

and the right to ensure constant improvements in accountancy and statistics. At the same time, he has to issue binding regulations and to check upon their application in practice. These regulations include:

- parameters and definitions
- nomenclatures and systematizing guidelines
- rules for evaluation
- rules for registration, e.g. in the form of accounts, balance-sheets, tables etc.
- standardized primary documents
- checking rules
- minimum demands for controlling the application of EDP
- rules for data protection.

For that purpose, the head of the Statistical Office, in addition to the Statistical Office in Berlin (capital of the GDR), is also directly in charge of county and district offices in all 15 countries and 223 districts of the GDR and of the Combine of Data Processing (Kombinat Datenverarbeitung), where about 30% of the total EDP capacity of our country is concentrated and which has highly efficient centres of electronic data processing in all counties of the GDR.

In addition to the organization and performance of the collection, processing, storage and representation of numerical data on economic and social events, the statistical offices in districts and counties are responsible for publishing analyses, including forecasts, for political organizations as well as information on the population.

With the establishment of this system of accountancy and statistics, clearly defined areas of responsibility were introduced in enterprises, institutions, branches of industry and ministries regarding the implementation and application of accountancy and statistics.

By order of the plant manager, the chief accountant, being on the same level as a managing director, is fully responsible for the implementation of accountancy and statistics and the reliability of reported numerical information. Therefore, all reports have to be signed by both the plant manager and the chief accountant. Orders issued by the head of the Statistical Office are binding for chief accountants in enterprises and all those who are responsible for accountancy and statistics in ministries and local authorities (county councils and district councils).

Within the framework of legal regulations valid for accountancy and statistics, the head of the Statistical Office has also been entrusted with the duties and rights of training specialists in accountancy and statistics in graduate, postgraduate and advanced courses both within and without his direct sphere of responsibility. These courses form an integral part of the integrated educational system of the GDR.

Three different levels of qualification are required for all stages of accountancy and statistics:

- skilled workers of accountancy and statistics
- technical college graduates of accountancy and statistics
- university and college graduates of accountancy and statistics.

2.2 BASIC FEATURES OF THE INTEGRATED EDUCATIONAL SYSTEM OF THE GDR

In the GDR, the 10-year school is compulsory for all children at state polytechnical secondary schools. In the 9th and 10th forms the pupils have to take part in practical courses. Several possibilities are open to them, including courses in mathematical statistics. For this purpose, a uniform programme is available, which was compiled by the Ministry of Education. The pupils are taught the basic principles of mathematical statistics up to frequency analysis. Pupils with special aptitudes and interests in mathematics, natural science, languages, sports and music are given the possibility to attend special schools from the 3rd and 4th forms. After the 10th form most school-leavers, as a rule, begin a 2-year vocational training course where they are trained to be skilled workers. Among the great variety of professions offered there is also that of accountancy and statistics.

Having completed vocational training, every skilled worker has the right to work in various fields of the national economy. After the successful completion of the 10-year polytechnical secondary school, school-leavers are also qualified to enter a technical college. Usually, the study courses at technical colleges last 3 years, and having completed them, the students qualify as engineers, industrial economists etc. and also as economists of accountancy and statistics.

On completing the 10th form, approximately 10% of the pupils continue their general education each year. There are two alternatives for extended education:

- a) the 2-year extended secondary education leading to the so-called Abitur, which is the university entrance qualification
- b) the 3-year vocational training with extended secondary education also leading to the Abitur. Among other things, the student is given the possibility of becoming a skilled worker in the field of accountancy and statistics.

There are 12 special classes for mathematics in the GDR, where mathematical statistics is taught in the 11th and 12th forms. The curriculum of these classes corresponds with that of the fundamental courses in mathematical statistics which undergraduates have to follow in their corresponding fields of science.

The 'Abitur' qualifies school-leavers for university. However, many specialized studies additionally demand a skilled worker's certificate or one year of practical work in a field related to the chosen subject. This also applies to accountancy and statistics. University study courses last for 4-6 years, that of accountancy and statistics for four years.

The levels of education mentioned above can also be acquired by correspondence courses and evening classes as well as by special courses, such as those specifically organized for women.

2.3 TRAINING SKILLED WORKERS IN ACCOUNTANCY AND STATISTICS

The training of skilled workers in accountancy and statistics is done on the basis of guidelines and training programmes issued by the head of the Statistical Office in accordance with generally valid principles.

A special department for education and advanced courses in the Statistical Office is responsible for working out these guidelines and programmes. The commission of education to the head of the Statistical Office analyses these materials and submits further recommendations. This commission of education includes employees in the field of statistics, chief accountants employed in enterprises, key personnel responsible for vocational training as well as members of the teaching staff in institutions of higher education.

Professional training is carried out as a unity of theoretical and practical instruction. It consists of 440 study days, including practical training which lasts for 55 to 60 days and is divided up into 3 to 4 sections. Future statisticians of the Statistical Office as well as those employed at district and county offices in the GDR receive their theoretical training centrally at two vocational schools, whereas practical training takes place at the corresponding statistical offices of their home territories.

For meeting the demand for statistical personnel in enterprises and institutions, practical professional training is provided at corresponding enterprises, with theoretical instruction being given at specially selected community schools or vocational schools forming part of the enterprise.

During their vocational training the students are taught and presented the knowledge required for collecting, processing and representing numerical information by means of various techniques of electronic data processing and for controlling and checking purposes. This training gives the students the ability to communicate with data banks in the conversational mode. Basic knowledge concerning analytical work is also taught.

2.4 STUDIES AT TECHNICAL COLLEGES OF ACCOUNTANCY AND STATISTICS

Technical colleges provide the training of future statisticians on the intermediate level of the statistical service as well as of those employed as chief accountants. There is a number of technical colleges offering courses in accountancy and statistics, one of them being especially designed for the statistical service and another one for statisticians employed at enterprises, industrial combines and business firms.

They are not only concerned with teaching the theoretical knowledge of collecting, processing and representing various kinds of information, but also with providing practical knowledge and skills for improving and rationalizing these processes and the appropriate control techniques.

Moreover, work at these institutions involves the elaboration of analyses and forecasts by using mathematical and statistical methods.

This special training is based on teaching comprehensive knowledge of political economy, national economy and industrial management as well as firm knowledge of mathematics, data processing and legal matters. Courses at technical colleges include periods of practical work carried out at the students' future enterprise. This is stipulated in the contract concluded between the future graduate and the managing director of the enterprise at least one year before the completion of courses at technical colleges.

A uniform syllabus for courses of statistics at technical colleges is issued by the Minister of Higher Education with the approval of the head of the Statistical Office.

Even for all the other subjects, for economists and engineers as well as some other fields, a certain minimum amount of knowledge in accountancy and statistics is required within the framework of technical colleges. Here, special emphasis is placed, however, on teaching students how to apply the results provided by accountancy and statistics.

Particularly in courses held at technical, medical and agricultural colleges, special attention is devoted to teaching students mathematical statistics. In the course of one year fundamental knowledge is provided in the fields of frequency analysis, distribution-free test procedures for single features and simple variance and regression analysis.

2.5 UNIVERSITY AND COLLEGE COURSES IN ACCOUNTANCY AND STATISTICS

Graduate degree courses in accountancy and statistics provide the basis of education for all those employed as executive officers in statistical services or as chief accountants in departments and institutions. There are special schools of accountancy and statistics at some universities and colleges, viz.

- Berlin School of Economics especially concerned with training statisticians
- Karl-Marx University of Leipzig especially concerned with training accountants to be employed in the book-keeping divisions of industrial and building enterprises
- College of Domestic Trade especially concerned with training accountants for book-keeping divisions in business firms.

Every year 250-300 students are enrolled for full-time courses of accountancy and statistics at these institutions.

In addition to the knowledge acquired at technical colleges the students are here taught the ability to recognise the necessity of the system of accountancy and statistics, to master its systematic development and improvement and to ensure its rational application in enterprises, branches of industry, areas and local territories. Moreover, the programme incorporates an improved elaboration of analyses and forecasts by using modern approaches and techniques as well as principles of management, planning and accountancy.

Apart from knowledge in the special field, the student is expected to acquire broader knowledge of economic, social and technological subjects, their theoretical basis and practical application in management and planning at all levels of the national economy and that of enterprises. Principally, much attention is devoted to teaching theoretical knowledge and its practical application. The first academic degree – diploma of economics – is awarded to all successful students in the field of accountancy and statistics. According to the principles of education at technical colleges, knowledge and practical skills in accountancy and statistics form an integral part of all courses in economics and engineering. This knowledge has to be identified in examinations. Within the framework of economic studies there is a special field of mathematics and data processing in economy. Students following these courses are also provided with comprehensive knowledge in accountancy and statistics. Other fields are systems analysis and project development. They are mainly employed in departments of data processing and computing centres. Students following courses in the fields of science, technology, medicine and agriculture are offered a training which duly takes mathematical statistics into consideration. The content of these courses is adapted to the corresponding special field, e.g. multivariate variance and regression analysis and rank tests are incorporated. In addition, waiting and reliability theory is envisaged for technical disciplines.

At five universities of the GDR, mathematical statisticians or biostatisticians are trained in the special field of mathematics. After five years of studies they are awarded the academic degree of a chartered mathematician. Special training for mathematical statistics makes up 2–3 years of the whole course of studies. In addition to the fundamental course in statistics and probability theory the following series of courses are included in the syllabus:

- conditional distribution and limit theorems
- regression and variance analysis
- multivariate analysis
- test theory
- statistics of stochastic processes
- statistical inference and decision-making theory
- optimal experimental design.

Graduates of these disciplines are employed in enterprises and research institutions as well as in state and economic institutions.

2.6 FURTHER EDUCATION (ADVANCED COURSES) IN THE FIELD OF ACCOUNTANCY AND STATISTICS

Starting from the recognition that the level of education attained after completing the professional training of a skilled worker or graduation is not sufficient for meeting all demands of a professional life, a comprehensive system of advanced courses has been established. In close co-

operation with technical colleges and universities the Statistical Office has established a systematic network of advanced courses for its employees, including those of county and district offices. A 2-year postgraduate training course has been introduced for all those college and technical college graduates of the Statistical Office wishing to continue their work in the statistical service beyond the year 1990. This postgraduate course is organised as follows:

It consists of six full-time study periods comprising a total of 14 weeks. At that time lectures and seminars are held. In the meantime, the students are expected to do private studies at home and to prepare for seminars and examinations. On completion of each study course a final examination paper has to be submitted for which examinees are granted a 4-week release from their work. The subjects of final examination papers and those of test papers are chosen, and the results assessed, jointly by colleges, technical colleges and the Statistical Office. The teaching staff consists of university or technical college teachers, executives or leading personnel from enterprises. Investigations and inspections in enterprises form an integral part of these advanced courses. There is no deduction from wages for all those taking part in them. Additional costs are borne by the institutions concerned. At present, advanced courses are focused on the following items:

- theory and practice of economic policy as well as issues of management and planning
- rational organisation of accountancy and statistics at enterprises and combines as well as inspection of the reliability of the results achieved
- modern methods of applying office and personal computers and electronic data processing for accountancy and statistics, especially the structure and use of data banks and acquaintance with the conversational mode of their operation
- compiling analyses and forecasts, particularly under the aspect of determining reasons and relations and finding possibilities of speeding up the development of performance and efficiency.

It is demonstrated and practised how, in this way, mathematical and statistical methods as well as modern techniques of electronic data processing, mainly distributed data processing, can be used successfully.

The Statistical Office is also responsible for organising advanced courses for executives and key personnel of accountancy and statistics. In special training centres supported by the State Central Statistical Office, chief accountants and their deputies in combines (these are mergers of enterprises manufacturing similar finished products) are trained at an interval of 5 years in courses lasting for 4–5 weeks. The teaching staff of these courses comprises senior officers of the Statistical Office, executive officers of ministries and executive boards of combines and enterprises as well as teachers of universities and technical colleges. Advanced courses held in combines for all those employed in accountancy and statistics are organised in this way. This organisational form of advanced courses held in close co-operation with college and university teachers and managerial

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staff from industry simultaneously provides favourable prerequisites to efficient theoretical and practice-oriented full-time study courses. The agreement concluded between the Minister of Higher Education and the head of the State Central Statistical Office according to which no lecturer or professor in the field of accountancy and statistics will be appointed unless he or she has worked in practice at least for one year after taking his or her degree is a further contribution in this direction.

In addition to the main forms of advanced courses mentioned above, a number of universities and colleges provide special courses and courses dealing with a limited number of specific subjects, e.g. 1 or 2-week summer courses, including those for graduates of different fields and employments.

Another form of advanced courses consists in systematically promoting gifted specialists and key personnel enabling them to take a doctor's degree, viz. the next academic degree of a Dr.sc. The candidates are usually engaged in solving problems of research, which, as a rule, are dealt with at universities at the request of institutions engaged in practical work.

2.7 CONCLUDING REMARKS

The system of education, postgraduate studies and advanced courses in the field of accountancy and statistics is, as in other fields, constantly improved. Special importance is attached to the task of ensuring the necessary orientation towards further development based on the results of the scientific and technological revolution. Considering the experience gained in practice today, its theoretical generalisation as well as the cognitions of the future development of economic and social processes and the corresponding requirements of management and planning, special emphasis has to be placed on attaining the necessary lead for training and further education on the basis of the results achieved by the scientific and technological revolution (particularly computing techniques with all facilities of data transfer). This can only be ensured by a close co-operation of theorists and those working in practice. In this respect, special attention has to be devoted to the formation and steady improvement of a uniform series of textbooks containing supplementary special references. In the GDR scholars from institutions of higher education, experts from research institutions and senior officers from the State Central Statistical Office are actively engaged in this work.

CHAPTER 3

The Training of Statisticians in the United States and Canada

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3.1 BACKGROUND

3.1.1 *Demographic and Geographic Information*

The United States consists of 50 states of which 48, excluding Alaska and Hawaii, are contiguous. Government is hierarchical beginning with the central Federal Government responsible for international, national and interstate affairs, state governments concerned with state affairs, and county governments involved with county or district governance, followed by local, city or town, governments in the form of councils or commissions.

The population of the United States (1984 estimate) is listed as 235,100,000, with major recent population increases occurring in the southern tier of states. Distances are great in comparison with most countries, examples of road distances being New York City to Los Angeles, 2,790 miles (4,500 kms.), Boston to Seattle, 2,980 miles (4,810 kms.), and Chicago to New Orleans, 920 miles (1,480 kms.). Regional cultural differences exist but are decreasing with modern mobility and communications. Legal systems have variations from state to state and this is true also of state and local taxes. Living costs vary substantially from urban to rural areas and tend to be lowest in the South-east.

The situation in Canada is much like that in the United States and living standards are similar. The population of Canada (1983 estimate) is 24,880,000, with a major portion of the population urban and located within one hundred miles of Canada's southern border. Canada is the second largest country with a land area of 3,849,700 square miles (9,970,600 sq. kms.) and distances are somewhat greater than in the United States.

Canada is divided into 10 provinces and two sparsely settled northern territories. Administratively, with provinces rather than states, the governmental organisation is similar to that of the United States. The provinces have generally larger land areas than those of states, but tend to have similar population sizes. Both English and French are official languages.

3.1.2 *Educational Systems*

Public education at the primary and secondary levels is free in both the United States and Canada. The general structure of the public education