RATIONALISING SEA TRANSPORT SERVICES IN AN ARCHIPELAGO

AN APPLICATION OF SIMPLE SPACE THEORY *

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The Problem

The port towns of the Pacific were European creations designed primarily as entrepôts linking the island hinterlands and metropolitan forelands.[1] In the course of time the towns became integral parts of the social and economic life of the islands, and regular passenger and freight traffic between the port towns and the villages grew to a position of vital importance.

In the Fiji Islands the port town of Suva came to dominate the archipelago in terms of population size and multiplicity of functions. It is to Suva that people in the outer islands come for educational, medical and social services – and for the purchasing of a number of relatively simple commodities. They arrive in large numbers and on a variety of craft. These range from small launches to vessels of 200 tons. Mainly, however, the mode of travel is on the deck of wooden cutters and schooners of 10 to 50 tons. These small craft trade around almost all villages in the islands unloading goods and loading copra. Their voyages are protracted for small quantities of cargo, due to tide delays at many villages and the inability to navigate between settlements at night in unlit coastal waters (Fig. 1). The ships carry workboats and large crews to handle cargo, and despite the high freight rates shown in Fig. 1 they can barely pay their way. In addition the risks of damages and total losses are substantial as the vessels approach close to villages in areas of difficult access.

Cargo from the port town is purchased by small shops and co-operatives in the islands. There are often two to three of these enterprises in a village and their trading hinterlands are extremely limited. These seldom extend beyond the village lands and are sometimes confined to a single 'mataqali' (family land-owning unit) within a village. The shops all incur relatively high overheads and as a result of their extremely limited market can stock only the most basic consumer goods. Many of the shops are barely viable and they periodically run short of supplies.

The port towns, the island vessels and the village stores are thus the principal components of the archipelago trading system. There are a number of inter-related characteristics of this system which have economic consequences. For example, vessels are kept small in the outer areas in order that they may negotiate the poorest of island channels. As a result they are unsuited to the carriage of livestock reared on some islands. The length of voyage which they undertake means that perishable cargoes are seldom shipped and the 'surplus' foodstuffs in the islands cannot be safely marketed. Trade is thus virtually devoted to the almost non-perishable copra. The resulting distribution of significant cash production zones in the outer islands (Fig. 2) is somewhat similar to the situation postulated by von Thünen in his initial model. It will be noted, however, that on the large island of Viti Levu, where roads give improved access and small subsidiary market centres exist, production zones are variagated and more adjusted to ecological conditions. This corresponds to Part II of the Thünen model[2] where modifying factors are

[1] A. Spoehr, Port Town and Hinterland in the Pacific Islands, *American Anthropologist* vol. 62 (1960).

* This paper is based on field work carried out in the Pacific under an Australian National University Research Scholarship.

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[2] P. Hall (Editor), Von Thünen's Isolated State: An English Edition of Der Isolierte Staat, New York Permagon Press 1966.

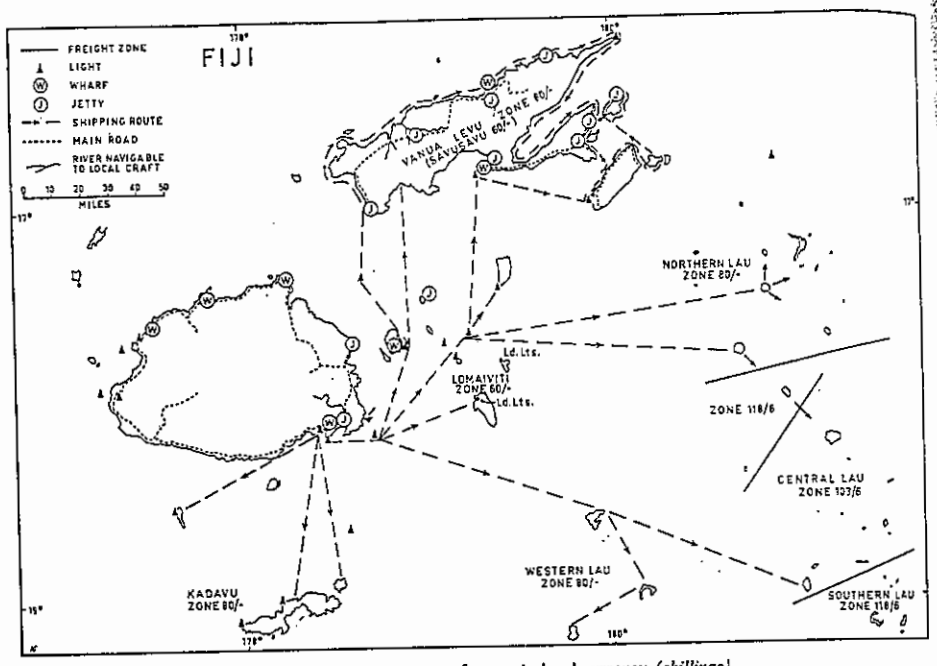

Fig 1: Freight zones per ton of copra in local currency (shillings)

introduced to the concept of a single town on a uniform plane.

For the villagers in the outer islands this trading system means that the nearest largest commercial centre is the port town of Suva. Generally there are more people wanting to move to Suva than there is space available on small cutters at any one time. Travelling is not always safe (overloading is common), it is always expensive, and the time involved can be substantial since a traveller cannot easily obtain a return trip and may have to spend several days in the port town. There appears to be two reconcilable needs in this trading system. First to reduce the turnaround times of vessels by concentrating their cargo activities on a limited number of places. Second to allow some island enterprises to achieve an island-wide market which would allow them to carry a larger stock of goods and offer the people more varied services. The possibility of encouraging central trading places (CTPs) in the outer islands would appear to meet the needs of shipping and hinterland commerce.

Rationalising by Regional Centralising in Fiji

The theory of rationalising on the basis of central trading places is to build up cargo at the most accessible points on an island, and if necessary improve entrance and landing facilities.[3]

The advantages of this form of centralisation are numerous from the point of view of shipping. The collection and concentration of cargo at one place by road, launch, and other means would allow scheduled services to be introduced from the port town to the CTPs, and ship turnaround times would be cut by half at least. The need to carry heavy workboats and extra crew to act as stevedores and boatmen would be eliminated (thus reducing total wage costs), and the dangers of accidents due to extensive reef pilotage minimised. These economies in shipping would allow a reduction in freight rates to be negotiated and at the same time enable vessels to pay their way. Apart from economies in shipping, consolidation would also mean opportunities for the sustained marketing of fresh produce and fish from some areas. It may even be possible for mobile refrigerated containers to be packed at central purchasing depots and loaded directly on board the vessels on arrival. The distribution of proposed CTPs in Fiji which

[3] A fuller outline of the CTP proposal was made in an official report to the government of Fiji by A. D. Couper (Report on the Inter-insular Shipping and Trade of Fiji, Australian National University, 1965).

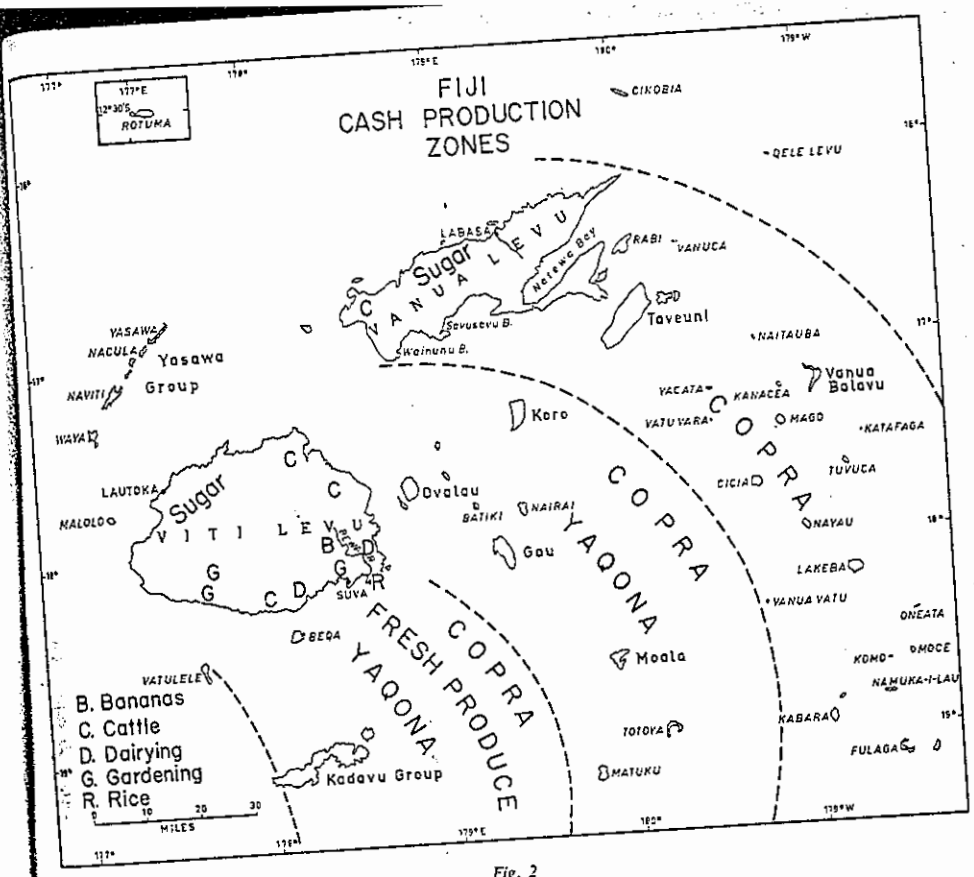

Fig. 2

have high access values, which are already school or medical centres, or which are the most important copra producers in their area is given by Fig. 3. This rationalised system contrasts with the 300 or so villages at which vessels called during 1963[4]. The centralising development project is a feasible solution but it requires a fundamental change in the pattern of island trade.

The CTP proposal has also implications for the hierarchy of settlement in Fiji. The suggestion here is that these central places could develop social and commercial functions in addition to facilitating a more economical transfer and redistribution of commodities. In effect, while manufacturing and more complex services would continue to expand at Suva – their most economical location – the CTP would take over some minor regional commercial and servicing activities from the town. This of course is a highly speculative proposition for it involves one of the pitfalls of 'social engineering' by anticipating changes in established patterns of social behaviour simply on economic grounds. It is nevertheless worth exploring, for if such a trend did emerge in Fiji it might be recognised as a positive one in the space-economy.[5]

Regional Centres and the Minimising of Movement

As has already been observed people frequently travel long distances to the port town in order to procure articles or to obtain services unavailable in their villages. One reason for this is the exist-

[4] The 1963 pattern of trade was arrived at by field observations and ship interviews in Fiji during 1963/64.

[5] By 1966 central trading places had been established in Natewa Bay area and were being supplied by co-operative society launches, some societies had also purchased a truck and were concentrating their trading activities at Savusavu.

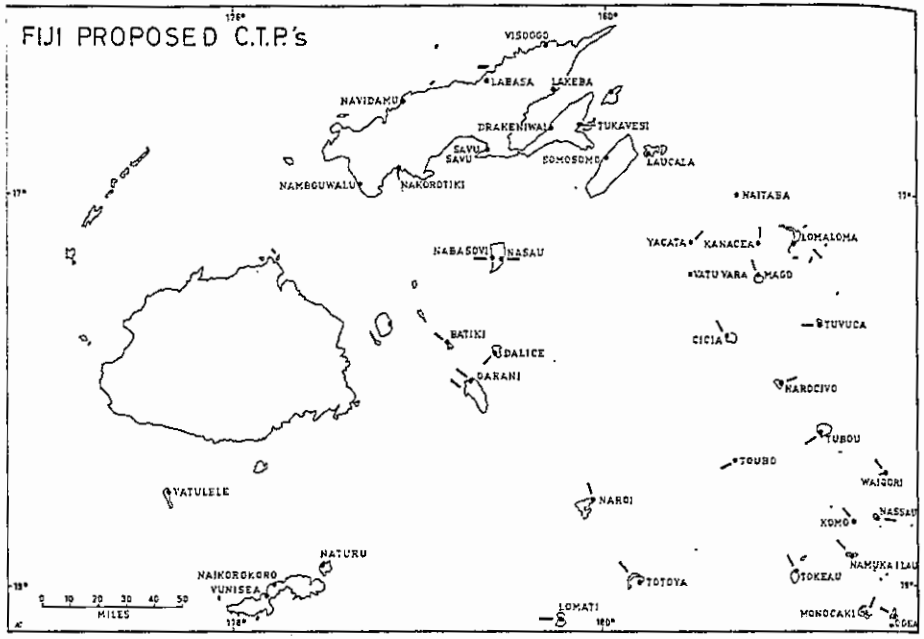

Fig. 3: Dashes show favourable entrances through the reefs.

ence of so many small competing village shops, each with a limited market, and few able to stock more than the same small range of basic necessities. This is not an unusual feature of an underdeveloped region – where it is normally treated as a sympton of disguised unemployment but may also arise from internal village conflicts. The central trading places might offer these areas island-wide markets in order to introduce such additional facilities as a cinema screen, bar, cafe, refrigeration plant as well as expanded stock in the stores. The anticipated effect might be a saving of some of the time and money which is consumed during trips to the port towns and also the creation of a certain amount of badly-needed non-agricultural employment outlets in the islands.

There is some theoretical and empirical support for this view. Chisholm states that "one of the objectives of planning is to reduce the amount of circulation necessary for the normal business of living"[6]. Likewise, if Zipf's 'minimum equation'[7] has any relevance for human behaviour it must surely be in this area where, if there were a choice, people might prefer not to spend a high proportion of their time and income travelling in order to procure goods and services available with less effort.

The degree to which any island regional centre could expand in Fiji would naturally depend on the population size and the prosperity of the rural hinterland. These factors would also determine the range of stock carried by the regional stores. The latter observation is a simplification of part of the locational system developed by Lösch.[8] He showed that a producer at a particular place would draw customers from the surrounding area until the good becomes too expensive to ship – then a second and third producing centre would arise.

More recently Curry[9] has applied similar reasoning to service centres within towns: and Haggett[10] has extended Curry's model to a

[6] M. CHISHOLM, Rural Settlement and Land Use, London Hutchinson Library 1966.

[7] G. K. ZIPF, Human Behaviour and the Principle of Least Effort, Cambridge Mass. Addison-Wesley 1949.

[8] A. LÖSCH, The Economics of Location, New Haven Yale University Press 1954.

[9] L. CURRY, The Geography of Service Centres within Towns: the elements of an operational approach. Lund Studies in Geography, Series B, Human Geography, 24, 31–54, 1962.

[10] P. HAGGETT, Locational Analysis in Human Geography, New York St. Martin's Press 1966.

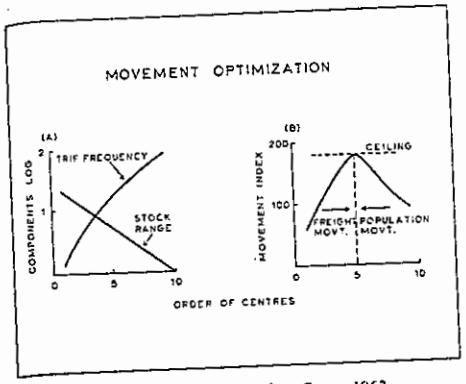

Fig. 4: Haggett 1966 after Curry 1962

hypothetical regional situation which has particular relevance for this discussion. The model erected by Curry is shown in Fig. 4. Haggett uses this to answer the query of why there is any need for intermediate centres. Why, for example, in the island context, should the cargo collecting places grow to anything beyond their village status? The Curry-Haggett model would indicate that a much greater range of functions required by outer area communities could be located at places other than the largest centre. Theoretically, there is an optimisation point in the space-economy to which freight is carried and to which people move on procurement trips.

This theory rests on four assumptions, which, to summarise Haggett, are:

(i) There exists an *order of goods* depending on the size of the population that is required for a market. First-order goods require the whole population of the given territory as a market, second-order goods require half this number, third-order goods one-third of this population, and so on.

(ii) Corresponding to this order of goods is an *order of centres*. This order, running from large first-order centres to small tenth-order centres, forms the x-axis of the graphs in Fig. 4.

(iii) There exists a *range of stock* for the order of centres, so that each lower grade of centre supplies one-third less than the next highest order of centres.... The form of stock range curve is shown in Fig. 4A in a given time period, the *trip frequency*, is the square of a centre's order....

(iv) By multiplying the stock-range by a trip frequency, a *movement index* is produced.

Fig. 4 thus constitutes a hypothetical model of 'movement optimisation in central-place structure'. The conditions shown in Fig. 4 actually apply to the islands of Vanua Levu and Taveuni in Fiji. These areas have one first-order centre (Suva) and three island-located lower-order centres of Labasa, Savusavu and Somosomo directly linked with Suva. Many of the settlements and villages of Vanua Levu and Taveuni are in the hinterland of the lower-order centres. They have as a result a 'two-stepped' relationship with the primary centre of Suva. That is, day-to-day items can often be procured by the people at village level, other commodities and educational and medical services are obtainable at the next largest regional centre, and higher goods and services can be obtained at Suva. On the other hand the outer island villages have only a 'one-stepped' relationship with Suva without intervening regional centres.

In effect the CTP proposal for Fiji envisages the growth of outer island centres corresponding to, say, the fifth-order centre in the Curry-Haggett model. Stores at such a place could carry a range of stock twice that held by village shops. The hinterland of the regional centre would be island-wide, but for first-order goods (such as furniture) and higher-order services (hospital treatment) all places would fall within the zone of a primate town.

Before some of the more obvious objections to these models are raised – especially the sociological factors involved – it is as well to look at such empirical evidence as there is on the effects of a regional centre on the movement of people. Zipf[11] expanding on Ravenstein (1885) demonstrated that in a number of instances the interchanges between any two communities (P_1 and P_2) varied directly with their populations and inversely with the distance (D) separating them. He expressed this by the formula

$$\frac{P_1 \times P_2 \times 1}{D} \quad \left(\frac{1}{10^7} \; \frac{1}{10^7} \text{ is a constant}\right)$$

Under archipelago conditions this is a reasonable working hypothesis in order to estimate the potential number of travellers. In simple terms, places with the largest populations are likely to record the greatest number of travellers but movement will be modified by distance.

In Fig. 5 some rather crude statistics which were recorded in Fiji during 1963[12] have been plotted against the Zipf equation. The hypothesis is supported for all points other than the areas Bau/Macuata and Cakaudrove. These places would from their high Zipf factor have been expected to provide the majority of passengers to

[11] ZIPF, *op. cit.*

[12] Derived from: 'Inwards and Outwards Book' at the Harbour Office, Suva.

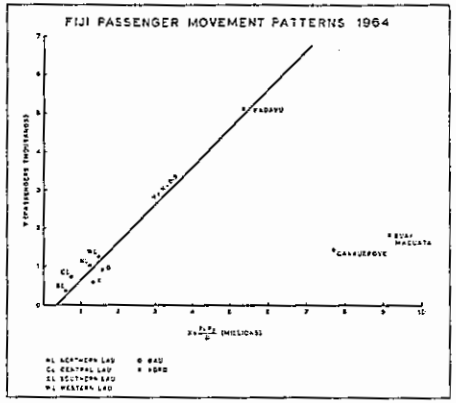

Fig. 5: Harbour office, Suva, Fiji

Suva. That they do not is partly because these are the areas where people have access to intermediate regional centres lying between their villages, estates, or farms, and Suva. It should also be pointed out that the two deviant areas were also in air communication with Suva from the vicinity of their regional centres. There are good reasons for believing, however, that it was the higher income sections of the populations that utilised this form of transport, and this would not have greatly affected the number of potential deck passengers.

One of the most obvious objections to the above speculation is the fact that we cannot anticipate the effect of such things as kinship 'pulls' which might still induce people to travel to the primate towns in preference to regional centres. Or people may simply desire to visit a large town. This latter factor certainly appears to influence the pattern of travelling in a higher income country such as Australia. According to Quinlan's study of air transport in Australia[13] local centres are often by-passed in favour of air connections directly with the state capitals. Rose[14] also points out that while people in a small Australian town might occasionally use the next nearest larger town for services it is more likely that they will use the distant capital. He also makes the point that there is in Australia no dimunition of the 'gravity' of the central city with distance.

The by-passing of small regional centres might apply in most countries where the cost of long-distance travelling only consumes a small proportion of income, and the frequency of services (especially the ability to choose a convenient return trip) are reliable. It seems arguable that this would not be the case in the Pacific Islands, were there an alternative centre to the primate town.

Speculation on the effects of the creation of small port regional centres in the outer islands of Fiji is supported by some theoretical considerations of the space-economy. It also rests on empirical evidence of the movement patterns recorded from places where some such small port centres exist. If we consider ports of any size as technological units then, in effect, this CTP type of technical change allows a more intensive application of capital at selected central places. These become the growing points in local economies which are more efficiently linked by scheduled shipping services to the port towns. Ships would have easier access to such places and could thus be increased in tonnage and their turnaround times reduced. This would undoubtedly make them more viable. Island entrepreneurs and co-operatives would also secure more local outlets for their energies, imported goods are likely to be cheapened and the marketing of a wider range of cash crops facilitated; the Thünen zones around the primate town would thereby be diversified.

[13] H. QUINLAN, Australian Inter-regional Air Passenger Services, 1965. Australian National University 1967 (Unpublished Ph. D. Thesis).

[14] J. R. ROSE, Metropolitan Primacy as the Normal State, *Pacific Viewpoint* vol. 7 (May ,1966) no. 1.

THE ECONOMIC ADMINISTRATIVE REGIONS IN THE U.S.S.R.

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In contrast to the general regionalization (division of the country into major economic regions – currently 18) according to Soviet sources the economic administrative regionalization is characterized by unity of economic and administrative-territorial and political division, a basic principle of Soviet economic regionalization.[1] This unity may be explained in terms of Marxist philosophy as the active role of the superstructure (influence of the state) on "creation and development of the socialist mode of production" guaranteeing "the unity of political and economic leadership."[2] Therefore by Soviet standards the economic administrative region constitutes "the fullest, most complete type of region, 'classical' type of economic region by socialism."[3]

The aim of the present paper is to analyze economic administrative regionalization in the USSR historically and to discuss it in the light of the basic principle, mentioned above.

The Early Concern for 'Territorial Principle'

During the first few years following the October Revolution in 1917 much more attention was paid to the so called 'territorial principle' in industrial planning and management than was the case later on. This concern was reflected in the theoretical contributions to planning by GOELRO – State Plan for the Electrification of Russia – (1920) and Gosplan regionalization (1921-1922).[4] In the field of economic management, the logical consequence of the nationalization of industry was a full coincidence of administrative-territorial and economic division of the country. The same governmental organs (Soviets) performed not only the political-administrative but also economic functions in the new territorial units created soon after the revolution. More specifically the Soviets at each level of the administrative-territorial division possessed a department called sovnarkhoz (economic council).[5] The sovnarkhozy were subordinated not only horizontally (laterally) to the relevant Soviets but also vertically starting at the uyezd level through oblasts or gubernias, union republics economic councils up to the Supreme Economic Council (Vysshiy Soviet Narodnogo Khozyaystva) in Moscow. Untill 1929 there were no all-union plans, hence the local economic councils enjoyed a relatively large margin of freedom in economic decisions.[6] This margin narrowed substantially in the chaotic years of 'War Communism'(1917-1920), narrowing gradually again since 1924-25 to disappear almost entirely together with any concern for the 'territorial principle' in management and in

[1] P. M. ALAMPIEV, Ekonomicheskie administrativnye rayony, *Izvestiya Akademiya Nauk, ser. geografiya*, (1957) no, 5, p. 9.

[2] "Voprosy razmeshcheniya proizvodstva i ekonomicheskogo rayonirovaniya" sbornik statey, Gosplanizdat, Moscow 1960, p. 256–257.

[3] P. M. ALAMPIEV, Ekonomicheskie administrativnye rayony, *op. cit.*, p. 10.

[4] Z. MIECZKOWSKI, The Economic Regionalization of the Soviet Union in the Lenin and Stalin Periods, *The Canadian Slavonic Papers*, Vol. VIII, (1966).

[5] At the uyezd level they were called 'economic departments of the uyezd Soviet'.

[6] Throughout all this period a certain number of enterprizes of 'general state importance' remained in direct subordination to the Supreme Economic Council. This dualism of economic control, however, did not present a major problem as the centralized industry represented a relatively small part of overall production. However, this does not mean that the problem of overcentralization and departmentalism did not exist in this period (cf. complains of I. C. ALEXANDREV in 1924 quoted by P. M. Alampiev, in: Ekonomicheskie administrativnye rayony, *op. cit.*). They existed always in the USSR but were less acute in the early 1920's.

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