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Horst Matzerath

Aggregated Census Data and the Analysis of Urbanization in Prussia (1816–1939)

This survey is a preliminary report on a section of the project „Urbanization in Prussia (1815–1939)“ which has been supported by grants of the Deutsche Forschungsgemeinschaft (DFG). For this section the data are now available and analysis has begun. This report deals only with the sources, the data, and the techniques of analysis.

1. Subject of the Project

The subject of this project is urbanization as one main branch of the process of modernization. Some of the aspects of urban and social transformations are analyzed as to their temporal and spatial structure. The first aspect is to be investigated by the analysis of the towns and cities of all Prussia. The second point is treated in the framework of three case studies dealing with the changes in the particular town itself and in the surrounding villages. The cases are Mönchengladbach (cotton industry), Saarbrücken (heavy industry), and Breslau (center of commerce). The survey presented here deals exclusively with the analysis of all Prussian towns and cities.

The central hypothesis of the project is that important changes occurring in the transformation of modern industrial society originate from towns and cities and have spread throughout the society. The time-span chosen implies the assumption that, in the case of Germany at least, there is at the beginning, to a certain degree, still a „traditional“ pattern and at the end a „modern“ pattern of urban and social development. Proceeding from demographic changes, this project tries to investigate the causes and consequences of these changes. Three aspects of transformation are analyzed: the spread of urban „innovations“ (sewerage, gas, transportation system etc.), legal and institutional transformations, and longterm structural changes, which are quantitatively identifiable. The report concentrates on this latter point.

2. The Object of Investigation

Town/city (Stadt) and urban (städtisch) are the basic criteria for the analysis of urbanization. One crucial point of this analysis, however, is the question of what has to be regarded as town/city or urban. Whereas it is quite clear that the notion of town or city dating from the middle ages is obviously inadequate, it has not yet been replaced by another, commonly acknowledged one. Therefore, instead of beginning with a definition of what is urban, the topic of the investigation is to find quantifiable differences between „town“ and „country“. On this basis it has to be decided whether, where and when there exist fairly recognizable distinctions between towns/cities, or some categories of them, and the country or whether there is only a continuum. This question is to be decided on the basis of criteria developed in the discussion on modernization (e. g. birth rates, mobility, household structure, bureaucratization, budget expenditures, occupational categories).

Concerning the data available for this investigation, there are two different notions of „urban“: one is „town“ as a legal concept as it was used by the Prussian statistics, the other „urban“ in the statistical sense used by the statistics of the German Reich since 1871. Neither of these two criteria is wholly satisfying: the former includes a number of very small communities owing their title to their importance in previous centuries; on the other side the latter comprises a constantly growing number of villages, among them many relatively unimportant communities, so that one might doubt whether this criterion still makes sense at the end of the 19th century. The advantage of the legal definition consists in the fact that it comprises a relatively constant number of communities which is altered only by deliberations and decisions of the government or the crown, whereas the statistical definition allows comparisons on the basis of a firm classification.

3. Sources and Materials

The quantitative analysis is mainly based on the census reports of the Prussian statistics („Preußische Statistik“ and preceding statistical works), the statistical series of the German Empire (especially Statistik des Deutschen Reichs, Vierteljahreshefte zur Statistik des Deutschen Reichs) and historical statistics, available now for some regions of Germany, above all concerning demographic data. Moreover, additional statistical sources have been utilized: other statistical publications of Prussia and the German Empire, the statistics and annals for individual towns,

especially cities, and from 1890 onwards, the statistical annals of German towns¹. Finally, there are many contemporary publications and materials from the archives. The main problem of this material lies in its inconsistency. The level of aggregation is quite different: all towns or all communities of more than 2000 inhabitants, the big cities, the „Stadtkreise“, the towns of more than 10 000 or 5000 inhabitants are examples of totally different levels of aggregation. Besides there are data for every town/community, sometimes only down to a certain size category. The most favorable situation exists for the big cities (more than 100 000 inhabitants). The aggregation on the level of the local community is the main basis of the study. Data concerning intra-urban units are not utilized.

Another problem is brought about by the fact that the methods and criteria differ from census to census so that there are serious obstacles to constructing time series for all the factors being considered. For this project it has been possible to construct a complete time series only for the demographic development. Alongside the importance of population growth for urbanization this is the main reason why the data on population have become the basis of all extended analysis.

Wherever data concerning urban population are available for the whole territory of Prussia with differentiations concerning size, classes or regions (Provinzen, Regierungsbezirke), they have been utilized to trace the general structure of the demographic aspect of the urbanization process. But as these aggregations comprise an ever changing number and an average of very different towns and communities, it seemed necessary to make the individual town/community the starting point for further investigation. On the level of the Prussian state aggregated data on the population of towns with differentiation as to size and region are reported only up to 1910 (sometimes 1925), whereas the first information on communities of more than 2000 inhabitants dates from 1867 and continues to 1939.

Up to 1925 the number of the population of every town is listed for every census which was held since 1816 in intervals of three years, after 1867 intervals of four, and after 1875 five years and since the first world war in irregular intervals². There are lacunas for the years 1822, 1825, 1828, 1834 for which data may be found only for some kinds of towns or regions but which seemed dispensable for this study. Also the information on communities of more than 2000 inhabitants is

¹ „Statistisches Jahrbuch deutscher Städte“; from 1934: „... deutscher Gemeinden“; Silbergleit, Heinrich, Preußens Städte. Denkschrift zum 100jährigen Jubiläum der Städteordnung vom 19. November 1908, Berlin 1908, gives also historical statistical data.

² 1816: Jahrbuch für die amtliche Statistik des Preußischen Staates, 1. Jg. (1863), pp. 49 ff.; 1819: Beiträge zur Statistik des preußischen Staats, Berlin 1921, pp. 51 ff.; 1831: J. G. Hoffmann, Neueste Übersicht der Bodenfläche, der Bevölkerung und des Viehstandes, Berlin 1833, pp. 9 ff.; 1837: ders. die Bevölkerung des Preußischen Staats, Berlin 1939, pp. 225 ff.; 1840–1855: Archiv für Landeskunde der preußischen Monarchie, vol. 3 (1858), pp. 212; Tabellen und amtliche Nachrichten über den Preußischen Staat für das Jahr 1858, Berlin 1860, pp. 25 ff.; 1861: Zeitschrift des Königlichen Preußischen Statistischen Bureaus, 2. Jg. (1862), pp. 249 ff.; 1864 u. 1867, 1875–1910: Preußische Statistik, H. 10, 16^{II}, 39, 66, 96, 121, 148, 177^I, 206, 234; 1925: Statistisches Jahrbuch für den Freistaat Preußen, 24. vol. (1928), pp. 26 ff.

reported listwise up to 1925³. For 1871, partly for 1925, for 1933, and for 1939 all data were taken from the official register of communities⁴.

The criteria for recording the population have changed in the course of time. Up to 1864 there were two categories which formed the total population, the civil and the military population; the military population included not only the soldiers but also their families and servants at the garrison. For two census years (1831, 1837) only the civil population is recorded. From 1867 to 1910 the actual or present population (*faktische oder ortsanwesende Bevölkerung*) is counted, later on the resident population (*Wohnbevölkerung*). The differences between these categories are regarded as not so important as to prevent comparisons over time.

Since the beginning of the 19th century the techniques of census recording have improved⁵. The first census with recording lists was held in 1840, and in 1864 the recording was effectuated in all parts of Prussia on the basis of household lists. Nevertheless there remained many problems. Some of them result from the definition of town. Sometimes in the lists of towns we find places which neither possessed the constitutional local government law for towns (*Städteordnung*) nor were members of the provincial diets, two major criteria for the status of town. As the statistical lists were drawn up by the provincial authorities and controlled and published by the Royal Statistical Bureau, they were regarded as the official criterion for this analysis. In addition several places in the western regions of Prussia were members of the provincial diet only in combination with another place and only one figure was given for their population. Nevertheless, in the frame of this study, they are regarded as two towns. Sometimes special suburbs (*Vor- und Neustädte*, especially in the case of Magdeburg) were taken as part of the mother town, sometimes they were recorded as separate towns. Other problems resulted from uncertainties concerning town boundaries: in the first half of the 19th century the Prussian statistics counted only the urban settlement within the former walls as urban; in the provinces

³ 1867: *Preußische Statistik*, H. 16^{II}; 1871: *Jahrbuch für die amtliche Statistik des Preußischen Staates*, Jg. 4,1 (1876), pp. 61 ff.; 1875: *Statistik des Deutschen Reichs*, Bd. 25^{II}, pp. 60 ff.; 1880: *Statistik d. Dt. Reichs*, Bd. 57^I, pp. 30 ff.; 1885: *Stat. d. Dt. Reichs*, NF Bd. 32, pp. 42 ff.; 1890: *Vierteljahreshefte zur Statistik des Deutschen Reichs*, 1, H. 2 (1892), pp. 1 ff.; 1895: *Vierteljahreshefte z. Stat. d. Dt. Reichs*, 6, H.3 (1897), pp. 1 ff.; 1900: *Stat. d. Dt. Reichs*, vol. 151, pp. 736 ff.; 1905: *Vierteljahreshefte z. Stat. d. Dt. Reichs*, 16, H. 4 (1907), pp. 142 ff.; 1910: *Stat. d. Dt. Reichs*, vol. 240, Anhang, pp. 2 ff.

⁴ 1871: *Die Gemeinden und Gutsbezirke des Preußischen Staates und ihre Bevölkerung*, 11 issues, Berlin 1873/74 („*Gemeinde-Lexikon*“); 1925: *Gemeinde-Lexikon für den Freistaat Preußen. Nach dem endgültigen Ergebnis der Volkszählung vom 16. Juni 1925*, 14 vols., Berlin 1930–1933; *Vorläufige Ergebnisse der Volkszählung im Deutschen Reich vom 16. Juni 1925* (Sonderheft 2 zu *Wirtschaft und Statistik*); 1933: *Amtliches Gemeindeverzeichnis für das Deutsche Reich auf Grund der Volkszählung 1933*, Berlin 1933 (*Stat. d. Dt. Reichs*, vol. 450); 1939: *Amtliches Gemeindeverzeichnis für das Deutsche Reich auf Grund der Volkszählung 1939*, Berlin 1940 (*Stat. d. Dt. Reichs*, vol. 550).

⁵ Blenck, E. (ed.), *Das Königliche Statistische Bureau im ersten Jahrhundert seines Bestehens 1805 bis 1905*, Festschrift, Berlin 1905, pp. 21 ff.

of Rhineland and Westphalia the town was sometimes part of a Bürgermeisterei, a heritage of the French administration. This situation caused some confusion among the local authorities and in the statistics. Others were produced by confusing urban districts (Stadtkreis) or police districts (Polizeibezirk) with town boundaries. Many minor towns (Flecken) are to be found in the official lists of towns, whereas numerous markets (also Flecken) were counted as villages. In 1890 and 1905 official lists of towns were drawn up by the Prussian Statistical Bureau⁶.

The criterion of 2000 inhabitants for urban places in the statistical sense meets with problems, as well. Contrary to the French notion of „agglomeration“ (2,000 inhabitants at the principal place of the community)⁷, in Germany the criterion has been related to the whole community. After the occupation of Schleswig-Holstein and other territories in the war of 1866, places are recorded (Kirchspiele) in the list of 1867 which were left aside insofar as they appear only once. The investigation confines itself to Prussia in its respective borders.

4. The Data Base „Urbanization in Prussia“

The data base, collected on code sheets, punched on cards, and stored on tapes, contains 3398 cases and 152 variables. Each case (town/community) comprises 6 cards; 40 variables relate to the 30 census dates (10 variables relate to military population, 4 are empty) The other variables are intended to give information on special aspects of urbanization and to process the population data for cross sectional analysis at different points of time and for longitudinal sections.

The following variables are designed for this purpose:

- affiliation to administrative district (Regierungsbezirk) and changes
- date of bestowal of municipal statutes or the status of town and loss of municipal laws
- membership in the provincial diet
- tax group in 1837
- date of becoming an urban district (Stadtkreis)
- incorporation into another town (community/name of this community)

⁶ Verzeichnis derjenigen Gemeinden im preußischen Staate, welche nach Lage der Gesetzgebung als Städte zu behandeln sind, in: Zeitschrift des Königlich Preußischen Statistischen Bureaus, 33 (1890), pp. 51 ff.; Kühnert, F., Die Städte Preußens, in: Zeitschrift des Königlich Preußischen Statistischen Bureaus, 44 (1904), pp. 276 ff.

⁷ Horstmann, Kurt, Die Gliederung nach Stadt und Land in der Statistik, in: Allgemeines Statistisches Archiv, 28 (1939), pp. 22 ff.; Löwinger, Istvan Daniel, Stadt und Land in der Statistik (unter besonderer Berücksichtigung der städtischen Bevölkerung in der Schweiz), Diss. Zürich 1970, pp. 27 ff.

- entry in the official town lists of 1880 and 1905
- place of residence of public authorities in the years 1819, 1848, 1885, 1910, 1939 (Staat, Provinz, Regierungsbezirk, Kreis)
- geographical co-ordinates
- for every census date changes concerning the affiliation to the administrative district, the status and – as far as possible – the community district and, if necessary, the reason for leaving the data out (loss of the status of town, falling under the threshold of 2000 inhabitants incorporation, territorial changes) are given.

The data for some of these variables had to be obtained by individual investigation of every case by several means (among other sources the *Deutsches Städtebuch*)⁸.

As the administrative units often do not coincide with zones of urbanization processes it was planned to demonstrate the distribution and the spatial structure of major results by maps. For this purpose two variables were created recording geographic co-ordinates (system Gauss/Krüger). For the actually existing communities in the territory of the Federal Republic the co-ordinates were taken from the official register of communities⁹. For the territories outside the Federal Republic or for those places which have disappeared by incorporation or fusion of communities they were taken from contemporary maps¹⁰.

⁸ Among others: Keyser, Erich (ed.), *Deutsches Städtebuch*, 2 vols., Stuttgart/Berlin 1939, 1941; since 1952 the volumes in the other German regions. *Historical statistical surveys: Gemeindestatistik des Landes Nordrhein-Westfalen. Bevölkerungsentwicklung 1871–1961*, Düsseldorf 1964 (Beiträge zur Statistik des Landes Nordrhein-Westfalen, Sonderreihe Volkszählung 1961, Heft 3 c); *Historisches Gemeindeverzeichnis für Hessen*, 2 vols., Wiesbaden (1968); *Beiträge zur historischen Statistik Schleswig-Holsteins*, Kiel 1967; Uelschen, Gustav, *Die Bevölkerung in Niedersachsen 1821–1961*, Hannover 1966. On the date of origin also: Haase, Carl, *Die Entstehung der westfälischen Städte*, 2nd. ed., Münster/Westf. 1965; Weczerka, Hugo, *Stadt- und Marktgründungen und Stadtabgänge in Schlesien 1450–1800*, in: *Zeitschrift für Ostforschung*, 23 (1974), pp. 193–261.

⁹ *Amtliches Gemeindeverzeichnis für die Bundesrepublik Deutschland – Ausgabe 1957* –, Stuttgart 1958, pp. 565 ff.

¹⁰ Especially: *Topographische Karte (1:25 000, Meßtischblatt, since 1875)*; *Topographische Karte (1:100 000, Generalstabkarte, since 1878)*.

5. Processing the Data

The processing of the data pursues various aims:

- a) The completion of the data at the aggregation level of Prussia
- b) Processing of variables concerning special aspects of urbanization (occurrence of new towns, loss of status etc.)
- c) Calculation of growth rates of the population
- d) Analysis of the factors of urbanization processes and their consequences by means of population growth rates and selected data on other aspects
- e) Demonstrating the spatial and regional structure and patterns of urbanization processes in different regions of Prussia by means of maps

For item a above, missing data for the whole population of towns for the census dates 1925, 1933, 1939 are completed by counting all cases in the sample and their values (i. e. the urban population) differentiated according to size classes and administrative districts (Regierungsbezirke), (see Table 1).

For item b, the untransformed data on population serve a basis for inquiring into the changes of rank-order for Prussia and for individual administrative districts (Regierungsbezirke). The frequency distribution of some phenomena differentiated as to date, size, and region allows statements on changes of the urban system (Table 2): new towns/communities of more than 2000 inhabitants, loss of towns/communities by incorporation or fusion, new urban districts (Stadtkreise). The results are discussed with regard to periods and zones of heavy or moderate changes.

For item b, the untransformed data on population serve as basis for inquiring into the distribution over several growth classes (Tables 3a and 3b) allows insights into the structure of urban growth as to different periods. The processing of growth rates for population size and other variables gives information on whether growth depends on initial population size, on the age of the town, on its formal status of town, on its administrative functions, on its geographic situation, or on its industrial activity (tax class 1837).

Furthermore these growth rates are the starting point for the analysis of causes and consequences of urban growth (item d above). As there are no data for all cases over time and as this aim would go beyond the scope and the possibilities of this project all the cases of the extreme groups (decrease and extreme growth) and samples of the other groups are investigated by statistical tests in so far as data are available. The basis of this investigation are lists of growth rates.

Some of the results are to be plotted by a program that was originally developed for small scale regions and relatively few cases¹¹. It enables one to locate a place by means of two co-ordinates, to use different symbols, to vary their size, and permits

¹¹ Kern, Hans, and Schulz, Karin, THEKAR — Ein Programm zur automatisierten Herstellung thematischer Karten nach dem Diagrammprinzip, in: Kartographische Nachrichten, 26 (1976), pp. 94 ff.

Table 1: Urbanization in Prussia (legal concept of „town“)

	Number of Towns	Population Living in Towns	Military Population Living in Towns	Share of Urban Population in % (including Military Population)
1816	1,020	2,731,439	150,094	27.9
1819	1,027	3,023,292 ²		27.5
1822	1,041	2,997,973	169,960	27.2
1825		3,223,173 ²		26.3
1828		3,367,433 ²		26.5
1831	983	3,334,140	258,215	27.6
1834		3,684,671 ²		27.3
1837	972	3,639,983	214,513	27.3
1840	976	3,861,019	205,247	27.2
1843	979	4,060,030	202,678	27.6
1846	980	4,308,208	200,740	28.0
1849	980	4,324,813	257,385	28.1
1852	988	4,638,511	176,698	28.4
1855	993	4,760,728	207,428	28.9
1858	994	5,040,033	195,966	29.6
1861	1,000	5,362,141	263,711	30.4
1864	1,001	5,741,982	274,285	31.2
1867	1,272	7,164,638	278,724	31.1
1871	1,290	8,000,931		32.5
1875	1,288	8,791,834		34.2
1880	1,287	9,707,802		35.6
1885	1,287	10,554,596		37.3
1890	1,263	11,786,061		39.3
1895	1,266	12,954,591		40.7
1900	1,266	14,847,846		43.1
1905	1,279	16,866,963		45.2
1910	1,276	18,963,785		47.2
1925 ¹	1,099	20,854,855		54.7
1933 ¹	1,098	23,494,292		58.8
1939	1,152	25,627,948		61.5

¹ Without Saarland

² Whole population (including military population)

Sources: 1819, 1837, 1846, 1852, 1855, 1861–1867, 1875–1910: see foot note 2; 1816, 1822, 1831, 1840, 1849, 1858: *Das Anwachsen der Bevölkerung im Preußischen State seit 1816*, in: *Zeitschrift des Königlich Preußischen Statistischen Bureaus*, 1. Jg. (1861), S. 9 ff.; 1825, 1828, 1834: *Preußische Statistik*, H. 188, Teil B, S. 2 f.; 1843: W. Dieterici, *Die Statistischen Tabellen des preußischen Staates nach der amtlichen Aufnahme des Jahres 1843*, Berlin 1845, S. 242; 1871: R. Jannasch: *Das Wachstum und die Conzentration der Bevölkerung des Preußischen Staates*, in: *Zeitschrift des Königlich Preußischen Statistischen Bureaus*, 18. Jg. (1878), S. 263 ff.; 1925, 1933, 1939: Results of data base „Urbanisierung in Preußen“.

*Table 2: Inclusion and Exclusion of Prussian Towns into the Data Base
(differentiated into Prussian provinces)*

	1816-42		1843-66		1867-89		1890-1918		1919-39		1816-1939		fluctu- ating
	incl.	excl.	incl.	excl.	incl.	excl.	incl.	excl.	incl.	excl.	incl.	excl.	
Ostpreußen	—	—	—	—	—	—	—	—	1	—	1	—	—
Westpreußen	—	2	—	—	—	1	1	1	—	—	2	3	1
Posen	—	2	—	1	—	11	—	4	—	—	—	18	—
Brandenburg	—	—	1	1	—	2	4	—	4	1	9	4	2
Pommern	—	—	1	—	—	—	—	1	—	—	1	1	—
Schlesien	1	1	3	3	3	—	2	1	5	1	13	6	3
Sachsen	—	5	3	—	1	—	—	—	4	—	8	5	6
Westfalen	5	35	2	—	3	—	5	1	36	—	51	36	—
Rheinprovinz	33	39	4	—	5	1	3	—	15	—	59	40	11
Schleswig- Holstein					1	—	3	—	—	—	4	—	—
Hannover					1	—	3	—	7	1	11	1	—
Hessen-Nassau					4	5	—	—	7	—	11	5	—
Hohenzollern- Sigmaringen					—	5	—	—	—	—	—	5	—
all together	40	84	14	5	19	24	21	8	79	3	173	124	23

Table 3a: Growth of Prussian Towns (annual growth rate in %)

	1816-40	1840-71	1871-90	1890-1910	1910-39	1816-1939
decline ($< 0,0\%$)	19 2.1%	81 8.5%	289 23.3%	253 20.4%	88 8.4%	10 1.4%
small growth rate ($0,0-0,6\%$)	82 8.9%	264 27.6%	334 26.9%	275 22.1%	298 28.4%	190 26.1%
($0,6-1,2\%$)	229 24.9%	304 31.8%	267 21.5%	232 18.7%	340 32.4%	308 42.3%
strong growth rate ($1,2-1,8\%$)	318 34.6%	178 18.6%	134 10.8%	206 16.6%	181 17.2%	146 20.1%
($1,8-2,4\%$)	169 18.4%	56 5.9%	84 6.8%	104 8.4%	74 7.0%	48 6.6%
extremely strong growth rate ($> 2,4\%$)	102 11.1%	68 7.1%	132 10.6%	173 13.9%	70 6.7%	26 3.6%
all together	919 100%	957 100%	1,240 100%	1,243 100%	1,051 100%	728 100%
mean	1.46%	0.98%	0.84%	1.09%	0.96%	1.00%
max.	5.46%	7.68%	7.48%	10.67%	7.39%	4.11%
min.	-5.83%	-2.82%	-3.05%	-1.64%	-0.43%	-0.48%

*Table 3b: Growth of Rural Communities with more than 2000 Inhabitants
(annual growth rate in %)*

	1871-90	1890-1910	1910-39	1871-1939
decline (< 0,0%)	80 16.5%	57 8.5%	95 13.2%	37 11.6%
small growth rate (0,0-0,6%)	124 25.5%	121 18.1%	189 26.2%	105 32.8%
(0,6-1,2%)	81 16.7%	105 15.7%	221 30.7%	91 28.4%
strong growth rate (1,2-1,8%)	57 11.7%	11.8 11.8%	110 15.3%	48 15.0%
(1,8-2,4%)	39 8.0%	66 9.9%	51 7.1%	18 5.6%
extremely strong growth rate (> 2,4%)	105 21.6%	240 35.9%	55 7.6%	21 6.6%
all together	486 100%	668 100%	721 100%	320 100%
mean	1.40%	2.20%	0.99%	0.91%
max.	11.01%	17.19%	9.18%	5.60%
min.	-3.09%	-3.02%	-3.67%	-0.86%

the overlapping of symbols. The program has been adjusted to the tasks of this project, but some further development is necessary. As the system Gauss/Krüger contains some cuts in the grid system, a plot of the six strips which cover the territory of Prussia has to be assembled with the maps which are available for the different locations of Prussia (1815–1866/1867–1918/1919–1933). On the other hand, the geographic co-ordinates (measured in kilometers) may serve for analysis on the structure of the urban system. Thus by calculating the distances between different types/sizes of towns, typical patterns of spatial distribution may be investigated.

6. Problems and Experiences

Some problems concerning the processing arise because the data are destined both for cross sectional and cross temporal analysis and because at every census the relation of a case to a status group (village, town, urban district etc.), or to an administrative district or other conditions may change. These definitions, the task definitions, and the number of cases cause a high demand for workspace. Up to now the data have been processed by SPSS, Version 6.0, or by special FORTRAN-Programs in the Wissenschaftliches Großrechenzentrum Berlin (GRZ).

As the SPSS system needs much space, too, it was possible to process the data only late in the evening or at night. Also concerning other aspects the SPSS program proved not well suited for the tasks in question: e. g. the summing up of the values of all cases for Prussia and the size groups was done by FORTRAN.

To meet these problems, tests are intended with the program DIANA developed at the Zentralinstitut für sozialwissenschaftliche Forschung (FU Berlin) implemented at the GRZ Berlin and the University of Hamburg¹². It is oriented to interactive applications of documentation, retrieval and numerical analysis. The advantages of this program consist in its ability to handle large quantities of data in its relatively simple instruction language, in its small requirements for workspace, and its quicker processing.

¹² Tiemann, Rainer, DIANA-Programmbeschreibungen (RAPROSYS/DIANA), Computer-Druck, Berlin 1977 (Änderungsstand v. 21. 6. 1977).