

# Defining Regional Employment Centers in an Urban Area

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Suburbanization of employment in urban areas has reduced the significance of the traditional downtown not only for shopping but also for commuting. However, there are no standard definitions of suburban employment centers comparable with those of central business districts. This paper describes a study of regional employment centers within the Washington, D.C., area. Guidelines are given for applying the technique to other regions. An empirical definition of employment centers was developed based on a detailed investigation of employment concentrations throughout the region. Criteria were developed based on size of the center, area, and specialization of employers. The study made use of a 1974 census of employment, aerial photography, and U.S. census maps.

Analysis of population clusters has been an important focus of urban geography from its beginnings to the present. However, the study of employment clusters has been limited to research on urban-type settlements within a rural environment, until recently. Advanced techniques for geoprocessing of work locations and improved availability of work place data now make it possible to replicate some of the population cluster research for employment centers. In contrast to patterns of population distribution, which are relatively continuous, employment tends to cluster in a relatively limited number of well-defined business districts, including the central business district (CBD). Neidercorn and Hearle (1) found that commercial and industrial land on which most jobs are located accounted for only 12 percent of the total regional land area. Therefore, it is necessary that studies of employment centers develop new geographic units rather than being limited by the same census tract boundaries frequently used in studies of population concentrations. Some of the principal reasons for identifying and analyzing employment centers in urban regions are as follows:

1. It has been suggested that such centers could serve as a major focus for transit service in the suburbs (2).
2. Improved knowledge of the location and function of current employment centers will make it possible to develop better forecasts of growth in existing centers and identify the location of future centers.
3. They can be used to target special transportation policies, such as ridesharing and carpooling.
4. Prior knowledge of the locations of major employment clusters in a region will focus data-collection efforts for special surveys.

## CONCEPT

The concept of a regional employment center is one in which there are concentrations of employment in a limited geographic area, similar to the retail clusters defined as major retail centers in the U.S. Census of Business. In addition, there should be a diversity of different employers rather than one or two principal ones that dominate the center. It is generally easy to reach agreement on the location of the CBD according to certain criteria of density and business type. However, there can be great controversy over not only the limits of a noncentral employment area but also its very existence. A number of high-rise offices clustered around a suburban crossroads would probably qualify in most planners' minds. However, what about a suburban office park, an industrial park, or a shopping center?

Central-place theories developed in urban geog-

raphy could be useful, except that they tend to focus on the hierarchies of towns within a rural region. One of the most comprehensive studies to date was that undertaken by Berry in southwestern Iowa, which analyzed the distribution of towns in a farming area (3). One of the reasons for this lack of urban research has to do with data limitations. It was not until the 1970s that small-area employment data began to become available within several metropolitan regions, typically based on state employment security files. Moreover, it was found that converting these data into the types of establishment-based information required by planners required considerable additional processing (4). For this reason, the study described here represents some initial steps to define regional employment centers based on empirical data. It is expected that further research will make it possible to improve the theoretical basis for the classification.

## IDENTIFYING EMPLOYMENT CLUSTERS

Before questions of size or composition can be addressed, it is necessary to develop a candidate list of employment centers for further screening. The small geographic scale involved requires an employment data base coded to very detailed geography, preferably block. This study was able to use an inventory created by the Metropolitan Washington Council of Governments (COG), which was a census of employment throughout the region for 1974. This regional employment census was tabulated by block in order to pick up the "hot spots" that serve as the core of a regional employment center. The block served as a more convenient geographic summary unit than building premise addresses, which are a cumbersome identifier to work with in a large file. In major employment districts, block-level summaries may include all employment located in buildings on the main street as well as the back street or side streets. In less-dense areas, one facility may occupy an entire block. All blocks with more than 1000 employees were identified. Such blocks accounted for almost 50 percent of regional employment in only 4 percent of all blocks. Those areas with several blocks of high employment were then considered for inclusion as employment clusters. In addition, density maps of employment grouped to grid squares were analyzed to pick out cases of possible medium-density employment centers with less than 100 employees/block, but that extended over a large continuous area. Aerial photographs were then used to delineate areas of nonresidential land use for each potential center. Employment tabulations were then made for each of these centers, and the land area was calculated. The distribution of these trial centers by land area and employment size is shown in Table 1.

## IDENTIFYING A MINIMUM SIZE OF CENTER

An analysis of Table 1 indicated that there were many employment centers with less than 5000 employees compared with fewer large centers. Out of 99 centers, 56 had less than 5000 employees. However, they only accounted for 15 percent of the jobs in all of these centers. The types of centers included in this category were industrial parks and sites, 14; hospitals, 13; shopping centers, 10;

Table 1. Distribution of trial centers: land area and employment size.

No. of Acres	No. of Employees			
	Less Than 5000	5000-9999	10 000-20 000	More Than 20 000
0-99	22	2	-	-
100-199	14	8	2	2
200-299	9	5	-	2
300-399	-	2	-	3
400-499	5	2	3	-
500-599	3	-	3	1
600 or more	3	6	1	1
Total	56	25	9	9

military and government sites, 7; universities, 3; and town centers and other, 9.

A conclusion of this phase of the analysis was that regional shopping centers not accompanied by office development were too small (median size, 2000 employees) to be considered regional employment centers. The same was true of hospitals (median employment, 1500) and most industrial areas (median employment, approximately 2000).

#### DEFINITION OF AREA SIZE

Many of the centers summarized in Table 1 encompassed rather extensive land areas, in some cases more than 600 acres, which is almost 1 mile<sup>2</sup>. The problem was typically a result of using blocks as the basic unit of geography. In suburban areas, where there is little residential development and, consequently, no regular grid system of streets; some of these blocks are quite extensive. It was, therefore, necessary to split blocks and only include the area of the block devoted to intense commercial uses. In some cases, this modification reduced the total employment in the center below 5000, and the center was eliminated. A further refinement was made to the boundaries of some centers with extensive campus-type sites, but with most of the jobs clustered in one area. In this case, the final land area considered was only that to be used probably for employment purposes. The only two industrial centers remaining after this phase were a large, high-density one in Fairfax County, Virginia, and an industrial corridor near the railroad in the District of Columbia. Although no centers were eliminated on the basis of a maximum area threshold, there were only two centers found with sites covering about 700 acres; all of the others were much more compact.

Once the basic employment centers had been identified, a final check was made on the boundaries. This involved cutting back areas near the perimeter with very low employment densities. Although the density of each block was not calculated, it was possible to relate the employment totals to those of other blocks and visually compare the areas.

#### CORE EMPLOYMENT CENTERS

The same method of analysis was conducted in the central area as in the suburbs. This produced a definition of suburban regional employment centers consistent with that used for the core area, the traditional downtown. Washington is unique, however, in that a building-height limitation has resulted in a downtown area in which employment has spread out rather than up. For descriptive purposes, the Washington central employment area was subdivided into seven districts. One of these,

Georgetown, which serves as a fashionable shopping area on the edge of the downtown employment area, was eliminated because it employed less than 5000 people. The remaining area was divided into six different districts for descriptive purposes based on the mix of employment and traditional distinctions between these areas. In addition, the regional employment core also includes three somewhat more distinct employment districts in the adjacent portion of Arlington, Virginia, which is actually an extension of the District of Columbia core.

#### SPECIAL EMPLOYMENT GENERATORS

An analysis of the revised list of centers that have more than 5000 employees showed that there were nine centers in the range of 5000-10 000 employees that were quite specialized in nature. As indicated above, one of the criteria for defining regional employment centers was a diversity of different employers. The justification for this is that a single business or government agency can employ vast numbers of employees at a single location, but numbers alone do not provide a truly regional economic base. For one thing, once such a massive installation is established, it is not likely to generate the type of agglomeration growth that would be expected when several similar types of business are located together. On the other hand, a single decision by that establishment or a parent group could result in substantial employment declines during economic slowdowns in that industry. In addition, such specialized employers as universities, military bases, hospitals, and even government installations do not serve a truly regional labor market in the sense that their jobs are generally restricted to a small portion of the labor force at any given time (e.g., active military, academic, or medical personnel with credentials to practice at particular institutions). Such specialized centers in this size range were therefore eliminated from the regional employment center definition. This excluded one university with an affiliated hospital, seven military installations, and the Federal Center in Suitland, which serves as the headquarters of the U.S. Census Bureau. In addition, a slightly larger center, National Airport, was excluded for similar reasons.

Other special employment generators that have more than 10 000 employees were not excluded from the final definition. It was felt that the scale of these facilities was so large that they should be included. Four facilities fell into this category: Pentagon (military offices), 30 000 employees; NIH-Bethesda Naval Hospital (medical), 19 000 employees; Langley (security agency), 16 000 employees; and Andrews Air Force Base (military base), 13 000 employees. Collectively, they account for 78 000 jobs, equivalent to the CBD of a large city.

#### FINAL REGIONAL EMPLOYMENT CENTERS

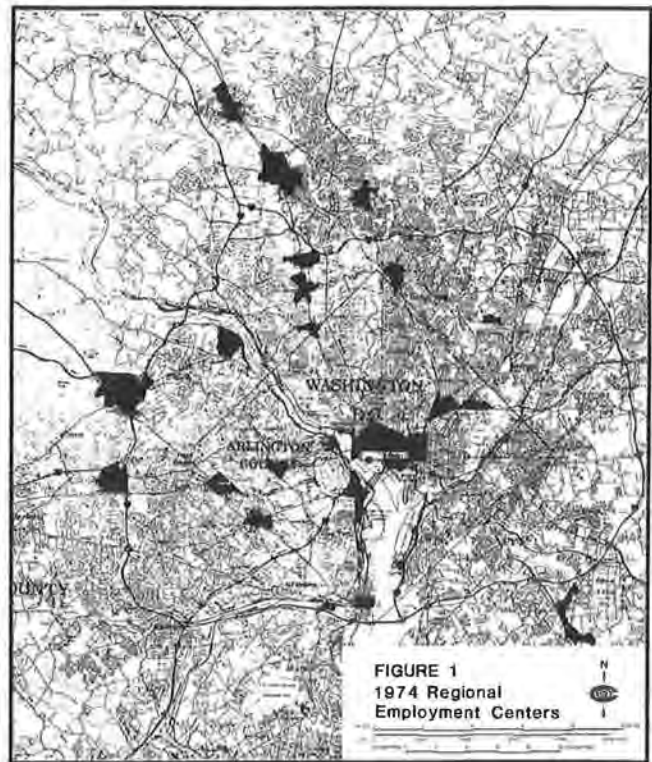
The final definition of regional employment centers yielded 27 centers. Nine of these were different core employment districts either in Washington, D.C., or in adjacent areas of Arlington County. The individual centers are listed in Table 2. Their location is shown in Figure 1.

#### CONCLUSIONS AND TRANSFERABILITY

This study has backed into a definition of regional employment centers because of the lack of accepted criteria. It appears from this empirical analysis

Table 2. Regional employment centers, 1974.

Employment Center	1974 Employment (000s)	Land Area (acres)
<b>Core</b>		
Downtown retail area	59	344
Connecticut Avenue	102	303
Federal Triangle	26	253
Foggy Bottom	40	320
Southwest	59	264
Capitol Hill	47	561
Rosslyn	13	136
Crystal City	21	184
Pentagon	30	127
Total	397	2492
<b>Suburban</b>		
Silver Spring	19	427
NIH-Medical Center	19	405
Langley	16	532
Bethesda	14	401
Andrews AFB	13	424
Tyson's Corner	12	714
Friendship Heights	11	190
Ballston	9	216
Twinbrook	9	157
Merrifield	8	708
Prince George's Plaza	8	114
Wheaton	7	345
Rockville	6	583
New York Avenue, N.E.	6	500
Seven Corners	6	334
Cameron Run Valley	6	248
Alexandria	5	194
Bailey's Crossroads	5	295
Total	179	6787



that a regional employment center will have the following characteristics:

1. A minimum of 5000 jobs,
2. A maximum developed area of 700 acres, and
3. A diversity of region-serving employers rather than a few special institutions.

In the Washington area, which has a very high percentage of jobs in the regional core, the 18 suburban regional employment centers employed almost half as many people as worked downtown in 1974. It is likely that in more dispersed regions, the cumulative employment in such centers could exceed that of the downtown. The ability to isolate such a high percentage of regional jobs within a relatively small number of well-defined centers should make it possible for researchers and planners to focus more sharply on the growth and distribution of employment within an urban region and how well it relates to population patterns.

The research described here has been a case study of the application of a regional employment center definition to the Washington, D.C., metropolitan area. This region has a few major differences with most other urban areas: (a) the dominance of government employment (about 4 out of every 10 jobs, including state and local employment) and (b) the concentration of regional employment in the central area.

It is believed, however, that the pattern of suburban employment centers in other regions will be similar. In fact, because of the much higher relative importance of the central employment core in

Washington, D.C., it is likely that other regions will contain more and larger suburban employment centers. It is expected that such centers will also satisfy the criteria of a large number of employees and a diversity of businesses clustered on relatively compact sites. The maximum area definition may need to be expanded. Assuming that the basic approach applies, it will be possible to identify a substantial share of the regional employment base on a limited number of job sites. Special policies for improving transportation efficiency can then be focused on a reasonable number of potential sites.

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REFERENCES

1. J.H. Neidercorn and E.F.R. Hearle. Recent Land Use Trends in 49 Large American Cities. Land Economics, Vol. 40, 1964, pp. 105-110.
2. J. Schneider and S. Smith. Redesigning Urban Transit Systems: A Transit-Center-Based Approach. TRB, Transportation Research Record 798, 1981, pp. 56-65.
3. M. Yeates and B. Garner. The North American City. 2nd ed. New York, Harper and Row, 1976.
4. R.T. Dunphy. The Illusion of the Secondary Source. Proc., Urban and Regional Information Systems Assn., Atlantic City, NJ, 1973.