PROVISION OF SERVICES IN POLAND: A THEORETICAL AND STATISTICAL STUDY

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Problems raised in the article relate to the treatment of services in a planned economy. While the theoretical discussion argues for change in the conceptual framework for qualifying and measuring the output of the service sector, the practice of statistical reporting is still based on the classical concept of the material product system (MPS) of national accounts. The first part of the article gives an outline of the MPS background and presents major theoretical and practical dilemmas of measurement of services in the non-material sphere of production. The second part is an empirical investigation of interrelatedness between production in the material sphere and services created in the non-material sphere in Poland during the period 1970–81. Correlation and elasticity of growth analysis as well as structural forecasting methods were used in order to demonstrate the strong relation between the development of the material and non-material spheres of production, and the favorable position of services in terms of factor productivities with their low potential for dynamic structural changes in the future. For the purpose of empirical analysis, the service sector output was estimated by using an extended version of MPS. There are two major conclusions to be drawn from the analysis. The first is that the classical concept of MPS not only inadequately copes with changes resulting from economic reforms in Poland but produces more and more dilemmas and practical problems. The second conclusion calls for a more active approach to services in development programming and planning.

INTRODUCTION

The problem of how to treat services within the framework of development of a planned economy has been the subject of discussion for at least thirty years.[1] The exchange of ideas in the literature has lead over this time to various assessments of the service problem but they all fall between the two following marginal approaches; one supports the classical concept which treats the sphere of non-material services as a form of consumption of national income, and the second suggests a new economic classification system based on the criterion of the social utility of work performed in various activities. The second approach seems to be gaining more and more acceptance up to, for example, an attempt to modify the well known investment formula of growth of national income of M. Kalecki.[2]

With the theoretical debate going on, the empirical analysis of the real interrelatedness between various economic sectors including services has lagged behind. Such analysis is not simple for at least one reason, namely that the

[1]This is evidenced for example in: Jastrzębowski, W., Propozycje systematyzacji usług, in *Usługi i ich rola społeczno-ekonomiczna*, Ginsbert, A. (ed.), PWE Warszawa, 1965; Cz. Niewadzi, *Zagadnienia usług w teorii ekonomii*, PWN, Warszawa 1979; Prawdin, D. J., *Rozwitije nieproizwodstwiennoj sfery pri socjalizmie*, Moskwa 1976; Tendencje rozwoju konsumpcji, Pohorille, M. (ed.), PWE Warszawa 1982; Morecka, Z., *Społeczne aspekty gospodarowania*, PWE, Warszawa 1981; Secomski, K., *Polityka społeczno-ekonomiczna. Zarys teorii.*, PWE, Warszawa 1978; Szablewski, A., Usługi a kategoria pracy produkcyjnej, *Ekonomista*, 2, 1978.

[2]K. Secomski, op. cit., chapter 3.

classification of economic activities actually practiced and statistical reporting based on the classical division of the economy into the material- and non-material spheres of production, is heterogeneous. So the achievement of a relative homogeneity of information concerning jointly the productive and non-productive spheres creates serious problems. The authors believe that the effort put into the creation of both theoretical and empirical pictures simultaneously treating the material production and services sectors in the Polish economy constitutes an important contribution to future theoretical development, as well as to changes in the practical treatment of services within the framework of development programming and planning.

1. The Sphere of Services in Statistical Accounting

1.1. *Material Production and the Sphere of Non-material Services*

In a centrally planned economy a distinction is made between the sphere of material production and the non-material sphere. The theoretical premise behind this distinction is Marx's assumption that we are dealing with two types of work: productive and non-productive. Only productive work is capable of generating and increasing national income. Labour exerted in the material sphere is generally held to be productive, while the activity of the non-material sphere consists of consuming a part of the national income which has already been created. A consequence of the assumption of two types of work is the theoretical model and statistical accounting of the process in which gross product and national income are generated and distributed. This is illustrated by Figure 1.

National income embraces the whole of "v" and "m". Basic information on non-material services is contained in the segment labelled "other consumption". The value of other consumption corresponds to the part of the national income

Type of inputs (process of generating) material services from outside / Fields of allocation (distribution)	Intermediate demand	Consumption		Accumulation	Balance of foreign trade	Gross product
		From personal income*	Other			
c	c		$v+m$			$c+v+m$
m v						
$c+v+m$						

*Material goods and services

Figure 1. A simplified scheme of the generation and distribution of gross product and national income. c = material cost borne in the sphere of material production, i.e. industry, construction, agriculture, forestry, transport and communication, trade and material part of the communities; v = wages of labour employed in the sphere of material production; m = surplus value; $v+m$ = value added or national income.

generated in a given year which has been allocated to finance the non-material provision of services for the population and for general social needs. The place of "other consumption" in Figure 1 suggests that non-material services should be provided for the population free of charge. In reality, this other consumption is a complex economic category, which is accounted for in a number of differing ways which do not allow for unambiguous indentification of the various aggregates which it contains. "Other consumption" includes both some activities which are strictly non-material, some which clearly enter the sphere of material production, such as maintenance of public roads and parks, unsuccessful geological works, etc. Figure 1 also shows the method of accounting for material services created in the sphere of material production, in the part devoted to material cost (value of material services from the outside), as well as material services purchased and consumed by the population and paid for out of personal income.

The above concept of the generation and distribution of national income, as seen from the point of view of the service sphere it contains, has some serious shortcomings. Firstly, it fails to define the scope of non-material services used in the sphere of material production. Thus, the impact of the sphere of non-material services on the development of material production is either very difficult to ascertain, or altogether impossible to describe. Secondly, in the field of accounting for the non-material sphere, the internal structure of outlays for the generation and provision of non-material services is not identified. In consequence, it is not possible to establish the flow of internal services within the non-material sphere. Thirdly, efforts to measure the volume of services generated in the non-material sphere are academic, rather than aimed at programming development. The lack of estimates of the volume of product generated in the non-material sphere renders impossible all measurements of the efficiency with which it functions. This also predetermines the manner in which development of the service sphere can be studied. In particular, one has to omit the development of the non-material sphere seen as a factor activating the whole economy.

1.2. *Basic Disparities in the Evaluation of Volumes in Material Production and in the Sphere of Non-material Services*

Regarding the services of the non-material sphere in practice as consumption of the national income generated has contributed to the fact that most of the service providers function according to criteria which are different than those prevailing among producers in the material sphere. Providers of non-material services are to a large extent or entirely subsidized by central or local state budgets. The prices charged for services provided by them do not cover operating costs, or the services are free of charge. The level of prices for non-material services is determined by the objectives and obligations stemming from the country's social policy. The system of financing and evaluation of providers of non-material services does not require detailed cost calculation. In consequence, the services of the non-material sphere have no full money estimate. This estimate in principle includes only two value-creating elements—$c + v$. Furthermore, for most of the services in this sphere there has so far been no market price. The legal framework created to this end by the economic reform of 1981 has opened

new possibilities for providers of services, but its immediate consequence was to unveil the shortcomings of the previous evaluation and measurement of services.

1.3. *Service Accounting in the Traditional MPS (Material Product System)*

The concept of accounting for the national income and the system of management (especially, of planning) determine the main principles of service accounting. The command-and-allocation mechanism of managing the economy, predominant up to 1982, has created demand for two types of information: in physical units, to describe the output of the non-material sphere, and in value terms, to account for services purchased by the population. The first stemmed from the need to plan and evaluate the activities of institutions, economic agents and administrative units, all providers of services. The second was needed to regulate the incomes and expenditures of the population. Adoption of a more market-oriented model of management following 1982 has created a need for much information which has hitherto not been used or accounted for. Such circumstances force some changes in the methodology of measuring and statistical accounting for services. The statistics of the sphere of services have found themselves at a crossroads.

It has to be admitted that the ambiguity of services as an economic category has given rise to many debates and theoretical disputes. The issue of applying various kinds of information in economic practice and in research has in the meantime been ascribed a place of lesser importance.

In Poland's post-war literature on the subject, the most popular theoretical approach has been that which classified services as activities which do not directly create new goods, which are rendered by providers to customers outside the national economy and which satisfy directly or indirectly the needs of the population.[3] In the interpretations of the above concept, the scope of services was widened rather than narrowed, underscoring the unity of the process of production and consumption.[4] The concept of services as activities suggests the existence of two forms of effects in economic processes—products and services. It does not determine the principles necessary to measure the effects and outlays involved in generation of services. It also excludes the provision of services within households.

The scope and contents of service statistics are a consequence of a theoretical formula. In statistical terminology, services include the following groups of activities:[5]

(a) activities which have an impact on products (maintenance, repair, increasing utility value);

[3]See: Krzyżanowski, W., Teoria produkcji usług, *Ekonomista*, 3/4, 1987, Lange, O., *Ekonomia polityczna*, Vol. 1, p. 24, PWN, Warszawa, 1967; Niewadzi, Cz., *Problemy rozwoju usług*, p. 17, KiW, Warszawa, 1968; Szablewski, A., Usługi a kategoria pracy produkcjyjnej, *Ekonomista*, 2, 360, 1974.

[4]See: Wierzbicki, J., *Rachunek usług niematerialnych w gospodarce narodowej*, pp. 29-35, PWN, Warszawa, 1973; Sarapuk, M., Rozwójsektora usług-struktura, dynamika, *Prace Naukowe*, Zeszyt 126/148, pp. 9-13, 1978; Daszkowska, M., *Ekonomika i organizacja usług*, pp. 18-28, PWN, Warszawa, 1982.

[5]The classification of services in force since January 1, 1981. Zeszyty Metodyczne No. 45, pp. 6-7, GUS, Warszawa, 1980.

(b) activities in the sphere of transport and communications;
(c) activities satisfying other needs (i.e. of a personal type: barbers, photographic, knowledge-expanding, recreation etc.).

In practice, despite the theoretical misgivings, services also include some activities which consist of producing goods from materials provided by the contracting party and activities related to servicing of the production process in individual farming units. Such a procedure can be interpreted as resulting from a fairly homogeneous treatment of providers of various services.

Doubts concerning the definition of the scope of activities classified as services have been tentatively suppressed by adoption of various sets of classifications. Such attempts at classification have been undertaken by E. Lipiński, W. Jastrzębowski, B. Kłapkowski and others.[6] The basic classifications used by GUS (Poland's Central Statistical Office) refer to their concepts.

1. *Type of services generated*:
   (a) material (industrial, in construction, agricultural, in transport and communications, in trade, in remaining fields of material production, community services);
   (b) non-material (housing and non-material community services, science and development of technologies, education, culture and art, health care and social care, physical education, tourism and recreation, remaining branches of non-material services, services provided by public administration, justice and national defense, financial and insurance services, services of political organizations, trade unions and others).
2. *End users*:
   (a) consumption services;
   (b) services for the whole society,
   (c) production services.
3. *Charge for services provided*:
   (a) free of charge;
   (b) partially or entirely paid for: by the population, by other units of the socialized economy.
4. *Extent of socialization of the providers*:
   (a) provided in the socialized sector (state enterprises, cooperatives, social organizations, budget units and entities);
   (b) provided by private parties: small producers, liberal professions.
5. *Type of activity characterizing the provider*:
   (a) services provided as a part of economic activity;
   (b) services provided as a part of social activity.

One may also distinguish between services using the organisational (under competence of respective ministries) and territorial (voivoidships) criteria.

The above criteria for classifying services can overlap, but that does not apply to all types of services. Services for the population, related to its living

[6]Jaworek, R. and Rylke, M., *Metodologiczne podstawy klasyfikacji usług*, Warszawa, 1964; Jastrzębowski, W., *Propozycje systematyzacji usług*, Warszawa, 1963; Iszkowski, J. and Kalestyńska, C., Klasyfikacja usług, *Wiadomosci Statystyczne* 5, p. 1-4, 1970; Wiśniewski, F., Pojęcie i podział usług, *Ruch Prawniczy, Socjologiczny i Ekonomiczny*, 2, 245, 1965, and others.

conditions, appear in nearly all types of classification while the sphere of production-related services, i.e. in industry, includes only one material cost of outside services (including transportation, repair, subcontracting etc.). The scope and contents of the accounts of both material and non-material services are usually subordinated to planning requirements. The most detailed accounting of services can be found among services for the population which finally express the degree of attainment of the planned economy's goal—the satisfaction of needs. Of the classifications quoted above, the key role is played by the criteria relating to the type of service provided. Organizational units engaged in multi-branch operations classify services into various branches and sectors according to their specificity. In such cases one generally respects the principle of grouping data conforming to the so-called "production division method" (predominance of a given type of service in the production division or in provider's unit).

Information on services for the population and social services constitutes an important item in statistical accounting for services. It justifies their short presentation which follows[7].

Services for the population constitute the expenditure of the population allocated to finance all activities falling under the definition of services and, additionally, of those which:

—consist of producing goods out of own resources of the service provider;
—consist of construction of individual housing from owner's own basic construction material;
—are related to the construction of wells.

Living services consist of industrial, construction, trade, laundry, tourism and recreation (including physical education) and personal services. They do not include tourism and recreational services provided as a part of the social action of enterprises.

Social services include social and economic activities in the field of education, culture and arts, health care and social care, tourism, physical education and sports, as well as science and development of technology.[8]

The subsystem of accounting for service activity is detached from the production potential (this comment applies to a lesser extent to living services). Services are viewed mainly from the perspective of outlays incurred by the population, institutions, enterprises and the state. They are not viewed from the aspect of production cost. The extensive care provided for the employees of the centrally-planned economy by their employers takes the shape of diverse services (a part of statutory social action) which are included in the cost of production.

The statistical data on the sphere of non-material production, such as science, culture and arts, education, health and social care, tourism and sports, public administration and the judicial system, finance and insurance, are collected as a part of central and branch accounting. The scope of information is subordinated to the sphere of competence: data on health and social care is gathered only by

[7] *Działalność usługowa w 1983 r.*, GUS, Warszawa, pp. 5-6.
[8] Łukaszewicz, A. (ed.), *Usługi społeczne*, p. 23, PWE, Warszawa 1984.

the respective ministry. Despite a certain progress which has been made over the last few years, there still exist "blank spots" of accounting. Information is dominated by the simplest subject data, which gives less emphasis to effects while stressing the scope of engagement in the provision of services. Should measures comprehensively depicting service activities be divided into five groups i.e. measures of demand, supply, activity, efficiency and type of end user, then it can be established that most of the data gathered applies to natural measures of supply and activity (very often non-homogeneous from the economic point of view), mostly pertinent to conditions in which services are provided by units of the non-material sphere. Rare is the information which expresses the efficiency with which some spheres of non-material production function (i.e. operating cost of research and scientific units, application of licenses, receipts from cinema admissions, the number of graduates). Among the data most readily collected is the scope of employment and wages, though even there some deficiencies appear (i.e. employment on part-time basis, dismissal from part of the classes in schooling).

One can also wonder over the lack of strictly economic information on the functioning of the non-material sphere, such as cost and output expressed in gross and net terms, as well as the efficiency with which various spheres and sub-elements of non-material activity function.[9] The statistics which exist for the sphere of non-material production can be labelled as decorative. What is the cost related to the operation of this service-providing sphere and who bears it? There is no answer, however incomplete, to this question in the present system of accounting. Furthermore, there is nearly a conviction that efficiency of non-material production cannot be measured in money and value terms. In order to prove the point, the misleading question of how to measure the value, or input of labour, of an actor, doctor, teacher etc., is often quoted here, which must lead to the conclusion that it is impossible, or nearly so.[10]

1.3.1. *Measuring Services for the Population and in the Sphere Outside of Material Production*

Measuring services for the population and in the sphere outside of material production is a theoretical and practical issue much more complex than evaluation of services in an economy with developed market mechanisms. *Firstly*, for many types of services price is unknown or close to zero. This is the case of services provided free of charge which are consumed by the population, such as education. *Secondly*, the scope of services which are transferred to the population at a token charge is important. The level of prices for services, particularly the non-material ones, is partially determined by political options. The scale of services provided free of charge or transferred at a token charge is so wide that this problem cannot be left out of the methodology used in measuring the volume and value of services.

[9]With the exception of analyses on schooling, i.e. Andrzejak, S., *Koszty kształcenia w szkołach wyższych*, PWN, Warszawa, 1982 and *Koszty kształcenia w szkolnictwie ogólnokształcacym i zawodowym w latach 1966-77*, GUS, Warszawa, 1979.

[10]Andrzejak, S., Badanie statystyczne w zakresie usług niematerialnych *Wiadomści Statystyczne*, 9, p. 5, 1983; Omelczuk-Szlachta, A., *Konsumpcja społeczna w gospodarce socjalistycznej*, Ph.D. dissertation, SGPiS, Warszawa, 1981, p. 115 and subsequent pages.

TABLE 1.1

OUTLAYS OF THE POPULATION AS PERCENTAGE OF THE VALUE OF SOCIAL SERVICES

(Percentages)

Type of Service	1970	1975	1980
Health, social care	4.9	3.5	3.2
Culture and arts	64.6	63.6	55.8
Education	6.0	7.2	8.0
Sports, tourism, recreation	58.9	47.9	52.5

Source: Golinowska, S., Odpłatność ludności za usługi społeczne, *Finanse*, 7, 24, 1982.

This is confirmed by data in Table 1.1, *Thirdly*, there are different price mechanisms for services provided by self-operated, self-financing units and those provided by budget units and social organizations. The prices of services provided by the latter two do not include the cost of depreciation write-offs; they include only two basic elements of value: v plus some of "c". In order to express the value of those services in price terms one still has to estimate the surplus value "m". The prices of services provided by self-operated, self-financing units do not always cover their production cost if the enterprise is subsidized. *Fourthly*, the fact that there is a price for various types of services does not mean that these services are available on the market. Various priorities and criteria of access are formulated with respect to many services (sanatoriums, medicaments, kindergartens).

In state accounting, the value of services for the population is reflected by expenditures incurred by the population in order to purchase them out of personal income. This data has been systematically collected since 1970 from various service providers. The population is in this case conceived rather widely and it consists of individuals, households, units of the non-socialized sector and religious organizations. Households buy services which facilitate housewives' life: laundry, TV and radio repair, ready-made foods; the units of the non-socialized sector may purchase services indispensable to the completion of their production processes. This means that the aggregate term "services for the population" brings together different spheres of needs. In the course of measuring the value of services for the population several rules must be respected:

—Only receipts from the sale of services are included. One does not take into account subsidies received from the central or local budget;

—If the provider, beside the main service, supplies other types of services, then one has to evaluate separately all types of services (i.e. the value of tourist services supplied by the tourist office does not include the value of receipts from shopping, restaurants and cafés it operates for its customers);

—Not included are also losses included in the price of services provided. Thus, the losses for destruction or damage of rented equipment do not augment the value of services. In turn, the losses from using public transportation without a valid ticket, illegal and improper use of the telecommunications network, etc., are included in the value of respective services.

—receipts from the sale of services to the population are expressed in gross terms except for services in the sphere of radio and TV (in this case the receipts are reduced by the percentage received by the post office).

The evaluation of services for the population is also to some extent "distorted" by the system of planning and criteria of evaluation applied to service providers. For instance, the value of services labelled as repair and maintenance of cars does not include the value of equipment and car accessories. Such solutions have been designed to prevent easy fulfillment of economic objectives which would lead to unjustified bonuses. For the same reason receipts from the sale of materials effected by service providers to the benefit of the population are also excluded from the value of services.

The value of services purchased by the population includes only the extent to which its personal income has been allocated to the purchase of a particular group of services. It does not even represent a crude estimate of the cost of providing these services, to say nothing of the gross or net product generated by service providers. In this context the accounting for services to the population does not allow for definition of the extent to which demand for services is met, since the volumes of both desired and actual output are unknown.

In light of the above observations it has to be stated that the value of an important part of services purchased by the population in official statistics is clearly understated. On the other hand, some other services provided for the population are overstated. In particular, this applies to classification into this group of construction of individual housing from construction material of the owner, which means that this group of services has been inflated by the inclusion of an aggregate which in reality corresponds to the final product typical of the construction sector of the productive sphere. One should not expect that the overstating and understating of the value of some services eventually cancel each other out. It is probable that the scale of understated value of services is far greater than the value of services which have been overstated.

1.3.2. *The Value of Services to the Population in Constant Prices*

The study of price fluctuations and price indexes is not a strong point of national accounting conducted by GUS. According to L. Zienkowski, we are currently facing a disintegration of statistical research on prices and price indexes.[11] Furthermore, the study of changes in prices of goods and services has since 1980 been forced to face some serious obstacles resulting from the acute shortage of goods and services (the number of observations quoted has dropped sharply) and the inability to make correct identification of representative goods (i.e. the decline in quality not accounted for in a price change). Hence appeared the urgent need to elaborate a new methodology of studying the indexes of price dynamics.[12] These modifications consisted of:

—an extended description of the representative product (instead of watching a single commodity or service, observation of whole product groups has been introduced),

[11]Zienkowski, L., Cena—pięta achillesowa statystyki, *Wiadomści Statystyczyne*, 1, 3, 1982.

[12]See: Kordos, J., Kowalski, G., Program badań cen, towarów i usług konsumpcyjnych w warunkach silnej nierówności rynkowej, *Wiadomosci Statystyczne*, 1, 5-7, 1983.

—studying goods and services which have enjoyed top sales in the given month,
—a study of the price level for services in two successive months (preceding and current),
—the inclusion of studies of black market prices by quarter-year.

The choice of representative products has been determined by their share in total output of a given product group and by availability. This last criterion has not been met by any of the representative products, even though the 1982 "basket" included some 1,200 goods and services.[13] This basket includes services indispensable to satisfaction of basic consumer needs. The prices come from spot quotes on the market or from price lists. The spot quotes were collected in 100 cities, on 117 sites of research and some 350 city markets.[14] The information on prices of services is collected by "city" and "rural" inquirers acting as benevolent social workers. It has to be stressed that quotes include not only prices actually charged, but also those hypothetically charged should the service be provided.

The general dynamics of prices can be estimated from the observation of prices for two types of services: (a) services whose prices can be quoted only in a given month (i.e. "novelty search") and (b) services the prices for which were available in the given and preceding month. The computation programme for the index of prices includes the calculation of the standard deviation and price dynamics for each representative product; it also includes the control of input information (to catch the "coarse" errors).

Research on the change in retail prices of goods and services purchased by the population is a part of social accounting statistics. Included in this research is, among others, the index of prices in catering firms, consumer services provided by the socialized and non-socialized economy, and the index of prices for some 300 representative non-consumption goods and services. The problem which appears is the difficulty of reconversion from indexes registered in Classification of Comestibles (NAS in Polish) to classifications based on services as types of activity.

1.3.3. *Concept of Accounting for Surplus Value in Services Outside Material Production*

Inclusion of the sphere of non-material services into national income accounting and evaluation of the "value of unpaid labour" have become the object of interesting theoretical considerations. Three concepts seem to merit particular attention.

The concept of equal social productivity of labour in the material and non-material sphere can be expressed by a set of two equations:

$$D^n = D \cdot \frac{Z^n}{100 - Z^n} \tag{1}$$

$$m^n = D^n - V^n \tag{2}$$

[13]Dublanka, I., Kordos, J. Metody badania cen towarow i usług konsumpcyjnych 1975–82, *Wiadomści Statystyczne*, 12, 8, 1982.

[14]In 1982 the number of observations (quotes of prices for consumer services) was 118, while price lists were consulted in 82 cases. In 1975 the respective figures were 74 and 107.

where D = national income in the sphere of material production, D^n = national income in the sphere of non-material production, Z^n = employment in the sphere of non-material production, m^n = surplus value in the sphere of non-material production, V^n = wage fund in the non-material sphere.

The above method of estimating m^n is based on the assumption that social productivity of labour in the sphere of material and non-material production is identical.[15] Further evolution of this concept foresaw the inclusion of different complexity of labour in the two spheres, which called for the adoption of further risky assumptions.

Differentiated conditions of production in the two spheres, including different technologies, volume of output, and structure of durable assets, as well as different character of products generated, seem to undermine the key assumptions acting as the cornerstones behind the logic of these estimations. Furthermore, this concept gives little success in studying the inter-sectorial differentiation in the efficiency with which basic factors of production are being used.

The concept of equivalence between labour in the material and non-material sphere is expressed by the method of estimating m^n presented in equation (3):[16]

(3)
$$m^n = \frac{V^n}{e} - V^n$$
$$= \left(\frac{1}{e} - 1\right) V^n$$

where e = coefficient of equivalence of labour ($e = V/(V+m)$), $V+m$ = national income generated in the sphere of material production, V = wage fund in the sphere of material production, V^n = wage fund in the sphere of non-material production.

The estimate of surplus value in the sphere of non-material production is based this time on the assumption of the equivalence of labour in the two spheres. Compared to the previous concept, this assumption more adequately reflects the impact of the human factor on output in the non-material sphere. However, the doubts which have been formulated previously are not dissipated. There is a danger that wages in the non-material production sphere, historically lower than in the material one, would cause the surplus value in this sphere to be understated.

The concept of "resignation", or cost of the non-material sphere's functioning is expressed by equation (4):

(4)
$$D^n = C^n + V^n$$

where C^n = material and non-material cost in the sphere of non-material production, V^n = wage fund in the sphere of non-material production.

Equation (4) is based on the pragmatic assumption that since surplus value cannot be realistically estimated, it is better not to calculate it. The contribution

[15]See: Winiewski, M., *Fundusz spożycia społecznego a stopa życiowa ludnosci*, p. 56, KiW, Warszawa, 1969; Szwemberg, K., *Społeczny fundusz spożycia w Polsce*, p. 46, PWE, Warszawa, 1965.

[16]See Morecka, Z., Płaca w gospodarce socjalistycznej, in *Zagadnienia ekonomii politycznej socjalizmu*, p. 463, Warszawa, 1960, KiW.

which the non-material sphere makes to the generation of national income can be better defined by the cost incurred in this sphere's functioning.

1.4. *Measuring Services in the Expanded Concept of National Income Accounting*

The weakness of attributing services to the sector of non-material production in the MPS system, and especially the lack of data on the volume of output of this sphere, has since long prompted GUS (the Central Statistical Office) to search for methods to remedy this situation. Work on this topic was started in 1970, resulting in an expanded method of measuring the output of the non-material sphere. This method consists of compiling data on the sphere's gross and net value added, gross product and final distribution of non-material services. Information is compiled in various necessary aggregates and prices (current and constant).[17] Not all of the data is systematically published in GUS Annual Yearbooks.

1.4.1. *Principles of Service Accounting Under the Expanded Concept of National Income (NI)*

Despite the fact that the methodology of determining output in the non-material sphere is clearly a step forward in macroeconomic statistical accounting, it does not fully correspond to the requirements of the SNA. The disparities result not only from the difference in social and economic systems, but also from inclusion of such accounting as a complementary (expanding) element, which does not undermine the logic adopted by the MPS accounting. The idea behind expanded national income accounting is depicted by Figure 2.

The value of the gross product generated by non-material services can be represented as the total output of diverse organizations of the non-material sphere and the value of non-material services provided as a part of social action by all sectors of the national economy (both material and non-material). The volume of output is not homogeneously perceived by all providers of the non-material sphere—its sense is different in self-financing organizations than in the remaining organizations. In the self-financing units the value of gross product can be seen as a measure of output accounted on a parallel basis with that in the sphere of material production.[18]

Different principles are used to determine the output of enterprises providing housing. The services of these enterprises are determined by the cost of their operation, including the estimated value of depreciation. This does not appear to be the most opportune solution, since most of the housing stock is managed by housing cooperatives which have to abide by the principle of economic calculus and which must bring in revenues.

In budget units, such as libraries, museums and hospitals, the value of gross output is seen as the difference between operating cost and the so-called transfers

[17]Over the last few years there have appeared exceptional difficulties in accounting for output of non-material production in constant prices. The estimates of respective indexes are based on the expanded balance of inter-branch flows (1977), which have become largely obsolete.

[18]Changes in the principles of financing, introduced after 1983, cause some organizations which are nominally self-financing to fulfill this requirement only partially, or not at all (the case of institutions of higher learning, radio, TV, cinemas, theatres).

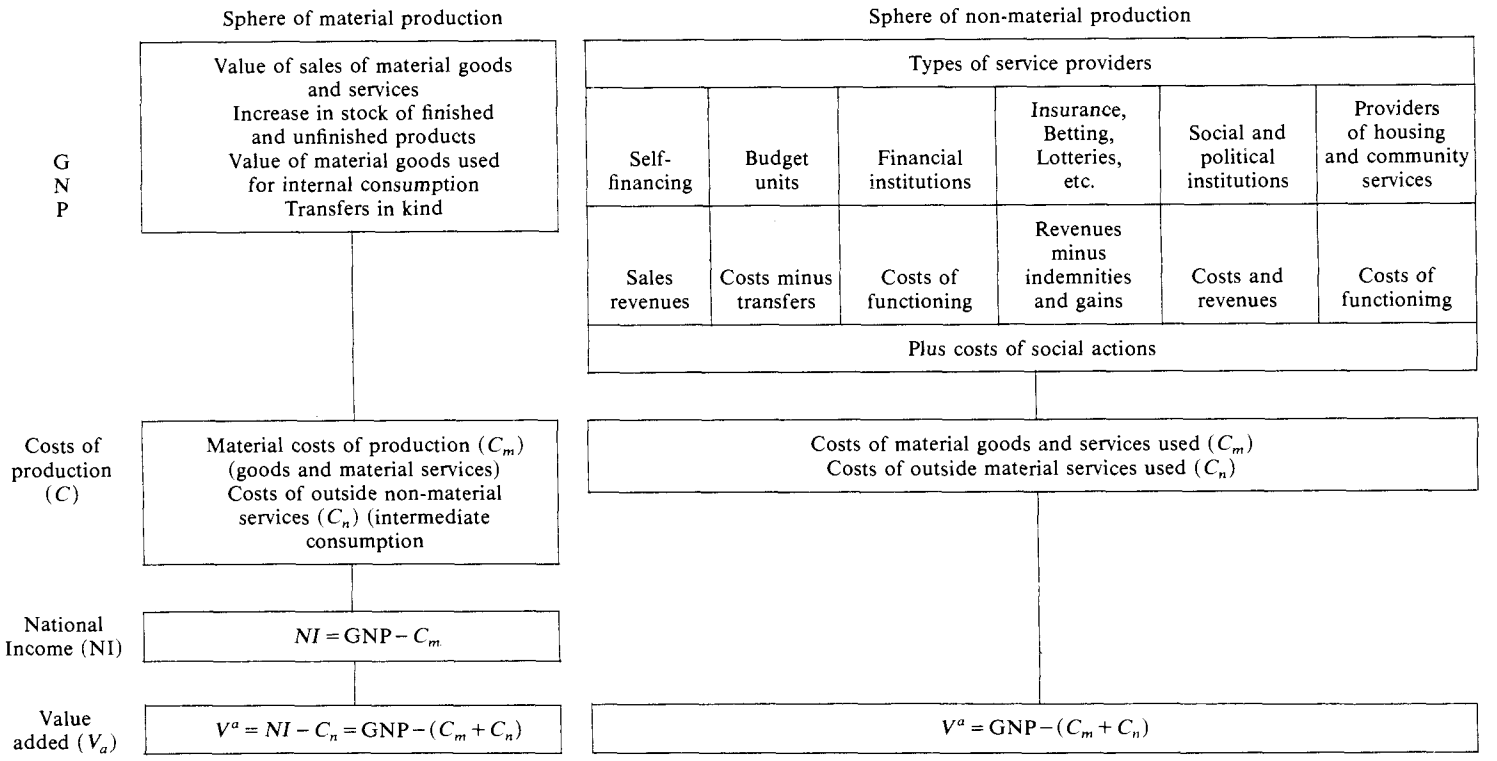

Figure 2. Creation of value added in the sphere of material and non-material production

such as subsidies, scholarships, relief-aid allocations, subsidies on drugs, etc. The operating cost of these units does not include depreciation. The output thus computed does not contain surplus value.

The services of the banks are determined by the level of their operating costs; they do not result from the economic effect of their banking operations. Such a solution is a reflection and a consequence of the management system in which the role of banks is seen as an instrument for allocating financial resources subordinated to the planner's objectives. In the opposite case, banks could follow objectives which would diverge from those of social and economic plans.

In insurance, the total output is obtained from the difference between receipts and the value of indemnities paid out (the problem of negative value of output can occur). A similar principle is used to compute the output of institutions such as state lotteries and horse races, where winning sums are subtracted from gross receipts.

A different method was applied to social and political organizations. The level of output in statutory activities is determined by the level of cost incurred, while extra-statutory activities are accounted for as receipts from the sale of services.

In the units of the non-socialized sector the total output of services is considered to be gross receipts from sales.

The aggregation of data in the sphere outside of material production is done according to the enterprise method. Independently of the number of activities provided, all receipts from sales are attributed to the activity which identifies the provider (i.e. should a cultural institution engage in industrial, trading and construction activities, the volume of output is attributed to "culture and arts").

A consequence of the method of measuring gross output is the measure of value added. Gross value added in the material sphere includes the following elements:

—wages,
—depreciation,
—part of the cost of non-material services (i.e. banking and financial operations, but exclusive of the cost of social action),
—subsidies from the budget,
—financial outcome of operations.

The value of gross value added in the non-material sphere includes in principle the cost of wages, a part of the expenses of social action (production cost of own non-material services) and a part of accumulation and depreciation cost (included only in some units of the non-material sphere—see Figure 2).

As a result of the solutions adopted, the value added of the non-material sphere is greatly understated in relation to the volume of material output. This understating results, among other factors, from: (a) inflexibility of this sphere's functioning (prices, rents, tax system), (b) methodology of product accounting in the units of the non-productive sphere (especially in those organizations in which output is measured by costs), (c) methods of data aggregation (method of enterprises) and omission of the parallel economy in the sphere of services. Currently under consideration are modified concepts of accounting for the prod-

uct of the non-material sphere, which are based on the following two assumptions:[19]

—classification of all units of the material sphere as either self-financing or budget units,

—provision of "clean solutions" in basic data through the elimination of all transfers (of income and cost) which obscure the outcome of national income accounting.

The adoption of these suggestions would call for the modification of classification by type of cost incurred and the alteration of contents in some statistical reporting. It would certainly contribute to the perfecting of information in the sphere of generation and distribution of national income. These propositions cannot overshadow many methodological shortcomings present in national income accounting under today's expanded version. What we have in mind is the elaboration of indexes, inclusion of depreciation, and computation of output in housing. We are faced here with a more general question, the answer to which should become an object of thorough studies—to what extent may the current accounting system (MPS) allow evaluation of national income comparable to SNA accounting without upsetting its own principles?

2. Interdependence between the Development of the Non-material Services Sector and the Sphere of Material Production

In the research which has so far been conducted in Poland, services have been regarded as a factor limiting economic development[20] (as opposed to dynamizing it) and the general trends of service sector development have been analysed mainly through employment and independently of the material sphere.[21] Authors have expressed the need of wider understanding of the service issues, but the available statistical data have not allowed expansion of the scope of empirical research, especially in what concerned interdependence between material production and services of the non-material sphere. In our study, we have adopted the assumption that the service sector constitutes an aggregate element, which is one of the interdependent sectors in economic development. The results of research currently undertaken in Poland to estimate the product of the non-material sphere have allowed for a tentative analysis (comparative) of the material and non-material spheres, as well as the elaboration of mechanisms of interdependence between the two spheres, which could be expressed in terms of a unique methodology. As compared to the studies hitherto attempted, such

[19]Jakubowicz, A., Problemy prezentacji dochodu narodowego—propozycja ujęcia wariantowego, *Wiadomści Statystyczne*, 8, 1-3, 1982. This issue is also explored from a different angle by Kucharski, M. See Kucharski, M., *Bilanse syntetyczne gospodarki narodowej*, pp. 16-61, PWE, Warszawa, 1967.

[20]See Niewadzki, Cz., *Problemy rozwoju usług*, pp. 29-34, KiW, Warszawa, 1968; *Zagadnienie usług w teorii ekonomii*, pp. 176-206; PWN, Warszawa 1979, *Usługi i ich rola społeczno-ekonomiczna*, PWE, Warszawa, 1965. Another approach is used towards science and technology, which is regarded as a directly productive force. Such an attitude is represented by Chołaj, H., *Nauki ekonomiczne a rozwój gospodarki socja-listycznej*, PWE, Warszawa, 1975 and Madej, Z., *Nauka a rozwój gospodarczy*, PWE, Warszawa, 1972.

[21]Sarapuk, M., *Rozwój sektora usług—struktura i dynamika*, post-docral thesis, Prace Naukowe AE, Wrocław No. 126/148/, Wrocław 1978, Szablewski, A., *Usługi a rozwój gospodarczy*, op. cit.

an approach seems to be innovational both with respect to the theory and the perfecting of planning methods and techniques.

2.1. *Theoretical and Methodological Premises*

The essential hypothesis made in this study is that there exists interdependence between the sphere of material and non-material production and that this interdependence can be used in the programming and planning of economic development. To analyse the problem, the following research scheme has been used to study three types of interdependence:

(a) between material services and the remaining sphere of material production,
(b) between provision of services in the non-material sphere and the sphere of material production from which material services have been subtracted,
(c) between services of the material sphere and the sphere of non-material services.

It has to be added that an approach such as (a), to say nothing of (b) and (c), have not yet been analysed in complex terms in Polish literature of the subject. The scheme of the interdependencies studies is depicted in Figure 3.

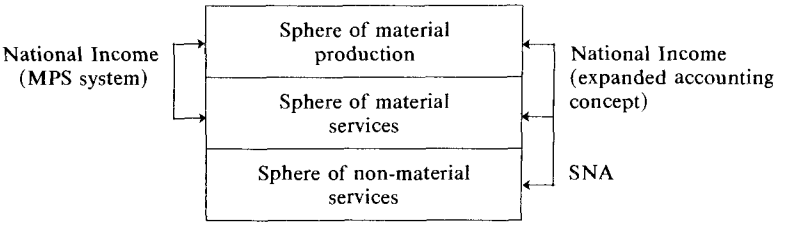

Figure 3. Scheme of development interdependencies

For sake of analysis, comparative statistics for the 1970–81 period have been assembled. They cover such data as output, production assets in constant and current (historical) prices, employment and investment. Output was measured according to GUS data on value added in various sectors of the material and non-material sphere calculated according to the so-called expanded concept of national income accounting.

Since this is a relatively unknown field of research, various study tools have been used: correlation analysis, study of development elasticity basing on exponential econometric models, comparative analysis of productivity coefficients, production function with variable elasticities of substitution, etc. Under consideration was also the use of the input-output method; however, its application was not possible due to the fact that an expanded input-output table (in terms close to the SNA) for the Polish economy has only been elaborated once, in 1977.

Beside *ex post* analysis, use was made of Markov chains with non-stationary transition to forecast the structures of output and employment.

2.2. *Timing and Scope of Research*

The period under analysis comprises the years 1971-81. In the history of Poland's economic development, this period is exceptional. The initial years of "hope" have liberated the society's motivation to make use of the simplest reserves in production capacity. Simultaneously, on an unprecedented scale, the economy has started to modernize on the basis of foreign credits. The paper growth in wages and income of the population which took place at that time was to convince the society that the hypothesis voiced by economists about a conflict between high rates of consumption and investment (in the short term) was naive. In the mid-Seventies, some clear symptoms of a breakdown appeared, especially in the sphere of investment. These symptoms pointed to the need for change in the strategy pursued, but efforts to remedy the situation have become very difficult to apply given the stimulation of newly-acquired development "fever". This situation is confirmed by the data in Table 2.1.

TABLE 2.1

GROWTH RATE OF VALUE ADDED, DURABLE ASSETS, INVESTMENT AND EMPLOYMENT (IN %) IN THE NATIONAL ECONOMY OVER THE PERIOD 1972-81

	1971-75	1976-81
Value added	11.9	6.7
Employment	3.5	0.5
Durable assets	7.4	5.2
Investment	20.5	−7.7

Source: Own calculations based on Statistical Yearbooks.

The development dynamics of the period 1976-81 was much lower than at the beginning of the 1970s.

The period under scrutiny, despite a differentiation of sub-periods, can be regarded as homogeneous since there has been no change in the system of management and planning, in tools of economic policy or in the basic options of the economic and financial system.

The study comprised five sectors of material production, seven sectors of the non-material sphere and related aggregates. All aggregates concerned are listed in Table 2.2. Furthermore, the annex provides the reader with selected information on development in the provision of services in Poland. Many statistical operations have been performed to make the data fully comparable, but in the end no complete success has been reached. Particular difficulty was encountered in preparing data on the sub-sphere of social services.

2.3. *Analysis of Correlation*

In order to establish the general direction of correlations between the spheres of material and non-material production, the coefficients of correlation have been computed for two types of data: employment and value added. Such a procedure was deliberate; it made it possible to establish the existing interdependence

TABLE 2.2

STRUCTURE OF INFORMATION NECESSARY TO STUDY INTERDEPENCENCE BETWEEN THE SPHERE OF MATERIAL PRODUCTION AND NON-MATERIAL SERVICES

No.	Aggregate Item \ Information	A	B	C	D	E	F	G
1	2	3	4	5	6	7	8	9
1	Whole economy	×	×[1]	×	×	×	×	×
2	Whole material sphere	×		×	×		×	×
3	Industry	×		×	×	×	×	×
4	Construction industry	×		×	×	×	×	×
5	Agriculture and forestry	×		×	×	×	×	×
6	Transport and communications	×		×	×	×	×	×
7	Trade	×		×	×	×	×	×
8	Whole non-material sphere	×		×	×		×	×
9	Housing	×		×	×	×	×	×
10	Education	×		×	×	×	×	×
11	Culture and arts	×		×	×	×	×	×
12	Health and social care	×		×	×	×	×	×
13	Science and technology			×	×		×	
14	Physical education, sports, tourism		×	×		×		
15	Administration, judicial system, finance, insurance			×			×	
16	Sub-sphere of social services			×			×	
17	Remaining social services	×			×	×		×

× = Data which could be collected; in the opposite case, no data has been available or collected.
A = value added (gross) in constant prices (SNA) in billions of zlotys.
B = value added (net) in constant 1977 prices in billions of zlotys.
C = average employment (in thousands).
D = value of productive durable assets in constant 1977 prices (billions of zlotys).
E = value of gross durable assets in current prices (billions of zlotys).
F = value of investment outlays in current prices (billions of zlotys).
G = value of investment outlays in constant 1977 prices (billions of zlotys).
[1]Value of national income for distribution in constant prices (MPS) and billions of zlotys.

between the aggregate categories in question from the point of view of inputs of production factors and effects obtained. The results of these computations are presented in Table 2.3.

All coefficients of correlation for value added in Table 2.3 were positive and greater than 0.85. Furthermore, the level of correlation between the material sphere (from which material services have been subtracted) and material services is close to the level of correlation between the material sphere and the non-material sphere.

The results of the analysis based on employment give a more diversified view. In analysis of the interdependence between the sphere of material production (excluding material services) and services of the non-material sphere, one can distinguish three groups of relations. There is strong correlation between material production and the services of science and technology ($r = 0.98$), physical education, sports and tourism ($r = 0.91$), education ($r = 0.89$), and health and social care ($r = 0.85$). An average level of correlation was noted for housing ($r = 0.65$), administration, judicial system, finance and insurance ($r = 0.57$). The

TABLE 2.3

INTERSECTORIAL CORRELATION COEFFICIENTS FOR EMPLOYMENT (NORTH-EASTERN CORNER OF THE MATRIX), AND FOR VALUE ADDED SNA (SOUTH-WESTERN CORNER)

Pos.	Name of Sector	Sector	r_{ij} 1	2	3	4	5	6	7	8	9	10	11
1.	Sphere of material production without material services	1	1.000	0.948	0.958	0.657	0.982	0.894	−0.457	0.853	0.906	0.569	—
2.	Transport and communication	2	0.991	1.000	0.949	0.855	0.904	0.962	−0.493	0.959	0.977	0.765	—
3.	Trade	3.	0.909	0.919	1.000	0.754	0.919	0.950	−0.506	0.921	0.910	0.633	—
4.	Housing and non-material community services	4.	0.903	0.899	0.933	1.000	0.581	0.881	−0.425	0.941	0.866	0.925	—
5.	Science and technology	5	—	—	—	—	1.000	0.863	−0.344	0.801	0.840	0.532	—
6.	Education	6	0.940	0.928	0.884	0.955	—	1.000	−0.483	0.987	0.944	0.838	—
7.	Culture and arts	7	0.971	0.965	0.927	0.961	—	0.980	1.000	−0.466	−0.607	−0.078	—
8.	Health and social care	8	0.926	0.917	0.856	0.933	—	0.996	0.974	1.000	0.931	0.777	—
9.	Physical education, sport and tourism	9	—	—	—	—	—	—	—	—	—	—	—
10.	Administration, judicial system, finance and insurance	10	—	—	—	—	—	—	—	—	—	1.000	—
11.	Remaining social services	12	0.982	0.975	0.909	0.945	—	0.973	0.985	0.985	—	—	1.000

Sources: Own calculations based on data specified in Table 2.2. The "−" sign stands for lack of data which has made respective calculations impossible.

lowest and negative level of correlation has been registered in the relation between the sphere of material production without material services and services labelled as "culture and arts" ($r = -0.457$).

One should also note the negative correlation between culture and arts and the remaining sectors of the non-material sphere, i.e. physical education, sports and tourism ($r = 0.61$), health care ($r = -0.48$) and education ($r = -0.46$).

The following conclusions follow:

(a) the employment needs of sectors providing non-material services are perceived with greater intensity when various types of material services are expanded (the coefficients of correlation between the material and non-material sphere are higher for employment than for respective production coefficients).

(b) In the structure of development priorities actually expressed, some sectors of service provision seem to be getting second-rate treatment. As the analysis of correlation points out, this applies mainly to housing, non-material communal services, culture and arts.

(c) Employment in the culture and arts sector seems to be "substitutable" with respect to other sectors of non-productive sphere. This situation is probably linked with non-competitive wages or conditions of work in this sphere (i.e. in relation to physical education, sports and tourism) or stems from the gradual deterioration in the level of services provided. A drop in cultural activities is to a certain extent confirmed by data presented in the Annex. They also depict a much wider problem. As pointed out by data on the volume of cultural services provided in the 1945-83 period,[22] the number of participants attending plays and concerts per 1,000 inhabitants has been decreasing since 1956. A similar phenomenon applies to the attendance of films, musical shows, etc. The number of books (titles) and booklets per 1,000 inhabitants is also stagnating. These data seem to conflict with the widely quoted hypothesis which presents rapid development of culture and the arts as one of the characteristic features of socialist industrialisation.[23]

2.4. *Interdependence between Services and Production in the Material Sphere—the Analysis of Elasticity of Development*

In order to closely identify the mechanism of development interdependencies in the sphere of material production, the estimation of models expressing econometric relations (1)-(3) has been conducted:

(1) value added of material (industrial) services (V^a_{si}) and value added generated in the remaining part of the material sphere (V^a_m);

(2) employment in material (industrial) services (E^m_{si}) and value added in the remaining part of the material sphere (V^a_m);

(3) employment in material (industrial) services (E^m_{si}) and employment in the remaining part of the material sphere (E_m).

[22] *Zmiany w dostępie do kultury w latach 1945-1983,* Instytut Kultury, Warszawa, 1984.
[23] Szablewski, A., *op cit.*, pp. 133.

The information contained in Table 2.4 allows for an evaluation of the degree to which the change in services is sensitive to changes in the remaining part of the material sphere. Elasticity of value added in services with respect to value added in the remaining part of the material sphere points to the appearance of stabilized proportions of development. They are close to one for both sectors. The elasticity of employment with respect to changes in value added are some four to six times lower and more diversified. This points to the fact that employment is several times less sensitive to changes in the volume of material output. This can mean that in the period under analysis a dynamic growth in the productivity of labour has taken place in trade, transport and communications, or that the structures of employment established in the initial period of observation have been characterized by a low rate of labour utilization. It can also be thought that the mechanism of allocating labour was not related to the dynamics of change in the provision of services. Such a disparity between the elasticities of production and employment is also not justifiable in terms of the change in prices of trading services (profit margins) in 1976. The coefficients of elasticity of employment in material services with respect to employment in the remaining spheres of material production (lines 3.1 and 3.2 of Table 2.4) point to clear differences in the functioning of allocating mechanisms of labour. The sensitivity of employment in trade is much higher than in the sector of transport and communications. An increase of employment in the sphere of material production (services excluded) by 1 percent causes employment in trade to go up by 1.4 percent, while that in transport and communications by some 0.9 percent only.

TABLE 2.4

ESTIMATED PARAMETERS OF THE EXPONENTIAL MODEL $y = e^{a_0}x^{a_1}$ OF RELATIONS IN THE SPHERE OF MATERIAL PRODUCTION

Relation	Sector	a_1	a_0	R
1. $V^a_{si} = f(V^a_m)$	1.1. Transport and communication	0.996	−2.299	0.995
	1.2. Trade	1.039	−2.534	0.851
2. $E^m_{si} = f(V^a_m)$	2.1. Transport and communication	0.160	5.804	0.989
	2.2. Trade	0.248	5.150	0.953
3. $E^m_{si} = f(E_m)$	3.1. Transport and communication	0.864	−0.679*	0.952
	3.2. Trade	1.401	−5.444	0.960

* a_0 statistically insignificant at significance level = 0.1, the remaining parameters being significant at level = 0.1. R = coefficient of multivariate regression.

Information in Table 2.4, and especially the similarity between relations 1 and 3, suggests that the allocation of labour is (or has been to this day) a derivative of production structure development, without entering deeper into the analysis of the rate at which this labour is utilized. The estimated models also point to the delay with which the sphere of material services has been developing as compared with the remaining part of the material sphere. More than proportional growth of employment in trade should be interpreted as a deficiency of the technical and organizational framework of trade, which is unable to cope with the requirements of the expanding market.

2.5. *Interdependence between the Sphere of Non-material Services and the Sphere of Material Production—Analysis of Elasticity of Development*

Just as in section 2.4, an econometric analysis has been conducted to establish relations between value added and employment in the sphere of non-material services and, on the other hand, between value added and employment in the whole sphere of material production over the 1970–81 period.

The results are shown in Tables 2.5 through 2.7. Due to information gaps, the analysis of value added has been conducted for five sectors of non-material services, while employment has been shown for seven sectors matching the scope of Table 2.2.

Observation of data from Table 2.5 allows us to note that the elasticity of value added of non-material services with respect to value added of the whole material sphere for sectors $si = 2, 4, 5$ is higher than those for trade in the material sphere (see Table 2.4). Elasticities in these sectors take on values in the 1.2–1.4 range, while in remaining sectors $si = 1, 3$ it is respectively 0.92 and 0.97. One can, therefore, speak of the relative acceleration in development of service output in the following sectors: the sub-system of non-material services ($a_1 = 1.39$), health and social care ($a_1 = 1.29$) and education ($a = 1.20$) with regard to development

TABLE 2.5

VALUE ADDED OF NON-MATERIAL SERVICES ($y = V^a_{si}$) AS A FUNCTION OF VALUE ADDED OF THE WHOLE MATERIAL SPHERE ($x = V^a_m$), MODEL: $y = e^{a_0}x^{a_1}$

No. (si)	Sector	a_1	a_0	R
1.	Housing and non-material community services	0.968	−4.144	0.871
2.	Education	1.202	−5.009	0.972
3.	Culture and arts	0.926	−4.925	0.979
4.	Health and social care	1.285	−6.104	0.970
5.	Sub-sphere of non-material services	1.388	−6.022	0.984

Source: Own calculations.

TABLE 2.6

EMPLOYMENT IN SECTORS OF NON-MATERIAL SERVICES ($y = E^n_{si}$) AS A FUNCTION OF VALUE ADDED IN THE WHOLE NON-MATERIAL SPHERE ($x = V^a_m$), MODEL: $y = e^{a_0}x^{a_1}$ *

No. (si)	Sector	a_1	a_0	R
1	2	3	4	5
1.	Housing and non-material community services	0.349	2.533	0.916
2.	Science and technology	0.563	0.749	0.834
3.	Education	0.224	4.893	0.973
4.	Culture and arts	−0.094	5.107	0.529
5.	Health and social care	0.347	3.718	0.988
6.	Physical education, sports, tourism	1.160	−4.285	0.967
7.	Administration, judicial system, finance, insurance	0.059	5.247	0.796

*All parameters significant at significance level $\alpha = 0.1$.
Source: Own calculations.

TABLE 2.7

EMPLOYMENT IN SECTORS OF NONMATERIAL SERVICES ($y = E^n_{si}$) AS A FUNCTION OF TOTAL EMPLOYMENT IN THE MATERIAL SPHERE (E_m), $y = e^{a_0}x^{a_1}$

No. 1 (si)	Sector	a_1	a_0	R
1.	Housing and non-material community services	1.460	−8.231	0.728
2.	Science and technology	3.410	−26.233	0.761
3.	Education	1.135	−3.821	0.938
4.	Culture and arts	−0.443*	8.459	0.471
5.	Health and social care	1.684	−9.107	0.912
6.	Physical education, sports and tourism	6.000	−50.527	0.950
7.	Administration, judicial system, finance, insurance	0.241	3.480	0.616

*Parameter insignificant at significance level $\alpha = 0.1$.
Source: Own calculations.

of production of the whole material sphere, as well as of the relative time lags in housing, culture and the arts ($a_1 < 1$).

Information contained in Table 2.6 points to a significantly less than proportional relation between employment (with the exception of the sector $si = 6$) and value added of the material sphere. A similar relation has already been noted in Table 2.4. All elasticities (with the exception of $si = 6$) are inferior to 1. Elasticities of employment in non-material services with respect to employment in the material sphere, shown in Table 2.7, show that social priorities chosen in the course of the 1970s—development of physical education, sports and tourism ($a_1 = 6.00$), health care ($a_1 = 1.68$), science and technology ($a_1 = 3.41$) have been pursued mainly by a growth in employment in these sectors, its pace being superior to growth in employment in the material sphere. The only exception to this rule has been the sector of culture and arts ($a_1 < 0$).

2.6. *Forecasting the Structure of Value Added and Employment in the National Economy*

The analyses conducted in sectors 2.3 through 2.5 clearly point to the specificity of mechanisms determining the structure of production and employment both in the material and non-material sphere. This state cannot be viewed as satisfactory since it has been largely shaped by non-economic criteria of choice. The important issue which appears concerns possible long-term consequences of unchanged functioning of such mechanisms. In order to answer this question, the authors of this paper have attempted to forecast the future structure using Markov chains with non-stationary transition probabilities.[24] Tables 2.8 and 2.9 show results of these attempts.

Two important conclusions can be drawn from comparison of the forecasts shown in Tables 2.8 and 2.9. Under *ceteris paribus* assumption, the mechanism of changes in the structure of output leads to a state of equilibrium of the system,

[24]This method has been presented in *Prognozowanie struktury za pomoca, łańuchów Markowa*, Prace i Materiały Instytutu Cybernetyki i Zarządzania, SGPiS, Warszawa 1980. Computer calculations have been carried out at the CSPS (SGPiS) by M. Witkowski.

TABLE 2.8

FORECAST OF THE STRUCTURE OF VALUE ADDED IN THE NATIONAL ECONOMY

No.	Sector	1970	1975	1980	1990	Ergodic State Year 2006
1.	Industry + construction + agriculture + forestry	75.49	78.46	72.91	74.23	74.30
2.	Transport and communications + trade	15.54	11.84	16.14	15.70	15.67
3.	Housing	1.26	1.01	1.31	1.16	1.16
4.	Education	2.29	2.50	2.81	2.67	2.66
5.	Culture and arts	0.43	0.35	0.39	0.38	0.38
6.	Health care	1.46	1.62	1.91	1.77	1.76
7.	Remaining social services	3.52	4.20	4.53	4.09	4.07

Source: Own calculations.

in which the value added of non-material services would only constitute some 10 percent of the total value added. Such a state could already be reached by the year 2006. The mechanism of changes in the structure of employment is less stable and a state of equilibrium could be reached by the year 2145, with the share of non-material services at 25.3 percent. Forecasts for the year 1990 show that the share of value added generated in the non-material sphere to be some 10 percent of the total value added, and that of employment, some 23 percent of total figure. A question arises whether the phenomenon of different mechanisms governing the development of production and employment is a healthy one. To some extent, the answer can be affirmative since in services the productivity of labour is lower than in material production. The boundaries of justifiable disparity call for a closer investigation. Doubtlessly the expected share of value added of

TABLE 2.9

FORECAST OF THE STRUCTURE OF EMPLOYMENT IN TNE NATIONAL ECONOMY

No.	Sector	1970	1975	1980	1990	Ergodic State Year 2145
1.	Industry + construction + agriculture + forestry	62.05	61.80	59.41	56.42	53.25
2.	Transport and communications + trade	18.82	18.47	18.78	20.12	21.45
3.	Housing	3.73	3.91	4.56	4.61	4.95
4.	Science and technology	0.76	1.32	1.22	1.13	1.06
5.	Education	6.13	6.13	6.59	7.80	8.52
6.	Culture and arts	0.86	0.67	0.69	0.77	0.84
7.	Health and social care	4.41	4.57	5.35	5.65	6.15
8.	Physical education, sports and tourism	0.28	0.67	0.81	0.75	0.78
9.	Administration, judicial system, finance, insurance	2.95	2.48	2.58	2.76	2.99

Source: Own calculations based on available data.

services seems to be too small in a contemporary set of conditions. This is an argument in favour of looking at the material and non-material sphere as two interdependent elements; it also pleads in favour of using an economic approach to the sphere of services. This implies the necessity of modifying the evaluation of targets and mechanisms of their implementation in a centrally planned economy.

More light on the subject can be shed by an intersectorial differentiation of the effectiveness with which factors of production in the material and non-material sphere are being used.

2.7. *Productivity in the Sphere of Services*

The specificity of providing services in a planned economy, especially those of the non-material sphere, and the particular character of application of the basic factors of production in this sector, call for caution in the interpretation of growth in productivity coefficients. This growth cannot always be interpreted in terms of increased effectiveness with which service providers function. It is certain that relations in this sphere are neither as direct nor as strong as in the productive sphere, but there is no reason to neglect their existence. The way productivity coefficients evolve in time can indirectly inform about changes which take place in the degree and structure of social need fulfillment, about cost and effects of providing services etc. For instance, coefficients of capital/labour ratio can convey information on the potential of the non-productive sectors (the scope of durable assets and human factors involved) and also to some extent about the quality of services provided. The economic meaning of these coefficients depends on the quality and content of the data used. This study considers alternative coefficients of productivity, the application of which depends on the measures of output (net, gross value added) and durable assets (constant prices, historical prices) which are used.

This section makes reference to only one of such alternative measures i.e. gross value added and value of productive durable assets expressed in constant prices. The respective coefficients for the material and non-material spheres of production in 1971, 1981 and their mean value over the whole period analysed can be found in Table 2.10. The observation of differences in the absolute value of coefficients as well as the analysis of differences in tendencies of change could point to potential opportunities for making economic development more dynamic. It should be stressed here that the methodology of calculating value added in the non-material sphere causes coefficients of the productivity of labour and productivity of durable assets to be clearly understated compared to similar coefficients describing the sphere of material production (see section 1.4).

In the period under analysis the sphere of material production has shown a clear tendency towards increase in the productivity of labour and capital/labour ratio, accompanied by a falling productivity of durable assets. It appears that the highest productivity is reached in agriculture (some 1.5–3 times higher than in industry); and the lowest productivity is registered in transport and communications. One may think that the productivity of labour in the whole economy is highly sensitive to changes in productivity of agriculture. One should also note

TABLE 2.10

PRODUCTIVITY RATIOS IN MATERIAL AND NON-MATERIAL SPHERES OF PRODUCTION IN 1971 AND 1981

Type of coefficient and Years	Productivity of Labour in 1000s zł per 1 Employee			Productivity of 1 Złoty of Fixed Assets			Capital Labour Ratio in 1000s zł per Employee		
Name of Sector	1971	1981	mean	1971	1981	mean	1971	1981	mean
Whole economy	104	224	161	0.22	0.31	0.28	480	735	572
Industry	114	223	159	0.44	0.40	0.48	262	562	388
Construction	94	130	140	1.20	0.57	1.16	79	230	131
Agriculture	216	670	316	0.20	0.45	0.25	1,088	1,506	1,214
Transport and communication	79	166	127	0.17	0.21	0.21	466	788	601
Trade	114	196	143	0.92	1.32	1.15	123	149	122
Housing and non-material community services	99	168	124	0.01	0.02	0.01	11,275	11,079	11,414
Education	41	114	67	0.18	0.46	0.29	234	250	230
Culture and arts	49	132	85	0.14	0.31	0.22	353	431	379
Health and social care	34	99	57	0.24	0.62	0.38	140	158	147
Remaining social services	88	274	167	0.74	0.93	0.88	120	295	190

Source: Own calculations based on data from *Wytwarzanie i podział dóbr materialnych i usług niematerialnych*, pp. 24–25, GUS, Warszawa, 1983, and from *Statistical Yearbooks of Poland.*

that in the construction industry productivity has been falling since 1978, which is related to an investment slowdown in the economy following 1978.

A drop in productivity of durable assets in the sector of material production, especially in construction, industry, transport and communication, testifies that the efficiency with which material assets are being managed is deteriorating. One possible cause for this was the unprecedented increase in new production capacity from completed investment projects (over 400 large production plants), as well as the lack of an efficient mechanism of eliminating units which are economically unsound.

Over the whole period of analysis one can note an increase in the technical capital/labour ratio and its important differentiation within various sectors. For instance, in agriculture one job post requires over 1.5 million zlotys in durable assets, while in trade, the figure is one-tenth of that (see Table 2.10).

The analysis of full time sequences confirms (with the exception of agriculture) the existence of identical mechanisms which describe the evolution of productivity and the capital/labour ratio. The curves of productivity and the technical capital/labour ratio are closely correlated both in the case when these curves cross and in the case when they run parallel to each other. This phenomenon can be explained by the fact that a key factor behind growing productivity of labour was in the increasing cost of one job post.

The coefficients under study show different tendencies in the sphere of non-material production. One notes a tendency toward growth in the productivity of labour and assets while coefficients of the technical capital/labour ratio show diverse tendencies.

The productivity of labour in non-material services grows much faster than in the material sphere. Lower growth can only be noted in housing, in which in 1981 productivity was 70 percent lower than in 1971. Rapid change in the productivity of labour in this sector can result from an increase in the unit cost of wages and from an increase in the scope of services provided (a derivative of growing employment). This fact allows us to view in a different light the growth of productivity in the sphere of culture and arts, where total employment has gone down by 5 percent. Given lower dynamics of wages in this sector, the increase in productivity must have been accompanied by a deterioration in the quality of services provided by or an increase in the price of cultural services.

The absolute value of coefficients of the productivity of durable assets are highly differentiated in the sphere of non-material production. The lowest level is found in housing, where each zloty of durable assets generates some 0.01 zloty of value added. In the sphere of social services, this coefficient is about 3 times higher.

It has to be noted that, given the share of non-material production in total value added (10–13 percent), the value of productivity coefficients in the non-material sphere is clearly encouraging. These coefficients could be even more advantageous should we include in our analysis the impact of the structure of durable assets by type of asset. Such an analysis shows that in the sectors of the non-material sphere the active part of assets does not surpass 20 percent.[25]

[25] *Aktualizacja wartości środków trwałych w gospodarce narodowej*, pp. 15 and 16, GUS, Warszawa, 1984.

Even though the technical capital/labour ratio also follows the general increasing trend, in education, culture and arts up to 1974 this coefficient was actually falling. In housing, this fall has been registered since 1975. It is interesting to note that coefficients of the technical capital/labour ratio are least likely to change over time, much less than those in the material sphere. This small dispersion in time is to a large degree caused by the system of financing the non-material sphere (as a rule—allocate as much money as last year). It also appears that curves of productivity of labour and capital (except for the sphere of social services) run along what would seem to be a common pattern.[26]

2.8. *Analysis of Productivity Based on a Production Function with Variable Elasticity of Substitution (VES)*

The statistical data assembled on value added (gross) in historical prices, employment and durable assets in constant 1977 prices have been used to estimate the parameters of the following function of production:[27]

$$\ln Y = a_0 + a_1 \ln M + a_2 \ln Z + a_3 \ln M \ln Z \tag{5}$$

where Y = value added, M = value of productive durable assets, Z = employment, $a_0 - a_3$ = unknown structural parameters of the model.

A part of the results of these computations is presented in Table 2.11; they can be used to study the problem of intersectorial effectiveness with which factors of production are used.

The general picture of managing the limited factors of production by sector of production is rather gloomy.

In the sectors of material production high coefficients of the elasticity of production with respect to employment (e_E) appear in industry and construction, and they increase throughout the whole period. At the same time, for both of these sectors the elasticity of production with respect to durable assets is very low (7-10 times lower than for coefficients e_E). Furthermore, starting with 1974 for the construction and with 1977 for industry, the elasticity of production with respect to the value of durable assets has fallen. Thus, the increases in output due to completed investment have been progressively lower and lower, only to a slight extent synchronized with the allocation of employment. The increase in employment in these preferred sectors of production has been so long in coming that this factor was in short supply in relation to the completed investment in durable goods.[28]

On the other hand, agriculture, trade, and transport and communications seem to be clearly undercapitalised. One notes in this case a statistically insignificant or negative elasticity of employment e_E. The elasticity of production with

[26]A comparison between the productivity of Polish and the world's industry can be found in Gajęcki, R. Produktywność, *Przegląd Techniczny*, 1/1985, 18-19.

[27]In the course of analysis, the authors have also considered other forms of the production function, taking into account other variables. The results presented above have been chosen as most representative.

[28]These conclusions are further confirmed by a study of the socialized industrial sector (longer time span and scope—20 branches). See Gajęcki, R., Firlej-Kusak, E., and Kasiewicz, S., *Międzygałęziowe zróżnicowanie efektywności wykorzystania czynników produkcji jako wyznacznik zmian strukturalnych*, IRG, SGRIS, Warszawa.

TABLE 2.11

SELECTED CHARACTERISTICS OF PRODUCTION FUNCTIONS IN THE SPHERES OF MATERIAL AND NON-MATERIAL PRODUCTION

Characteristic symbol	e_E		e_C		σ		MRS	
Name of sector	1971	1981	1971	1981	1971	1981	1971	1981
Whole economy	2.2137	3.0454	0.7274	0.9681	0.5127	0.5895	1.4654	2.3121
Industry	3.5758	3.8894	0.5097	0.5526	0.8519	0.8621	1.8389	3.9541
Construction	1.4901	3.9347	0.1093	0.3520	0.2804	0.5107	1.0664	2.5707
Agriculture	—	—	1.8150	1.8150	—	—	—	—
Transport and communication	−4.0460	−4.0460	1.0972	1.0972	1.0000	1.0000	−1.7170	−2.9044
Trade	—	—	1.7526	1.7526	—	—	—	—
Housing and non-material community services	2.6610	2.6610	—	—	—	—	—	—
Education	2.9729	2.9727	1.5186	1.5186	1.0000	1.0000	0.4581	0.4893
Culture and arts	0.3023	0.0138	4.7006	4.7925	4.2070	4.8420	0.0226	0.0012
Health and social care†	−8.5564	−8.8455	−1.9615	−0.6749	3.2103	27.0725	0.6125	1.6013
Remaining social services	—	—	−0.9068	−0.9068	—	—	—	—

Symbols: e_E = employment elasticity and e_c = fixed assets elasticity of production; σ = elasticity of substitution; MRS = marginal rate of substitution.
Source: Own calculations, "—" non-convex function.

respect to employment and durable assets confirms that the general movement of economic development is greatly affected by agricultural output, and not industrial output, as could be expected.

The greatest impact on value added, as well as on the volume of non-material services provided, is exerted by employment in housing and education. Culture and arts seem to be largely determined by material assets. The results of the analysis show that this sector most strongly feels the deficiency of durable assets. The sector of health care has proven itself to be the most peculiar one, with both elasticities (with respect to employment and assets) negative. At this stage of research, one cannot regard the results for the sphere of social services as fully reliable. In further studies of the problem this sphere would have to be disaggregated, or at least the "science and technology" sector would need to be shown separately.

The substitution of durable assets for labour is limited to the extent which is expressed by the value of elasticity of substitution. The value of "σ" is clearly differentiated both in the material and non-material sphere. One should also note that σ is highest in the sector of culture and arts. This phenomenon can be interpreted as an example which illustrates the quickening pace of the process in which individual approach to local culture is being replaced by an integrated (but not always advantageous) culture based on mass media.

Conclusions

Given the complexity of today's economy, the classical MPS approach does not seem to reflect reality in a satisfactory manner. This applies to the role and share of non-material services in generation of value of the material sphere, as well as to the participation of the material sphere in the production and consumption of non-material services. In Part I we have presented some problems, as well as theoretical and practical dilemmas, related to the evaluation of the value of goods and services according to the MPS and according to the expanded concept of national income accounting (close to SNA in many elements). Under both types of approach we have noted diverse methods of evaluating different types of services, problems appearing in transition from indexes of current (historical) to constant prices, as well as the general understating of the value of non-material services. The share of value added generated in Poland's non-material services in the course of the 1970s was found to be some 10–13 percent of total value added.

Based on these estimates of value added generated in the two spheres of production in Poland, in Part 2 we have tried to present the inter-relatedness of their development expressed in terms of econometric methods.

Given the reservations discussed in Part 1, the results suggest that in the period 1970–81 stable development proportions seemed to dominate. There has been a strong interdependence between the sector of production and services, both material and non-material; the development of all sectors has been dominated by extensive, rather than intensive, use of production factors. Such a conclusion is confirmed by the correlation analysis and estimates coming from econometric models. One should also note that the sector of culture and arts behaves differently from other service sectors. Our analysis has shown that from

the point of view of the whole economy the productivity of various factors of production (their level, dynamics and trends) compares favourably with the sphere of material production, but at the same time the sphere of material and non-material services is relatively underdeveloped, which probably slows down the country's development. The forecasted structure of value added and employment calls for more active shaping of the sectorial structure of the economy and more efficient management.

The study confirms a need to pursue further studies of the subject, which should concentrate in two areas. The first would be to elaborate a theoretical and statistical mode of transition from the MPS to the SNA. The second one calls for more detail and improvement in the quality of statistical data, including those from input-output tables, which could be used to study in depth all the interrelations which are taking place between the two spheres from the perspective of their use in programming development.

APPENDIX

SELECTED INFORMATION ON SERVICES IN POLAND 1970-82

Data name	Years												
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
1. Telephone per 1,000 citizens	57	60	63	67	71	75	80	84	88	92	95	97	100
2. Total shopping surface is m^2 per 1,000 citizens	241	261	261	267	281	295	305	313	322	330	335	337	341
3. Number of taxis per 10,000 citizens	8	8	10	10	10	10	11	12	15	16	18	20	21
4. Percentage of community sewage purified (city network)	32	—	—	27	32	31	46	45	45	45	45	46	46
5. Number of patents licensed and projects applied per 100 thousand employees in socialized sector	1.2	1.2	1.3	1.4	1.5	1.4	1.4	1.4	1.6	1.7	1.5	0.8	0.7
6. Places available in student hostels per 1,000 students	254	261	252	244	238	229	230	244	252	267	274	296	318
7. Attendance of spectacles and concerts per 1,000 citizens	310	297	297	292	289	294	286	286	271	260	253	217	205
8. Nurseries per 100 under 3 year old children	4.7	5.3	5.2	5.5	5.5	4.9	5.1	5.1	5.2	5.4	5.2	4.5	4.0
9. Hospital beds in general hospitals per 10,000 citizens	52	52	53	54	55	55	56	56	56	57	56	57	57
10. Number of beds available in hotels per 10,000 citizens	10	10	12	12	13	14	14	15	16	14	14	14	13
11. Trips abroad to Western countries per 10,000 citizens	35	48	63	78	83	93	117	149	11	171	195	348	88
12. Percentage share of social consumption in national income†	15.7	16.0	15.9	15.1	14.3	14.0	14.0	14.9	15.5	17.6	19.6	23.4	22.7

Source: Own compilation based on *Statistical Yearbooks of Poland*, and also based on *Gmytrasiewicz, N., Usługi i świadczenia społeczne a produkcyjna sfera gospodarki*, Gospodarka Planowa, No. 3, p. 117 (1984).