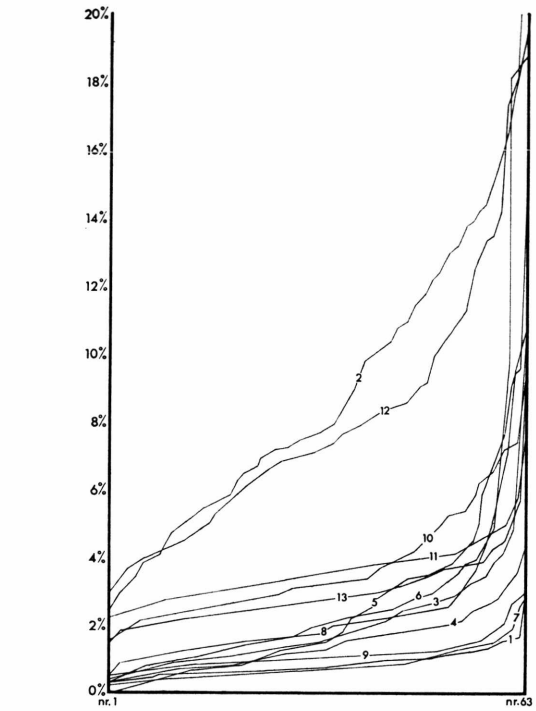
in size-classes IV and V, not all excess employment in trade could be considered regional for Bandholm and Kruså. The estimated extraregional employment is counted as transport.

C. Ubiquitous activities which are much more important in some towns than in others (shown at fig. 3). The employment ratio is 2 or more – often much more. (Education and hotels & restaurants have employment ratios below 2, but are included in the C-group, since a number of towns in size-classes IV and V have large employments in these activities). These activities, occurring everywhere, but with no upper limits for their importance, may usually be explained as heterogeneous statistical classes, containing both sporadic and ubiquitous elements. Thus the class "food, beverages, and tobacco manufacturing" comprises both ubiquitous bakers and sporadic fish canning plants. For a few activities, however, it is difficult to distinguish between heterogeneous elements. For instance, railway activities are both local and interregional.

Clearly the excess employment of these activities must be divided into a regional and an extraregional part. Another minimum requirements analysis for the region might have been considered. It is hardly feasible, however. (One reason is that while the minimum requirements for a town must be found in the town itself, the minimum requirements for a region may be dispersed into several settlements. Another reason is the impossibility of getting detailed employment statistics for the hinterlands). For the purpose of urban analysis it is also more meaningful to ask where the excess goods and services are actually sold than asking what is necessary for the region.

In the literature, no method of distinguishing between regional and extraregional employment has been found. The one applied in this study is not too satisfactory; it is our hope that better methods may be invented. The problem has a limited significance however, as the C group of activities hardly would exist if the statistics were sufficiently detailed.

For each of these activities a graph was drawn, in which each town of size-classes I, II, and III was marked, with the excess employment in the activity in question as ordinate, and the excess employment in the B (wholly "regional") activities as abscissa. As an example, the diagram of medical and social services is shown as fig. 4. In each diagram the majority of the dots form a long swarm stretching out from zero, while some



1. GARTNERI & FRUGTAVL
2. NÆRINGS- & NYDELSESMIDDELINDUSTRI
3. FODTØJS- & BEKLÆDNINGSINDUSTRI
4. GRAFISK INDUSTRI
5. MASKININDUSTRI
6. TRANSPORTMIDDELINDUSTRI
7. EL- & GASVÆRKER m. v.
8. JERNBANER & RUTEBILER
9. POST- & TELEGRAFVÆSEN
10. OFFENTLIG ADMINISTRATION
11. UNDERVISNING
12. SUNDHEDS- & SOCIALVÆSEN
13. HOTELLER & RESTAURATIONER

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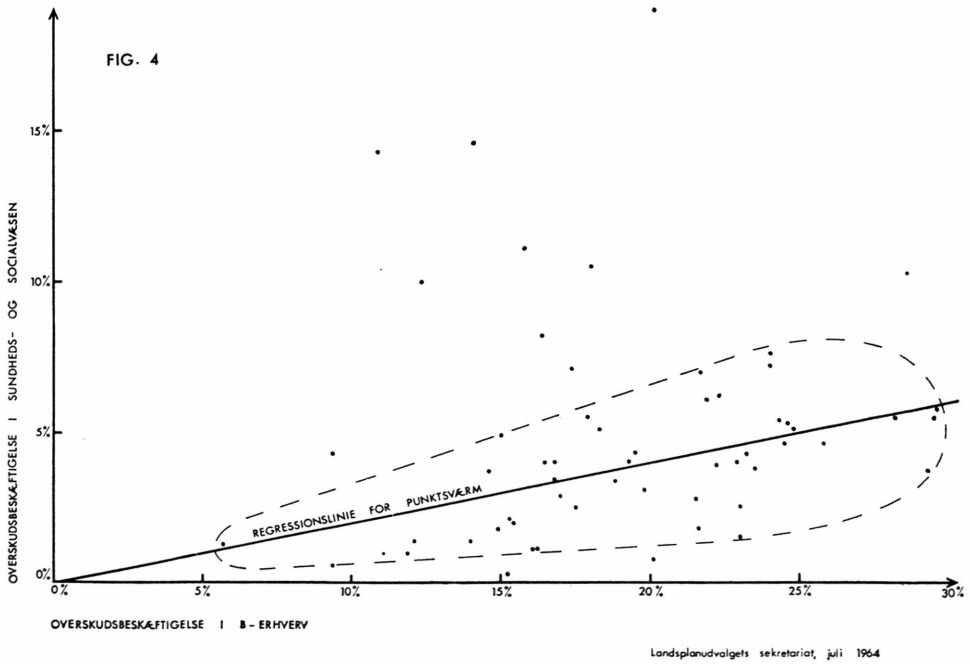
FIG. 3

ERHVERVENES ANDEL AF DEN SAMLEDE BESKÆFTIGELSE I KØBSTÆDER (INCL. FORSTÆDER) MED 3000 - 60000 INDB. 1958/60
C. ERHVERV DER FOREKOMMER I ALLE BYER, UNDERTIDEN I MEGET STØRRE OMFANG END ALMINDELIGT.

Fig. 3. Individual activities' shares of the total employment, in towns of 3000-60,000 inhabitants, 1958/60. C. Ubiquitous activities with high percentages occurring sporadically. 1. Market gardening. 2. Food, beverages, and tobacco manufacturing. 3. Apparel and footwear manufacturing. 4. Printing. 5. Machinery manufacturing. 6. Transportation equipment manufacturing. 7. Public utilities. 8. Railways and buses. 9. Post and telegraph services. 10. Public administration. 11. Education. 12. Medical and social services. 13. Hotels and restaurants.

Fig. 4. Ordinate: Excess employment in medical and social services. Abscissa: Excess employment in B-activities. Regression-line through the dot-swarm inserted.



dots are dispersed above the swarm. The swarm is interpreted as towns, where the importance of the activity in question is positively correlated to the importance of purely regional activities, and so conditioned by the hinterland, too. The dispersed dots above the swarm mark towns where the activity in question has a range beyond the "normal" hinterland of the town (as indicated by the B-activities). In some cases, the existence of a swarm is not too clear, but other information on the activities located in the individual towns could contribute to the delimitation of the swarm.

A regression line through the swarm indicates how much excess employment in the activity in question is probably actually engaged in selling to the "normal" hinterland (while some line along the lower edge of the swarm might have indicated the minimum requirements of the "normal« hinterland). Now for each activity and each town, excess employment up to the regression line is considered regional, while excess employment above the regression line is considered extraregional. For public utilities, the procedure described was only carried out for towns with big power stations. Other public utilities (gas-works etc.) are municipal and do only supply the town itself.

We must reconsider whether regional and extraregional employments calculated according to these rules express what they were intended to, namely the activities actually selling to and beyond the hinterland. In § 4 it was observed that the minimum employment often is lower than the employment actually selling to the town itself, – hence the excess employment larger than the employment selling outside. For activities of type A this is to the benefit of the extraregional employment, for type B and C to the benefit of the regional employment. A bit of the excess employment of type A-activities no doubt sells to the hinterland, but is counted as extraregional, while a bit of "regional" employment of type B-activities may sell outside the hinterland. – Altogether, the employment counted as extraregional probably rather well expresses the activities selling outside the hinterland, while the employment counted as regional probably is too large.

It is an advantage of the procedure applied that it is not necessary to delimit the hinterlands geographically or to use statistics for them. "Normal" hinterlands are indicated by the excess employment in type B activities. It should be stressed that the notion of

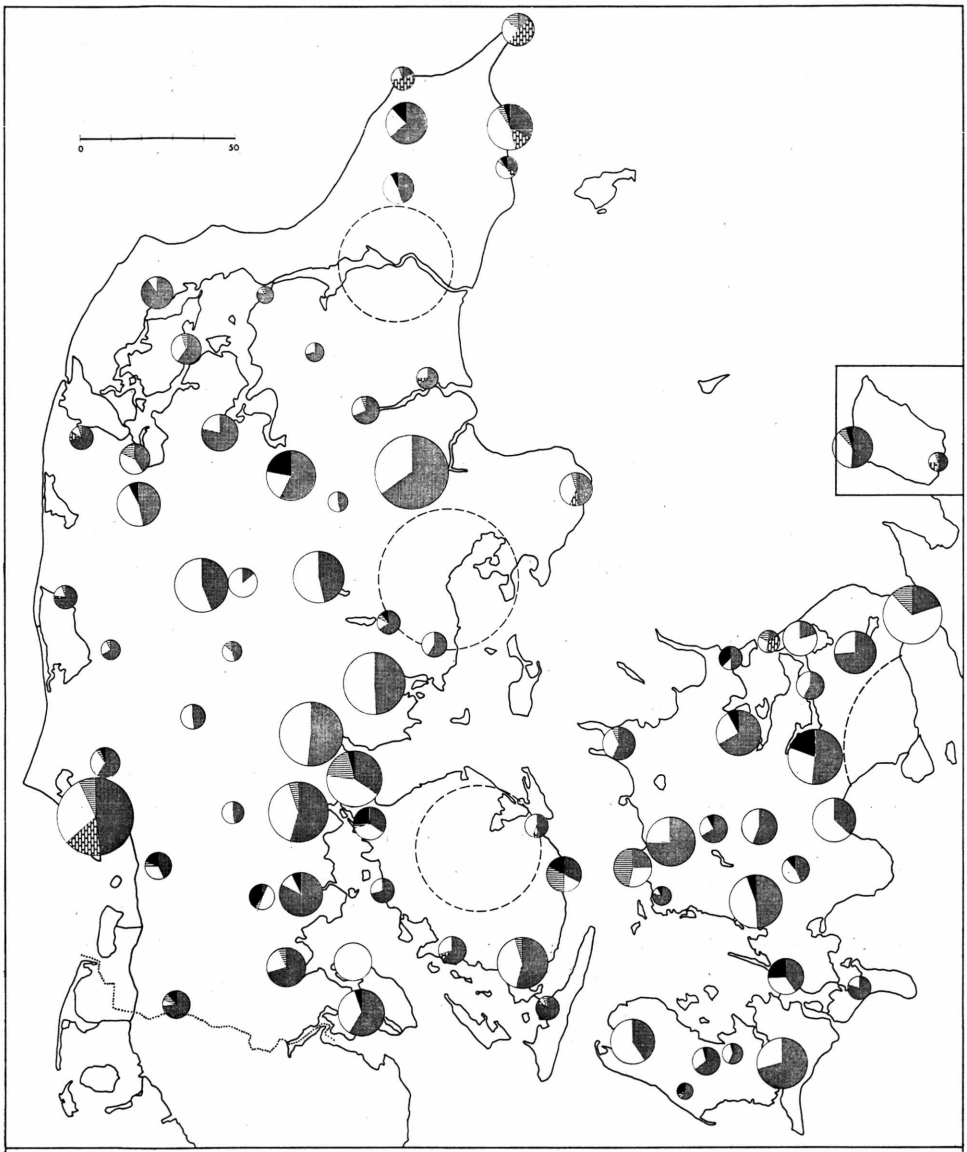


FIG. 5 ERHVERVSFORDELING FOR BYERNES OVERSKUDSBESKÆFTIGELSE 1958/60

UDOVER DEN BESKÆFTIGELSE DER ER NØDVENDIG TIL AT FORSYNE BYERNE SELV.
BYER 3000 - 60000 INDBYGGERE.
CIRKLERNES AREAL ER PROPORTIONALT MED OVERSKUDSBESKÆFTIGELSEN

10000 5000 2500 800 PERSONER

CIRKELSEKTORERNE ER PROPORTIONALE MED DE ENKELTE ERHVERVS ANDELE I OVERSKUDSBESKÆFTIGELSEN
1. ERHVERV MED MINDRE END 4% AF EN BYS SAMLEDE OVERSKUDSBESKÆFTIGELSE ER UDELADT

IKKE - OPLANDSBETINGET
6. ADMINISTRATION m. v.
5. TRANSPORT, HOTEL & RESTAURANT
4. INDUSTRI m.v.
3. FISKERI
2. OPLANDSBETJENING

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"normal" hinterland implies that the same excess function (of type C) in some cases is considered entirely regional, in other cases partly extraregional. For instance, in a middle-sized town the excess employment of a hospital is considered regional, while in a small urban settlement, a hospital of the same size may partly be counted as extraregional. This seems reasonable, even if a hospital in a small town may have a limited range: the activity is not based on the town's own local hinterland, for the small town its presence is similar to that of a manufacturing firm with an unlimited range. – According to central place theory, a major town has both small, local hinterlands of low order, and large high-order hinterlands. It should be stressed that the "normal" hinterland corresponds to the largest hinterland served by a greater number of activities in the town.

For size-classes IV og V, only fishing belongs to type A, and only "trade etc." to type B; the 4 remaining groups of activities belong to type C. The distinction between regional and extraregional employment rests on a weak base for these size-classes, partly because the excess employment in trade alone is so very decisive for the total "regional" employment, partly because the activity-groups "manufacturing" and "transport" are so heterogeneous that no well-defined dot-swarms occur (the regression line then was placed so as to correspond to size-classes I, II, and III).

While the minimum and regional employment is tied to the local and regional market, the location of extraregional activities is liable to be influenced by other factors. For national planning purposes, it is interesting to know that (in size-classes I, II, and III) 83 % of the extraregional employment were found in private establishments (mainly manufacturing), and 17 % in the public sectors (mainly transport and health).

Fig. 5. Composition of excess employment for towns of 3000-60.000 inhabitants 1958/60. The areas of the circles are proportional to the excess employment, the areas of the sectors proportional to the shares of the individual activity classes.

1. Activities with less than 4 % of the total excess employment are omitted.
2. Regional activities.
3. Extraregional fishing.
4. Extraregional manufacturing.
5. Extraregional transport, hotels, and restaurants.
6. Extraregional public administration etc.

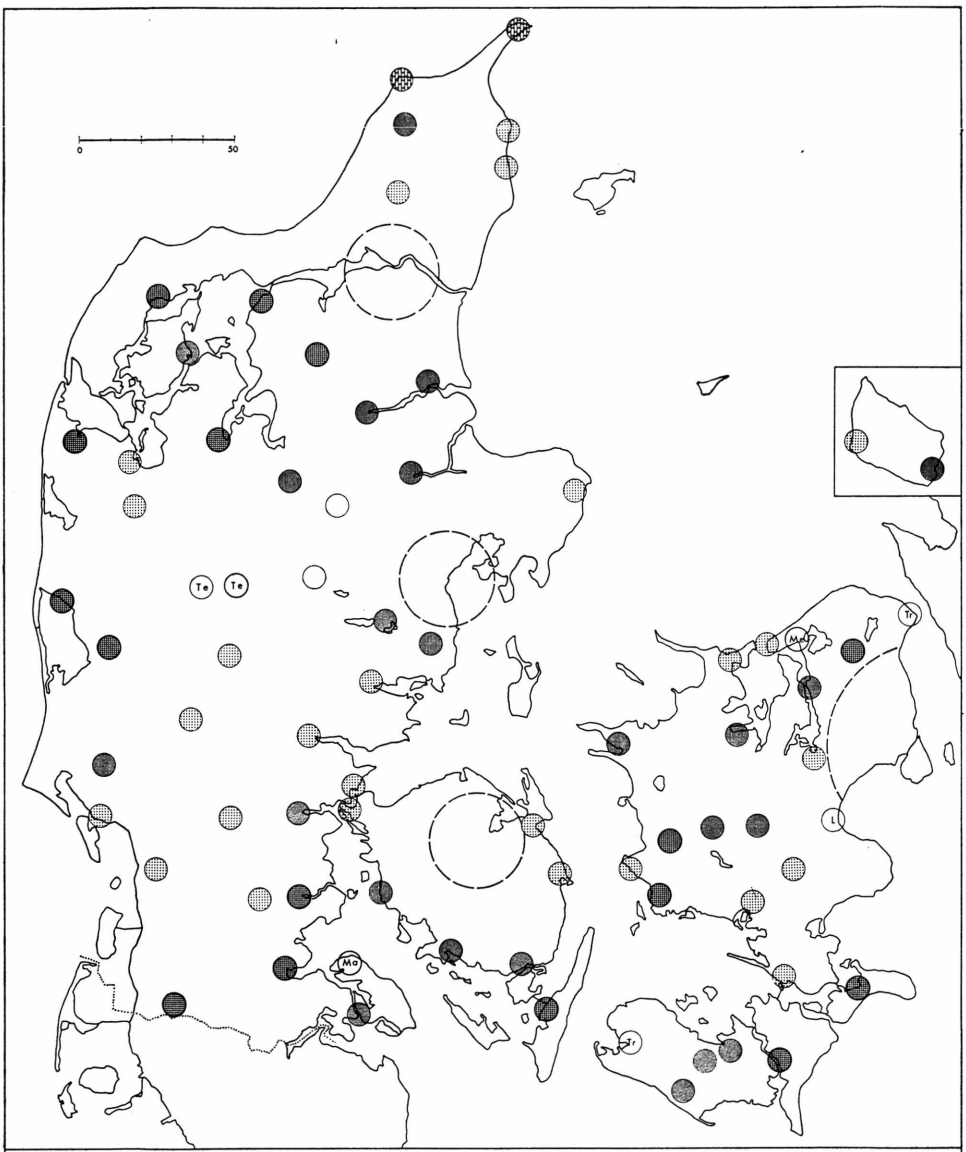

FIG. 6 **BYTYPER 1958/60**

KLASSIFIKATION AF BYER MED 3000 – 60000 INDB.

1. BLANDET BY
2. ⊥ OPLANDSBY
⊥ UDPRÆGET OPLANDSBY
3. FISKERIBY
4. ⊥ INDUSTRIBY
⊥ UDPRÆGET INDUSTRIBY
L a. LÆDER - & GUMMIINDUSTRIBY
Ma b. MASKININDUSTRIBY
Me c. METALINDUSTRIBY
Te d. TEXTILINDUSTRIBY
Tr e. TRANSPORTMIDDELINDUSTRIBY

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7. A typological classification

Having divided the excess employment of each town into "regional" and "extraregional" employment, we may synthesize the analysis on the basis of this dichotomy. As a consequence of the way it was found, the regional employment has a similar composition in all towns, so a further subdivision is not possible. But for the extraregional employment in type A and C activities, the composition according to the major statistical groups should also be shown, namely fishing, manufacturing (including quarrying and public utilities), public administration etc. and transport (together with transport hotels & restaurants have been pooled, as the most important extraregional hotel & restaurant activities are the restaurants of the large ferry-lines). Market-gardening was left out of consideration, as this activity nowhere accounts for more than 1 % of the excess employment (except Svendborg, 2 %, and Skælskør, 3 %).

On fig. 5 the distribution of the excess employment among regional and these 4 groups of extraregional activities is shown for each town.

A means of synthesis is a typological classification of the towns according to their dominant functions. Such classifications have often been made in order to show the most essential features simply and pedagogically. On the other hand, when using them it must be kept in mind that many details have been lost, as by all generalizations. Perhaps the most important value of typological classification is that it may be an analytical tool, a basis of further correlations and calculations, as pointed out by *Howard Nelson* (1957).

Several principles of town classification have been invented. The most well-known may be *Harris'* classification of American towns (1943) which is appreciated for corresponding well to what is generally considered characteristic of each town. Manufacturing towns are to have more than 60 % of the total employment in manufacturing, transport towns more than 11 % of the total employment in transport etc. This means that the classification is based on something like the basic employment, but without giving any theoretical

Fig. 6. Typological classification of towns of 3.000-60.000 inhabitants, 1958/60. 1. Mixed town. 2, I. Regional town. 2, II. Regional town (extreme). 3. Fishing town. 4, I. Manufacturing town. 4, II. Manufacturing town (extreme). 4 a. Leather and rubber manufacturing town. 4 b. Machinery manufacturing town. 4 c. Metal manufacturing town. 4 d. Textile manufacturing town. 4 e. Transportation equipment manufacturing town.

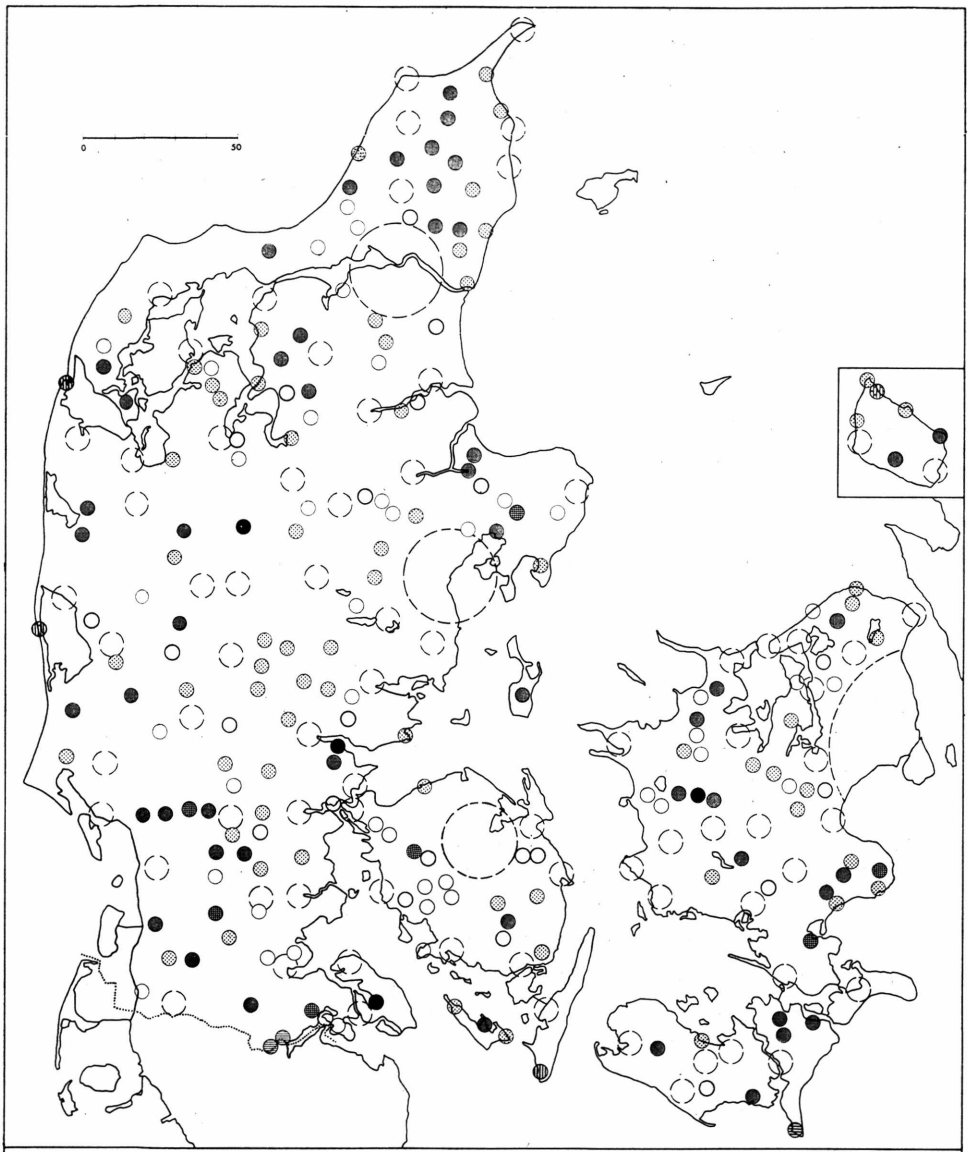

FIG. 7 BYTYPER 1958/60

KLASSIFIKATION AF BYER MED 700 – 3 000 INDB.

1. BLANDET BY
2. ⌶ OPLANDSBY
⌶ UDPRÆGET OPLANDSBY
3. ⌶ FISKERIBY
⌶ UDPRÆGET FISKERIBY
4. ⌶ INDUSTRIBY
⌶ UDPRÆGET INDUSTRIBY
5. ⌶ TRANSPORTBY
⌶ UDPRÆGET TRANSPORTBY
6. UDPRÆGET HOSPITALS- EL. MILITÆRBY
7. STØRRE BY

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reasons for choosing the old percentage-criteria. As pointed out by *Ullman & Dacey,* a classification should not be based on the total employment, but on the excess employment expressing the differences between the individual towns.

Le Guen (1960) classified French towns according to their excess employment, using a triangular diagram. As the most essential structure of the excess activities, according to our point of view, is the dichotomy between regional and extraregional employment, we prefer to use a 50 % criterion (like *Aagesen* (1961) did when classifying Danish towns, on the basis of the number of persons supported by each activity).

A further classification of the extraregional towns is possible on the basis of the extraregional employment in the 4 main statistical groups of activities mentioned, and (for size-classes I, II, and III) on the extraregional employment of the individual branches of activities. The whole system of classification is:

A. More than 50 % of the excess employment regional: Regional town.

B. More than 50 % of the excess employment extraregional:

B. 1. More than 50 % of the excess employment fishing: Fishing town.

B. 2. More than 50 % of the excess employment manufacturing: Manufacturing town.

Manufacturing towns with more than half of the excess manufacturing employment in a single branch, is named after this.

B. 3. More than 50 % of the excess employment transport (incl. hotels & rest.): Transport town.
Subclassification as for manufacturing towns.

Fig. 7. Typological classification of towns of 700-3000 inhabitants, 1958/60. 1. Mixed town. 2, I. Regional town. 2, II. Regional town (extreme). 3, I. Fishing town. 3, II. Fishing town (extreme). 4, I. Manufacturing town. 4, II. Manufacturing town (extreme). 5, I. Transport town. 5, II. Transport town (extreme). 6. Hospital or military town (extreme). 7. Bigger town.

Correction: Fig. 7. Gl. Tommerup must have a sign indicating manufacturing town (extreme) instead of the sign for manufacturing town.

Rettelse: Fig. 7. Gl. Tommerup skal have signatur som udpræget industriby i stedet for som industriby.

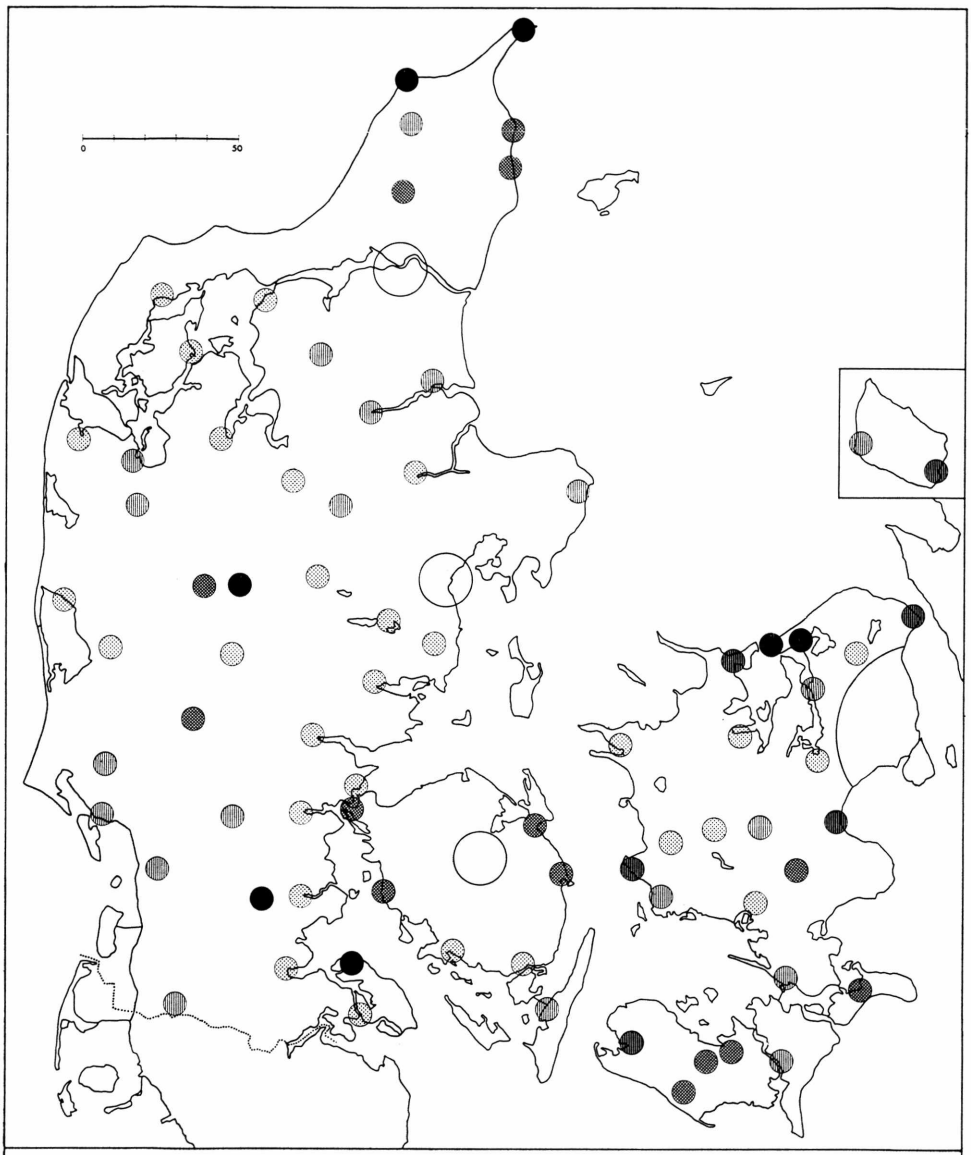

FIG. 8 **BYERNES SPECIALISERING 1958/60**

SPECIALISERINGSINDEX FOR BYER MED 3 000 – 60 000 INDB.
OVERSKUDSBESKÆFTIGELSE HELT JÆVNT FORDELT PA ALLE ERHVERV: INDEX 106

150 – 275
275 – 425
425 – 625
750 – 900
1400 – 3800
STØRRE BY

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B. 4. More than 50 % of the excess employment public administration etc.: Administration town. In the cases actually occurring, the excess employment was found in hospitals or in military establishments.
Subclassification as for manufacturing towns.

B. 5. No group of activities has more than 50 % of the excess employment: Mixed town. Furthermore towns are always classified as mixed if, out of the total excess employment, the share of the leading group of activities is less than 5 % larger than the share of the next group.

Towns with more than 66⅔ % of the excess employment in a given group of activities, are classified as extreme types.

Most towns appear to be regional, mixed, or (especially in size-class V) manufacturing towns. As regards the main geographical distribution, there is no clear-cut uniform region like the North American "manufacturing belt". Still, it may be seen from figures 5 and 6 that regional activities are dominating in most towns of the western and southern periphery of Denmark, while extraregional manufacturing is mainly found in towns near the big traffic lines in Eastern Jutland and across the islands (however important regional activities these towns may have, too).

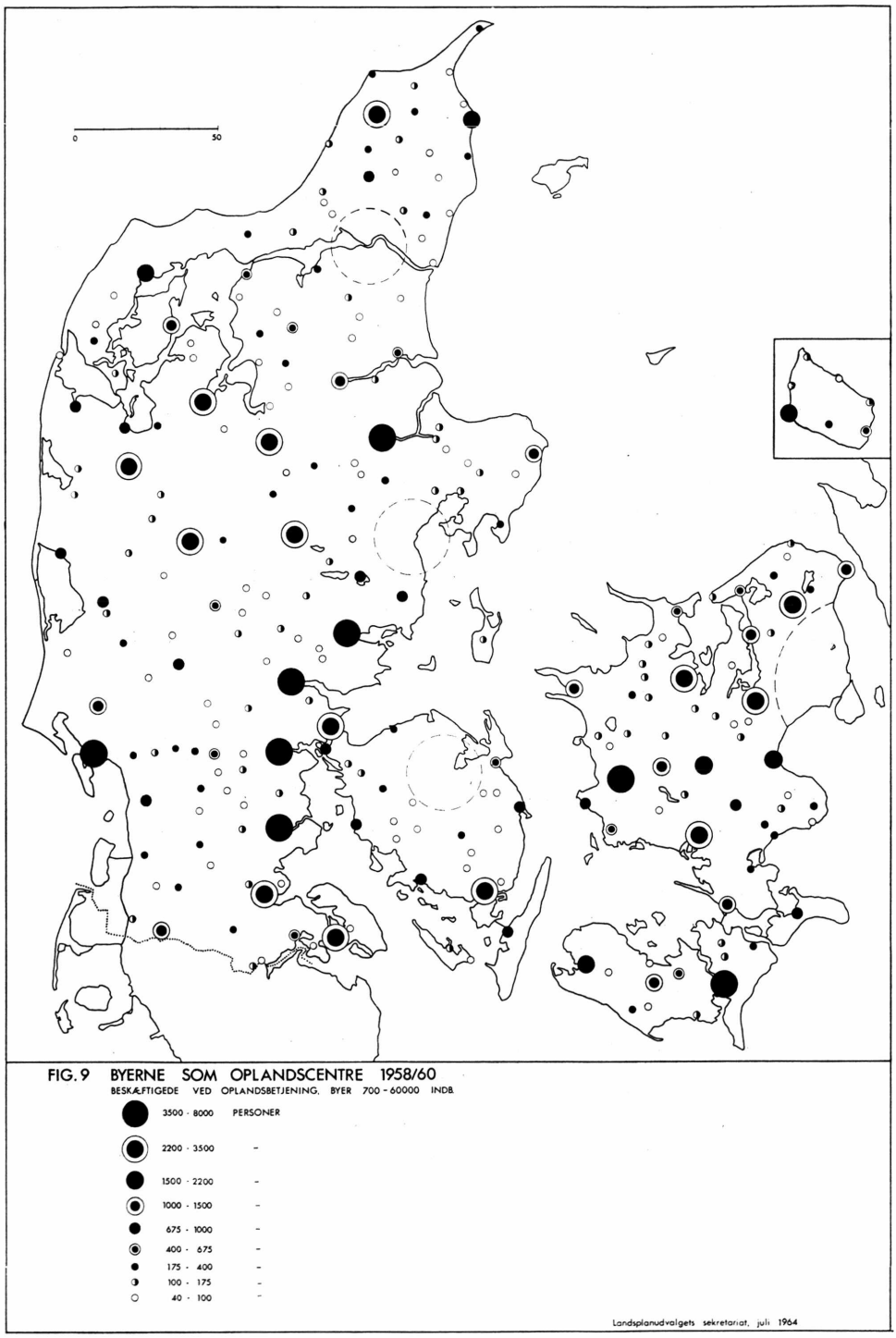
In regions which for historical (North Slesvig) or physical (island of Langeland) reasons have been isolated from the provincial capitals of Denmark, it is evident that wholesale trade is abnormally important in the towns. This fact explains the steep slope of line 2 in fig. 2.

As an example of the further studies, for which the typological classification may be used, the average growth rate 1955–60 was calculated for each typological class:

	regional towns	mixed towns	fishing towns	manufac. towns
Size-classes I, II, III	3,9 %	7,5 %	18,7 %	10,1 %
Size-classes IV, V	2,9 %	6,1 %	21,4 %	6,7 %

Between the growth rates of the various typological classes, the differences are much more marked than between the growth rates of size-classes.

Fig. 8. Index of specialization, towns of 3000-60.000 inhabitants, 1958/60. Excess employment equally distributed among all acitivities would render index 106.


0
50
FIG. 9 BYERNE SOM OPLANDSCENTRE 1958/60
BESKÆFTIGEDE VED OPLANDSBETJENING, BYER 700 - 60000 INDB.
3500 - 8000 PERSONER
2200 - 3500 -
1500 - 2200 -
1000 - 1500 -
675 - 1000 -
400 - 675 -
175 - 400 -
100 - 175 -
40 - 100 -
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As another example, the average income 1959 per tax-payer was calculated for towns of more than 9000 inhabitants (i.e. most towns of size-classes I and II). For regional towns, it was 11.500 D.kr., for mixed towns 11.500 kr., and for manufacturing towns 11.600 kr. Average income thus seems to be remarkably independent on economic town-type.

8. Calculations of specialization and centrality

From the excess employment data, other expressions very frequently used in urban geography may also be calculated. Two such expressions have been calculated for this study.

For several reasons towns dependent on one or very few activities are not desirable. To study such specialized towns, an index of specialization is useful. *Ullman & Dacey* used an index demanding a good deal of computing. A simpler one, namely calculated as the sum of the squares on the excess employment percentages of the 35 activities, should be satisfactory, however. (For a discussion of the mathematical expression of specialization, the author is indebted to *H. Kuhlman,* University of Copenhagen). Obviously an index calculated in this way is very sensitive to the statistical breakdown of activities. If different activities are registered in one employment class, the square on this is much larger than the sum of the squares on the individual activities. Thus the very composite class of "food, beverages, and tobaco manufacturing" yields heavy ciphers, while on the other hand linked industries registered in different classes are under-estimated. To diminish this drawback, two or three of the following classes were combined for Esbjerg, Frederikshavn, Hirtshals, Hundested, Kerteminde, Nexø, Skagen, and Sæby: Fishing, food etc. manufacturing, and manufacturing of transportation equipment. In the same way, the squares were calculated on combined classes of shipping, restaurants, railways, and post services for Fredericia, Korsør, and Nyborg.

Fig. 8 shows such indices of specialization for size-classes I, II, and III. It appears that the major towns generally are little specialized (the lowest indices are found at Randers and Horsens), while

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Fig. 9. Centralities 1958/60. Employment in regional activities, towns of 700-60.000 inhabitants.

Correction: Fig. 9. Nordborg — omitted on the map — must have a sign indicating 40-100 persons employed.

Rettelse: Fig. 9. Nordborg, som ikke er medtaget på kortet, skal have signatur for 40-100 personer.

many small towns are very specialized (Frederiksværk and Havnbjerg–Nordborg boast of the highest indices). The 6 activity-groups of size-classes IV and V are so composite themselves, that it would be meaningless to base specialization-indices on them.

More studies have probably been devoted to the notion of centrality (invented by *Christaller* to measure the importance of a town for a tributary area) than to any other expression in urban geography. In an earlier study it was concluded that at least for medium and superior central places, the expression should be a quantitative one. Based on the minimum requirements analysis, the regional employment of a town (§ 6) is by our very definition a quantitative expression of its centrality. A map of the centralities of Danish towns measured by the regional employment, is shown as fig. 9. (The intervals used were chosen according to the peaks and bottoms of the distribution diagram). If this expression of centrality may not be truer than many other, it is at any rate theoretically well-based and logically derived.

9. Conclusion

The investigation does not pretend to give an accurate analysis of each town, but only to render a rough description with a limited amount of calculation work. This purpose seems to be fulfilled in a satisfactory way, if the results obtained are compared to general knowledge and to other studies of Danish towns. If we resume the examples of § 4, at Ikast 79 % of the excess employment was found in the textile and apparel industries, and the town was classified as a highly specialized textile town. At Varde, 27 % of the excess employment was found in metal manufacturing. Still, the roughness of the study is evident in many cases.

It is also a defect of the study that the statistics applied are from the 1958 and 1960 censuses, the returns of which have only been published with a delay of 4–5 years. In several towns, great changes of the functional character have taken place since then, caused by a rapid expansion of existing establishments (e.g. Struer), or by the introduction of new ones (e.g. Rødby), or for both reasons (e.g. Kalundborg).

The general interest of this study may be due to the attempts of connecting hitherto separate lines of urban analysis, in particular the economic base analysis and the central place analysis. It seems to the author that a main task of urban research during the next years should be the integration of all theory concerning urban functions.

RESUMÉ: Danske byers funktioner

I landsplanudvalgets kommissorium pålægges det bl. a.: »at forestå en sammenfatning og bearbejdning af materiale vedrørende ... den geografiske fordeling af befolkning, erhverv, bebyggelse ... og en analyse af sammenhæng herimellem«. I denne forbindelse er undersøgelser af byernes økonomiske funktioner af central betydning. Analyser af den foreliggende statistik er nødvendige, omend ikke tilstrækkelige til at løse denne opgave. I nærværende artikel diskuteres metoder til en sådan statistisk analyse, hvorimod det ikke her er hensigten at gøre rede for resultaterne.

Byer er defineret som bebyggelser med over 700 indbyggere (1960), fordi bebyggelser under denne grænse dels (iflg. tidligere undersøgelser) sjældent udøver oplandsservice – den mest generelle byfunktion – dels har en aftagende del af befolkningen beskæftiget i byerhverv overhovedet. Statistikken tillader dog kun en mere detaljeret analyse af byer med over 3000 indb. Som en følge af den anvendte metode kan analysen ikke omfatte landets 4 største byer.

Den mest nærliggende måde at belyse en bys erhvervsstruktur på er at udregne de enkelte erhvervs andel af den samlede beskæftigelse. Men derved får man ikke et tilfredsstillende udtryk for de enkelte erhvervs betydning, idet en del af aktiviteten i visse erhverv går ud på at betjene byen selv. For at finde byens eksistensberettigelse må man se bort fra denne aktivitet og kun betragte de erhvervsgrene, der sælger deres varer eller tjenesteydelser til omverdenen.

Spørgsmålet er da, hvorledes man får adskilt den erhvervsbeskæftigelse, der afsætter til omverdenen, og som kaldes »basic«, fra den der betjener byen selv (»non-basic«). Det er jo uoverkommeligt at spørge hver enkelt virksomhed om, hvor stor en del af varerne eller tjenesteydelserne der sælges til byens egne indbyggere. Først i de seneste år er der i den såkaldte minimums-behovs metode fundet en tilfredsstillende fremgangsmåde:

For et stort antal byer udregnes den procentuelle erhvervsfordeling, og tallene opstilles således:

	erhverv I	erhverv II	erhverv III etc.	ialt
A-by	2 %	17 %	9 %	100 %
B-by	5 %	12 %	2 %	100 %
C-by	0 %	30 %	2 %	100 %
Minimum	0 %	12 %	2 %	

Det antages nu, at for ethvert erhvervs vedkommende svarer minimums-procenttallet til, at i vedkommende by sælger erhvervet kun til byen selv. Endvidere antages det, at i alle andre byer er den samme procentdel af den samlede beskæftigelse nødvendig til at forsyne byen, mens overskudsbeskæftigelsen udover dette minimums-procenttal afsætter uden-

for byen. I det benyttede eksempel vises disse overskuds-procenttal således:

	erhverv I	erhverv II	erhverv II	etc
Minimum	0 %	12 %	2 %	
Overskud i A-by	2 %	5 %	7 %	
Overskud i B-by	5 %	0 %	0 %	
Overskud i C-by	0 %	18 %	0 %	

Det må antages, at en mindre bys indbyggere kun kan få dækket en del af deres behov i byen selv, mens resten nu må dækkes i større byer. En større bys indbyggere har derimod mulighed for at skaffe alle varer og tjenesteydelser i deres egen by. Heraf følger, at minimums-beskæftigelsen skulle udgøre en mindre del af den samlede beskæftigelse i en mindre by end i en større, og minimums-behovs analysen bør kun gennemføres for byer af samme størrelsesorden. I denne undersøgelse deltes byerne med 3000–60.000 indb. i størrelsesklasserne I, II og III, og bebyggelserne med 700–3000 indb. i klasserne IV og V.

De minimums-tal, der er anvendt ved beregning af overskudsbeskæftigelsen, er modificeret på flere måder: For det første blev der ikke taget hensyn til den laveste femtendedel af byerne (i hver størrelsesklasse, for hvert erhverv), for at ikke helt exceptionelle forhold skulle øve indflydelse. For det andet kan det ikke være en realistisk antagelse, at minimums-tallet skulle svare til, at der ikke blev solgt noget ud af byen. Der blev derfor anvendt tal 30 %, 25 %, 20 %, 15 % og 10 % lavere end de egentlig fundne minimums-tal, i størrelsesklasserne I, II, III, IV og V. For det tredie viste det sig for de større byers vedkommende, hvor en detaljeret brancheopdeling anvendtes, at summen af de enkelte industribranchers minimums-tal blev ca. 50 % lavere end det minimums-tal, der kunne findes for den samlede industri. (Dette er rimeligt, idet minimums-tallene i de enkelte brancher naturligvis ikke findes i én og samme by). For de mindre byers vedkommende giver statistikken imidlertid kun oplysninger for den samlede industri, og af hensyn til sammenligneligheden måtte da anvendes et tal 50 % lavere end det fundne minimums-tal. På samme måde måtte minimums-tallet for handel fradrages 5 %, for transport 33⅓ %, for administration m. v. 10 % og for »andre erhverv« 10 %. For det fjerde, i stedet for at benytte de fundne minimums-tal for hvert erhverv, måtte det anses for rigtigere at bruge dem, der kunne aflæses på en regressionslinie gennem de fundne tal fra de 5 størrelseklasser. Dette kunne dog kun gøres for den grove erhvervsinddelings vedkommende, hvor man kunne få tal for alle 5 klasser, og som *anvendtes* for klasse IV og V; for den finere erhvervsinddeling, hvor der kun fandtes tal fra 3 klasser, kunne der ikke konstrueres regressionslinier.

På grundlag af de ved analysen vundne oplysninger om de enkelte erhverv kan man på forskellige måder beregne sammenfattende udtryk for byernes funktioner. Men overskudsbeskæftigelsen må sammenfattes med hensyn til *hvor* de enkelte erhverv sælger, dette grundlag er vigtigere for byens økonomi end *hvad* de sælger. En afgørende skelnen er mellem på den ene side erhverv, der sælger overalt i hele landet eller

hele verden, og på den anden side erhverv der kun sælger indenfor et større eller mindre opland. Efter forekomsten i de 63 analyserede købstæder kunne overskudsbeskæftigelsen inddeles i:

A. Sporadiske erhverv (fig. 1), hvis overskudsbeskæftigelse kan klassificeres som extraregionalt afsættende.
B. Erhverv, der forekommer med begrænset betydning i alle byer (fig. 2), og hvis overskudsbeskæftigelse kan klassificeres som oplandsbetinget.
C. Erhverv, der forekommer i alle byer, og i enkelte med meget stor beskæftigelse (fig. 3). Disse erhvervs overskudsbeskæftigelse deles i regional og extraregional ved hjælp af koordinatsystemer, hvori byerne afsættes med overskudsbeskæftigelsen i vedkommende erhverv som ordinat og overskudsbeskæftigelsen i B-erhvervene som abscisse (fig. 4). De fleste byer danner en punktsværm, hvorigennem en regressionslinie tegnes, visende en korrelation mellem overskudsbeskæftigelsen i vedkommende erhverv og i de oplandsbetingede B-erhverv. Overskudsbeskæftigelse i vedkommende erhverv indtil regressionslinien regnes da for regional, eventuel overskudsbeskæftigelse over linien for extraregional.

I fig. 5 er overskudsbeskæftigelsen opdelt i oplandsbetinget og forskellige grupper af extraregional. Det er af betydning for egns- og landsplanlægningen, at kun den extraregionale overskudsbeskæftigelse (hvoraf 83 % er i den private og 17 % i den offentlige sektor) ikke lokaliseringsmæssigt er fast knyttet til by og opland. På grundlag af fig. 5 er foretaget en typologisk klassifikation (fig. 6 og 7), idet byer med over 50 % regional overskudsbeskæftigelse er kaldt oplandsbyer, byer med over 50 % af overskudsbeskæftigelsen i extraregional fiskeri, industri, transport (incl. hotel og restaurant), eller administration m. v. (i de forekommende tilfælde skyldes det enten hospitaler eller militær) er kaldt henholdsvis fiskeri-, industri-, transport- eller hospitals- (el. militær-) byer. Hvor vedkommende erhverv havde over 66⅔ % af overskudsbeskæftigelsen, er byerne klassificeret som udprægede typer. Andre byer er kaldt blandede, og således er også klassificeret byer, hvor den vigtigste erhvervsgruppe var mindre end 5 % større end den næstvigtigste.

Klassifikationen har dannet grundlag for videre beregninger, som viser at byernes væksttempo varierer meget mellem de forskellige klasser, idet fiskeri- og industriklassernes vækst var meget større end de blandede byers, som igen voksede hurtigere end oplandsbyerne. Derimod vaierer skatteydernes gennemsnitsindkomst overhovedet ikke mellem de forskellige klasser.

Ud fra overskudsbeskæftigelsen er beregnet et specialiseringsindex (fig. 8), som er summen af kvadraterne på overskudsbeskæftigelsen i de enkelte erhverv (målt i %). Hermed vises, om byens erhvervsgrundlag er ensidigt eller mangesidigt.

Endelig er den absolutte regionale overskudsbeskæftigelse vist på fig. 9 som et udtryk for byernes betydning som oplandscentre (deres centralitet).

Det kan konkluderes, at den anvendte metode med en begrænset arbejdsindsats giver et tilnærmet udtryk for byernes funktioner. Det er beklageligt, at statistikken offentliggøres så sent efter tællingerne, at undersøgelsen allerede er forældet ved fremkomsten.

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