AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523
**BIBLIOGRAPHIC INPUT SHEET**

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Batch 52

1. SUBJECT CLASSIFICATION
A. PRIMARY: TEMPORARY
B. SECONDARY:

2. TITLE AND SUBTITLE
Industrialization in advanced rural communities: the Israeli kibbutz

3. AUTHOR(S)
Don,Yehuda

4. DOCUMENT DATE: 1977
5. NUMBER OF PAGES: 22p.
6. ARC NUMBER: ARC

7. REFERENCE ORGANIZATION NAME AND ADDRESS
Wis.

8. SUPPLEMENTARY NOTES *(Sponsoring Organization, Publishers, Availability)*
(In Land Tenure Center paper no.112)

9. ABSTRACT
(Industrialization R&D)
The industrialization of the Israeli collective settlement, the kibbutz, is one unique example of building industry in small, highly developed, and rather sophisticated rural communities. Only a few kibbutzim have more than 600 working members. In 1974, the 248 industrial plants in the kibbutzim produced 6 per cent of the country's industrial output. The kibbutz has changed from an agricultural character to a distinctly agro-industrial settlement in less than twenty years. The reasons for the widespread and rapid industrialization of the kibbutzim are a relative decline in the profitability of agriculture and a relative surplus of high priced kibbutz labor released from agriculture Many kibbutzim thus turned to industry realizing that the utilization of both capital and labor was more profitable in industry than agriculture. The organizational differenc between profit-maximizing plants and kibbutz plants is demonstrated. The kibbutz is still a fundamentally utopian and unique phenomena but the experience gained may be used in such areas as experimentation in different fashions of integration between agricultural and industrial activities, experimentation in the democratization of management methods, and experimentation with the adaptation of small and medium sized plants to branches. The introduction of industrialization to rural areas is considered as one possible means to obtain a more balanced population under conditions of declining demand for labor in agriculture due to mechanization or to the lack of additional employment opportunities for the large rural families.

10. CONTROL NUMBER
PN-AAD-135

11. PRICE OF DOCUMENT

12. DESCRIPTORS

13. PROJECT NUMBER

14. CONTRACT NUMBER
CSD-2263 211(d)

15. TYPE OF DOCUMENT

AID 590-1 (4-74)

Pelzman

January 1977
U.S. ISSN 0084-0793

LTC No. 112

THE LAND TENURE CENTER
310 King Hall
University of Wisconsin
Madison, Wisconsin 53706

# INDUSTRIALIZATION IN ADVANCED RURAL COMMUNITIES: THE ISRAELI KIBBUTZ*

by

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*Paper prepared for delivery at the Fourth World Congress of Rural Sociology, Torún, Poland, 9-15 August 1976.

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All views, interpretations, recommendations, and conclusions expressed in this paper are those of the author and not necessarily those of the supporting or cooperating agencies.

# INDUSTRIALIZATION IN ADVANCED RURAL COMMUNITIES: THE ISRAELI KIBBUTZ*

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## I.

The concept of rural industrialization has in the past decade gradually gained ground as a leading socio-economic option to combat undesirable effects of attempts to obtain economic growth by focusing development efforts on the major urban centers. Disparities, real or imaginary, between the rate of growth of economic and social opportunities in the cities vis-à-vis the usually dormant and often declining rural areas, led to a constant drift of rural population to urban centers. Such migration, if unchecked, will, according to World Bank sources, increase urban population at twice the rate of general demographic growth, and bring about uncontrollable sprawling urban conglomerates.[1] The introduction of industrialization to rural areas has been considered as one possible means to obtain a more balanced development, under conditions of declining demand for labor in agriculture due to mechanization or to the lack of additional employment opportunities for the large rural families. A group of experts was convened in September 1973, in Bucharest to explore issues of rural

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1. According to recent World Bank estimates, by the turn of the century, Mexico City is expected to reach a population of 31.5 million; São Paulo, 26 million; Calcutta, 20.4 million, Seoul, 18.7 million, and Jakarta, 17.8 million. M. A. Cohen, "Cities in Developing Countries, 1975-2000," Finance and Development (March 1976), p. 15.

industrialization. Its brief Report, which has now become a major document on the issue,[2] concentrates on the developing countries, with their particular set of conditions and requirements. However, industrial development in rural areas geared toward the local rural population [3] has been going on in Eastern and Western Europe as well as in other developed regions for the last two decades.

The industrialization of the Israeli collective settlement, the kibbutz, is one unique example of building industry in small, highly developed, and rather sophisticated rural communities.

II.

At the end of 1973 there were, according to the Annual Report of the Israeli Registrar of Cooperatives,[4] 253 kibbutzim with an average population of about 430, 260 of whom belong to the labor force.[5] Only a handful of kibbutzim have more than 600 working members, and a kibbutz with a labor force of less than 100 is usually not regarded as viable in the long run.

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2. Rural Industrialization: Report of an Expert Group, U.N. Publication ST/ESA/4 (New York, 1974).

3. This constraint excludes mines and other enterprises which are based on the exploitation of local minerals or which have been erected in rural areas to remove them from the city for security or ecological reasons. Among the outstanding examples of such industrializing efforts are those implemented in the F.R.G. based upon the regional conception of the industrial Schwerpunkt. Another well known example is the Agro-Industrial Kombinat in Yugoslavia.

4. Annual Report of the Registrar of Cooperative Societies for 1973: Labor and National Insurance (December 1974 [Hebrew]), p. 412.

5. This extraordinarily high ratio of 60 percent, despite the reasonably high birth rate, is the result of a statistical definition, which automatically considers every inhabitant between 18 years and retirement age as belonging to the labor force, irrespective of his occupation.

In 1974 there were 248 industrial plants in the kibbutzim, employing a labor force of 10,800 and generating an output valued at IŁ 1,575 million (ca. $262 million). They produced 5.7 percent of the country's industrial output, and invested 9.8 percent (IŁ 197 million) of the total industrial investment that year.[6] The kibbutz has thus become a distinctly agro-industrial settlement, in contrast to its overwhelmingly agricultural character in the past.

This process of industrialization took place in less than twenty years. The industrial labor force in the kibbutzim increased from 1958 to 1974 by about 260 percent, from 3,000 to nearly 11,000 workers. From 1958 onwards virtually the total increment to the kibbutz labor force was assigned to industry.[7] Output growth greatly outstripped that of the labor force, increasing by about 2,500 percent, from IŁ 15.7 million in 1958 to over IŁ 400 million in 1974 (all in constant 1958 prices).[8] Obviously, such disparity in growth rates can be explained only by heavy investment in industry, as well as by rapid technological progress, entailing an increase in total productivity. And, indeed, investment in the kibbutz industry in 1974 alone--IŁ 50 million at 1958 prices--was approximately 30 percent higher than total gross capital stock in 1958--IŁ 35 million.[9]

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6. Annual Report of the Interkibbutz Association for Industry for the Year 1974 (Tel-Aviv, 1975 [Hebrew]), passim.

7. Data for 1958 taken from H. Barkai, Industrial Revolution in the Kibbutz -- Clarifications and Notes, Falk Institute Research Series no. 31 (Jerusalem, 1972 [Hebrew]). Figures for 1958 also include workshops, without workshops, the industrial labor force grew by 590 percent.

8. Data for 1958, ibid.; for 1974 in Annual Report of the Interkibbutz Association for Industry for the Year 1974. Figures for 1958 include workshops; excluding workshops, output grew by about 6,200 percent, from IŁ 6.4 million in 1958.

9. Data for 1958 and for 1974, ibid. Figures for 1958 include workshops; excluding workshops, gross capital stock in 1958 was IŁ 10.6 million.

The rate of growth of the industrial sector in the kibbutz movement was considerably faster than that of Israeli industry in general. As a result, the share of the kibbutzim in total industrial output increased from 4.9 percent in 1970 to 6.0 percent in 1974.[10] Among the main reasons for this development was the fact that the rate of growth of investment in industry was considerably faster in the kibbutzim than in the economy in general.[11]

These developments changed the relative position of industry in the kibbutz economy. Industry/agriculture ratio of labor grew from 0.21 in 1958 to 0.65 in 1973. Industry/agriculture ratio of capital grew also impressively, from 0.14 in 1958 to 0.30 fifteen years later.[12] Beyond increasing its share of labor and capital, the kibbutz industry also outstripped agriculture in the rate of growth of its Total Productivity

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10. Growth indices for the years 1970-1974 for the two industrial sectors are the following:

| | | 1970 | 1971 | 1972 | 1973 | 1974 |
|---|---|---|---|---|---|---|
| I | Kibbutz industry | 100 | 114 | 142 | 170 | 171 |
| II | General industry | 100 | 111 | 125 | 133 | 140 |
| $\frac{I \times 100}{II}$ | | 100 | 103 | 114 | 128 | 122 |

Data from Annual Report of the Interkibbutz Association for Industry for the Year 1974, p. 45. In view of the lack of a reliable time series on output for the kibbutz industry, sales figures substituted for output figures. This created for 1974 an upward bias for the kibbutz industry of about 6 percent.

11. Investment index figures for 1970-1974 are the following:

| | | 1970 | 1971 | 1972 | 1973 | 1974 |
|---|---|---|---|---|---|---|
| I | Kibbutz industry | 100 | 100 | 158 | 186 | 180 |
| II | General industry | 100 | 111 | 122 | 115 | 129 |
| $\frac{I \times 100}{II}$ | | 100 | 90 | 130 | 162 | 140 |

Data from ibid., p. 57.

12. Data from Barkai, Industrial Revolution in the Kibbutz. Very approximately, labor force on kibbutzim was employed as follows:

| | 1958 | 1973 |
|---|---|---|
| Agriculture | 18,000 | 17,000 |
| Industry | 4,000 | 11,000 |
| Others: services, transportation, tourism, external employment | 32,000 | 34,000 |
| Total | 54,000 | 62,000 |

Index,[13] despite the fact that in these years kibbutz agriculture developed into one of the most productive agricultural systems in the world.

III.

The kibbutz model of industrialization is focused on the individual rural settlement. This concept is in sharp contradiction to the recommended models of inter-village industrial centers, leaning on already existing "locations, which possessed a higher degree of social organization than the rural agricultural settlements" and which "could become the module upon which the programme of regional development was constructed"; and in another passage "rural industrialization was not the setting up of one or more industrial undertakings in every village, or as one participant put it, at every crossroad."[14] This is exactly what kibbutz industrialization has been doing. It is introspective, aiming at the solution of the specific problems which arise in each kibbutz which embarks on the establishment of industrial plants.[15]

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13. Total Productivity Index of agriculture and industry showed the following development:

| Year | Agriculture | Industry | 100 x Industry/Agriculture |
|---|---|---|---|
| 1957 | 100 | 100 | 100 |
| 1965 | 146 | 157 | 107 |
| 1973 | 190 | 215 | 113 |

Data from H. Barkai, "The Kibbutz and the Economic Realities of the 1970s," The New Economic Policy and the Kibbutz, ed. Y. Don (Tel-Aviv, 1975 [Hebrew]).

14. See Rural Industrialization. Report of an Expert Group, p. 5.

15. There exists a parallel, highly developed regional network of industrial plants, serving groupings of kibbutzim--or moshavim--in most rural areas of the country. These "regional centers," however, do not accommodate production-oriented plants. The regional center plants, following the patterns of routine central production cooperatives or multipurpose primary agricultural cooperatives, aim at serving the agricultural and consumption objectives of their members-patrons, the kibbutzim in the respective

The reasons for the widespread and rapid industrialization of the Israeli kibbutzim during the last two decades are complex.[16]

The main motive has probably been economic. The first and fundamental task of the rural sector, after 1948, was the provision of food for the rapidly growing population. This task was accomplished toward the end of the 1950s, with most massive development projects completed, increasing greatly the production potentials of agriculture, and bringing cultivable land and, especially, water reserves close to full exploitation. On the other hand, the rate of growth of the Israeli population slowed at that time, so that agriculture was capable of handling the slowly increasing demand for produce with reasonably stable quantities of land and water.

In addition, to encourage production during the 1950s, the government had maintained a policy of easy credit and an artificially low rate of exchange for imported agricultural machinery. Relative prices of imported mechanized inputs were thus greatly reduced, thereby encouraging kibbutz agriculture to adopt capital-intensive production patterns. Such high capital intensity enabled kibbutz agriculture to meet easily the gradually

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(n. 15 cont.)

regions. For a comprehensive analysis of this network of regional centers, see A. Kellerman, "Spatial Aspects of Inter-Rural Centers of Israel," Journal of Rural Cooperation 4 (1976): 51-71.

16. The extent of industrialization is indicated in the following table:

| Number of Plants per Kibbutz | 0 | 1 | 2 | 3 | 4 | Total |
|---|---|---|---|---|---|---|
| Number of kibbutzim | 44 | 142 | 42 | 8 | 2 | 238 |
| Number of plants | 0 | 142 | 84 | 24 | 8 | 258 |

Differences in the number of plants are due to variations in institutional definitions. Source: Annual Report of the Interkibbutz Association for Industry for the Year 1974, p. 37.

expanding demand for its produce, with a constant and even slightly reduced labor force.[17]

Thus two processes had to be dealt with: (1) a relative decline in the profitability of agriculture; (2) a relative surplus of high priced kibbutz labor released from agriculture.

Under such conditions, and in view of the high priority given to industrialization by the government from the late 1950s onward (backed by appropriate policies), many kibbutzim turned to industry. They did so mainly because they realized that the utilization of both capital and labor was more profitable in industry than in agriculture.[18] It is suggested,

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17. Labor force index in agriculture declined from 100 in 1958 to 95 in 1969.

18. This contention seemed to be true. A three-year moving average calculated on Barkai's figures (Industrial Revolution in the Kibbutz, p. 11) gave the following results:

Marginal Product of Capital

| | In Percentage | | | Index | | |
|---|---|---|---|---|---|---|
| Years | Agric. | Indus. | Ind./Agr. | Agric. | Indus. | Ind. x 100/Agric. |
| *1958-60 | 0.102 | 0.221 | 2.16 | 100 | 100 | 100 |
| *1960-62 | 0.102 | 0.228 | 2.24 | 100 | 103 | 103 |
| 1961-63 | 0.110 | 0.214 | 1.95 | 108 | 97 | 90 |
| 1962-64 | 0.103 | 0.229 | 2.23 | 101 | 104 | 103 |
| 1963-65 | 0.123 | 0.227 | 1.85 | 121 | 103 | 85 |

Marginal Product of Labor

| | In Constant IL per Day | | | Index | | |
|---|---|---|---|---|---|---|
| Years | Agric. | Indus. | Ind./Agr. | Agric. | Indus. | Ind. x 100/Agric. |
| *1958-60 | 24.80 | 29.06 | 1.19 | 100 | 100 | 100 |
| *1960-62 | 27.29 | 37.79 | 1.38 | 111 | 130 | 117 |
| 1961-63 | 28.74 | 44.27 | 1.54 | 117 | 152 | 130 |
| 1962-64 | 32.61 | 45.11 | 1.38 | 133 | 155 | 117 |
| 1963-65 | 37.44 | 48.35 | 1.29 | 153 | 166 | 109 |

(*) Figures for 1959 were not available.

The following conclusions are derived from the tables: (1) Rate of return on capital in industry, as represented by marginal product, was and remained higher than in agriculture. (2) Rate of return on labor grew rapidly at the expense of little or no growth in the rate of return on capital.

therefore, that the prime motivation for industrialization was economic.[19] Additional reasons emphasized in the literature are:

a) The necessity to find suitable employment solutions for the aged and the physically limited members for whom agriculture is too straining.[20]

b) The demand for employment opportunities for female members in "productive" branches, outside the service-catering-education complex.[21]

c) The need to provide technologically challenging economic functions for the young and ambitious members.

From the point of view of the economic historian, the first industrial attempts in the kibbutz go back to the 1920s. From the mid-1930s industrial activity became a common phenomenon in many, particularly new, kibbutzim; during World War II, with the isolation of the Middle East from great industrial centers, production gained great impetus. The share

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(n. 18 cont.)

(3) No clear pattern can be observed in the Industry/Agriculture ratios on capital. In labor the ratio increased until 1961-63 and then slid back.

19. The author thus accepts the views of Barkai over those of U. Leviatan, "Industrialization and the Kibbutz Values--Contradiction or Completion," The Kibbutz [Hebrew] 2 (1975). 11-27, N. Golomb, "Social and Organizational Structure of the Industrial Plant in the Kibbutz," Mimeo. (Rupin College, 1975 [Hebrew]); and S. Schtanger, "The Kibbutz Industry," Mimeo. (Tel-Aviv: The Interkibbutz Association for Industry, 1971 [Hebrew]), who place economic and other considerations on equal footing. The approach of Barkai is preferred as it explains more satisfactorily the time factor and the rhythm of the industrializing process.

20. D. Atar forecast that by 1980, 15.4 percent of the population at the veteran kibbutzim (established before 1936) and 9.8 percent at the medium ones (established between 1936 and 1946) will be above the age of 65. See his "Gerontological Aspects of the Kibbutz Industry Study," The Kibbutz 2 (1975): 63-68.

21. Despite efforts of "productivization," the ratio of female workers in agriculture and industry remains low: 15.5 percent of the "young," and 10 percent of the "old" generation. See Y. Ben-David, "Continuity and Change in the Sphere of Work: The Second Generation in the Kibbutz," ibid., pp. 28-46.

of income from industry maintained a high level even during the first years after independence.[22] Nevertheless, there is a fundamental difference between contemporary kibbutz industry and that of the past. Before the late 1950s industrial production was in most cases either an extension of agriculture into food processing, or an unavoidable "ersatz" of agriculture. It was a reasonable solution to offset the seasonal character of agricultural employment, and to provide a workingplace for the physically unfit. Agriculture, however, remained the ideological raison d'être of the collective settlement. Modern kibbutz industry operates in its own right and stands on equal footing with agriculture.[23]

IV.

The kibbutz industrial plant is a unique blend of economic rationality and a rigidly confined set of ideological restrictions. Though the objective function of these plants is by no means the ordinary profit-maximization paradigm, economic targets form a prime constraint for any industrial

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22. The share of income from industry (including workshops, holiday resorts, and transportation) in the total income of the kibbutz sector during the 1930s and 1940s was as follows:

| | 1937 | 1941 | 1947 | 1950 |
|---|---|---|---|---|
| Total income (PL 000) | 743 | 1,991 | 11,130 | 25,639 |
| Income from industry (PL 000) | 142 | 576 | 2,650 | 8,231 |
| Share of income from industry (%) | 19 | 29 | 24 | 32 |

Table based on data in J. Shatil, The Economy of the Communal Settlement in Israel (Tel-Aviv, 1955 [Hebrew]), p. 374.

23. The literature devotes increasing attention to the wide spectrum of problems in kibbutz industry. It is indicative that the best interdisciplinary research review on the kibbutz, The Kibbutz, devoted its second issue to "Work and Industry in the Kibbutz" with eight empirical studies on various facets of kibbutz industry.

See, for instance: D. Atar, "Gerontological Aspects of the Kibbutz Industry Study"; Y. Ben-David, "Continuity and Change in the Sphere of Work: The Second Generation in the Kibbutz", and U. Leviatan, "Industrialization and the Kibbutz Values: Contradiction or Completion."

initiative. The kibbutz economy is operated by a remarkably high quality labor force, the average standard of education of which is probably the highest in the country, "as virtually every child is given 12 years of institutionalized full time education."[24] The average standard of living of this population--measured by disposable income per capita--places it between the 6th and the 7th decile from the bottom of the entire population.

Shadow price of labor in the kibbutz is at least 2.5 times higher than the price of industrial labor. Consequently, no kibbutz plant survives unless it fulfills the condition of very high returns to labor.

The noneconomic constraints on kibbutz industry originate from: the kibbutz constitution; the welfare conceptions of the kibbutz toward its members.

The constitutional constraints derive from the transplantation of kibbutz principles into the field of industrial relations.

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24. See my "Dynamics of the Development of the Israeli Kibbutz," Discussion Paper 7512 (Ramat-Gan: Department of Economics, Bar-Ilan University, 1975), p. 13. In a recent study on the second generation (Ben-David, "Continuity and Change in the Sphere of Work," esp. p. 34), the schooling standard of that population was as follows:

| | Years of Formal Education | | | | |
|---|---|---|---|---|---|
| | 8 or less | 9-11 | 12 | 13+ | Total |
| Percent of the population | 1 | 6 | 78 | 15 | 100 |

Regarding student/population ratio, returns are contradictory. According to M. Chizik, "Studies at the Kibbutz' Expense," Hedim [Hebrew] (October 1973), in one of the major kibbutz movements--Kibbutz Artzi--there were in 1972, 1,000 students, out of a population of about 36,000.

In another study of the other two great movements--Hameuchad and Ichud--G. Mossinsohn, "Higher Education of the Younger Generation in the Kibbutz," The Kibbutz [Hebrew] 2 (1975): 210-17, found in 1971, 1,084 students, out of a population of about 60,000. The crude student/population ratios are inexplicably different (2.77 percent by Chizik and 1.60 percent by Mossinsohn) though they are both higher than the national average (1.17 percent).

a) Operating within an equalitarian society, work in the plant, in whatever capacity, carries no direct remuneration.

b) Almost none of the customary motivational means exist in the kibbutz plant. There is no promotion; very little status remuneration to directors is acknowledged; there is a constant pressure for continuous rotation in all managerial functions; and the hierarchical relations necessarily created within the plant disappear outside of it.

c) The kibbutz is considered the sovereign over the plans and policies of its plant. Its elected directors (the Secretariat) are expected to exercise full authority over the management of the plant and the supreme ruler of its fortunes is the members' assembly.

d) Operating in a voluntary society, the plant's management has neither tools nor authority to effectuate disciplinary or coercive measures against noncooperating member-workers. Likewise, authoritarian managerial methods, as compared to authority based on professional skill and experience, are not only disliked, but also ineffective.[25]

e) The principle of self labor (no hired workers in the plant), when applied, becomes a limitation on the expandability of production.

f) No disciplinary action which manipulates the wages or the employment of the members is conceivable in the kibbutz industrial relations.

The welfare constraints confine the range of the socially acceptable industrial activities, in view of the characteristics of the labor force

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25. The extent of professional versus authoritarian managerial styles was analyzed on a 5-step ordered scale. Average results for the industrial management in the kibbutz were high (3.54), though not so high as in kibbutz agriculture (3.91). See A. Tannenbaum, et al., Hierarchy in Organization (San Francisco, 1974), p. 16 (Chap. 7 of this work is reproduced in vol. 2 of The Kibbutz, pp. 47-61).

involved in all stages of production and of its expectations from its work in industry.

a) Production processes entailing widespread and continuous physical strain are unaccepted.

b) The same applies to particularly monotonous processes.

c) At least some stages of the production must involve technologically challenging activities.

Without due considerations given to these constraints, the plant faces the perils of either losing its unique characteristics or jeopardizing its entire existence, due to the reluctance of its member-workers to go along with its industrial practices.

All these constraints operate under the shadow of the fundamental requirement of a high rate of return for labor.

It seems obvious that by the standard paradigms of microeconomic analysis, all ideological constraints are limiting factors, artificially narrowing the scope of profit maximization. Restrictions created by welfare requirements are handled in a market economy by the wages mechanism. The principle of two-way rotation seems to contradict the advantages of specialization.[26] Democratization of the decision-making procedures through shop-floor assemblies and management-worker committees introduces elements

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26. Rotation in the kibbutz plant is a two-way affair, with both upward and downward movements. It differs from the basically one-way (upward) rotation in market enterprises. The average rotation pattern in the kibbutz industry was 3-4 years (like that in agriculture) though it had a large variance. See U. Leviatan, "The Industrial Revolution in the Kibbutz Movement," Mimeo. (Givat Haviva, 1973 [Hebrew]). In a study on the aged members in industry it was found that of all industrial workers who had served in the past on the Board of Secretariat, 53 percent worked at the time of study as ordinary laborers. Atar, "Gerontological Aspects of the Kibbutz Industry Study," p. 66.

of inefficiency into management.[27] Equalized remuneration violates the principle of distribution according to marginal product. The implementation of kibbutz sovereignty may hinder the exploitation of opportunities for profit making or expansion. Finally, the reluctance to hire labor up to the level where its marginal product equals the ongoing wage rate reduces both the possibility of resolving problems of welfare constraints and the profit-making utilization of the plant.

However, these self-imposed restrictions indicate lack of rationality only if one assumes that the objective function of the kibbutz is identical to that of market enterprises. It is not. The kibbutz plant aims to simultaneously satisfy a wide range of welfare objectives. Satisfaction at work, a sense of involvement, and responsibility are as important objectives of the plant as profitability.[28]

There is a measure of novelty in this approach, with some interesting theoretical implications. The basic model is that of the rather ill-fated urban production cooperative. Probably this is why S. Melman entitled his thought-provoking study, comparing some private and kibbutz plants, "Managerial versus Cooperative Decision Making in Israel."[29]

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27. Measures of democratizing character are also utilized in other industrial organizations (see, for instance, Tannenbaum, et al., Hierarchy in Organization, pp. 53-55), yet in most cases this is done with the pragmatic objective of increasing production. Industrial democracy in the kibbutz aims to promote worker satisfaction as an end in itself.

28. N. Golomb, one of the veteran theorizers on the kibbutz, defined satisfaction of the workers and profitability as the joint objectives of kibbutz industry. His rather utopian outline of the structure of a model plant is an interesting attempt. Golomb, "Social and Organizational Structure of the Industrial Plant in the Kibbutz."

29. In Studies in Comparative International Development 6 (1970-71): 49-59.

The basic analytical difference between the profit-oriented and the kibbutz plant seems to be in the inverse logical sequence of the main variables and the opposite direction of their functional relationships. In a profit-maximizing plant[30] branch and location are simultaneously determined by their direct effect on profitability (in view of prospective marketing opportunities, regarded as a parameter for the entrepreneur). Branch selection has a decisive effect on technology,[31] which, together with marketing considerations, determines size.[32] Technology, together with size and relative price, also determines the structure of factors of production (itself influenced by location), and the method of production.[33] Method of production and size jointly determine the managerial structure and hierarchy. Labor relations and social organization are the results of this sequence, and are brought to optimum through the price mechanism. (There are, of course, additional social and political institutions of great influence, operated by the State, the trade unions, etc., but they are exogenous for our analysis of the course of decision-making.)

The course of decisions in the kibbutz plant is different. The objective function is complex and seeks solution for at least three separate,

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30. The following analysis assumes that both the profit-seeking and the kibbutz plants are "pure" models.

31. J. Woodward in her classical work (Industrial Organization: Theory and Practice [London, 1965]) distinguished between three industrial systems: production in small units; mass production; processing industries. For each of these three systems of industrial production, and even for rather detailed sub-groups within each system, the technological substitutabilities between capital and labor, various management methods, etc., are limited.

32. Availability of funds is not considered an effective constraint.

33. With size and technology given, there seems to be little leeway for substitutability of factors in production proper. It is, however, possible in various supporting activities.

though not necessarily independent, objectives: profitability--providing for the accepted standard of living, satisfaction of members at work--depending on psychological factors; industrial solution to employment problems--result of excess labor of given quality, limitations, and ambitions.

Satisfaction (welfare) and employment considerations determine simultaneously production methods and managerial systems, both of which have a decisive influence on size. Also present are ideological parameters, such as self-labor and considerations with regard to the balance between the plant and the kibbutz. They also affect decisions on size. Managerial and production methods, together with size, determine technology, which jointly with profit considerations and market parameters determines branch. Location is no variable in the kibbutz flow chart.

Charts 1 and 2 below graphically demonstrate the organizational differences between profit-maximizing plants and kibbutz plants. Probably the most significant difference between the two flow charts is the place of "Branch" and "Technology," which are prime determining factors in profit-maximizing plants and derivatives of size and methods of production and management in the kibbutz plant. This fact was eloquently emphasized by Melman who, in describing what he called "managerial mode of organization" wrote: "responsibility for the character of the industrial corporation and its consequences, is assigned to technology"; "Man individually, and in groups, is viewed as the servant of the machine."[34]

In the kibbutz plant, however, the three critical decisions of size, technology, and branch are the result of considerations aiming at a simultaneous solution of: optimum utilization of the available members' labor

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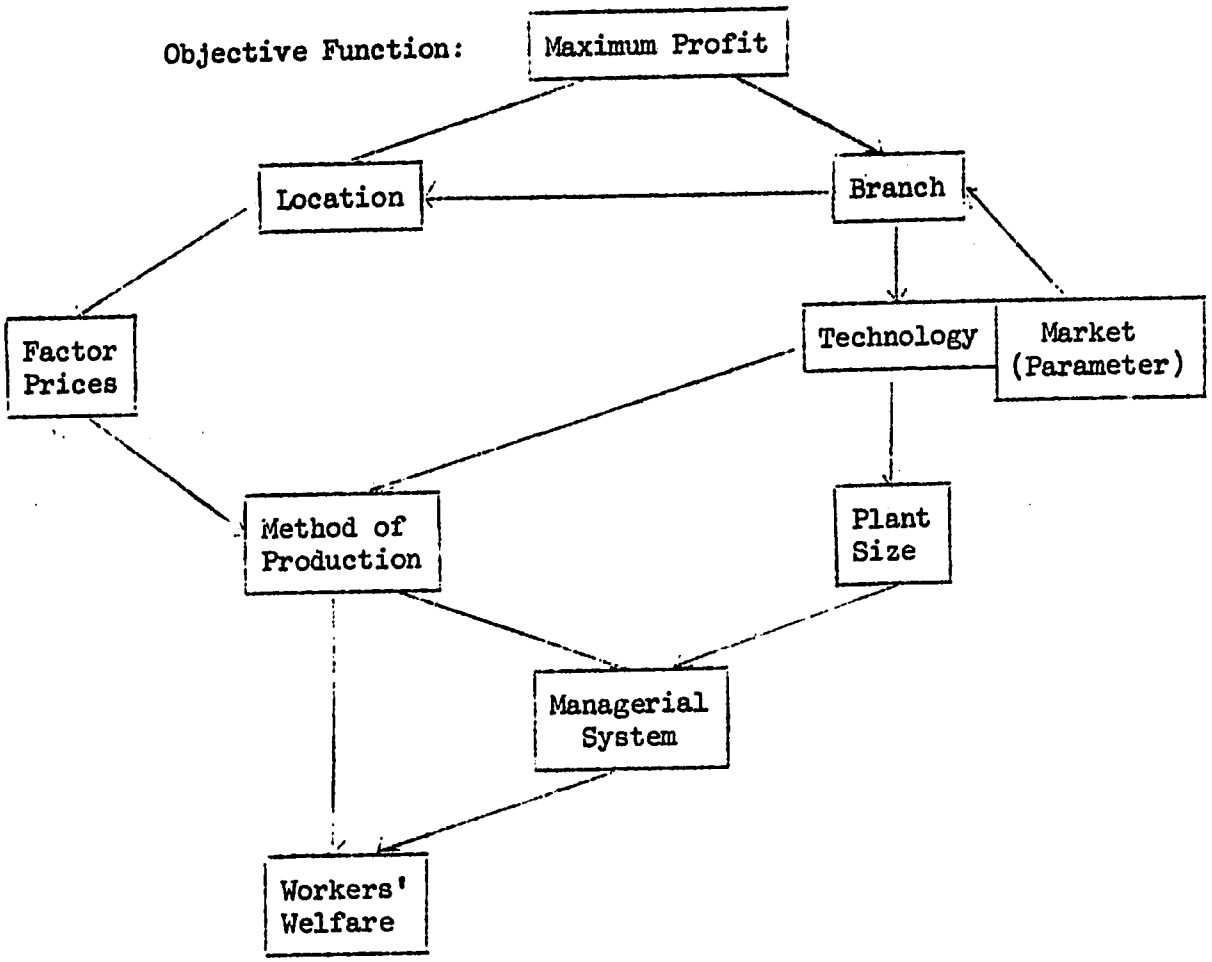
34. "Managerial versus Cooperative Decision Making in Israel," p. 47.

Chart 1

Flow Chart of a Market-Oriented Profit-Maximizing Plant

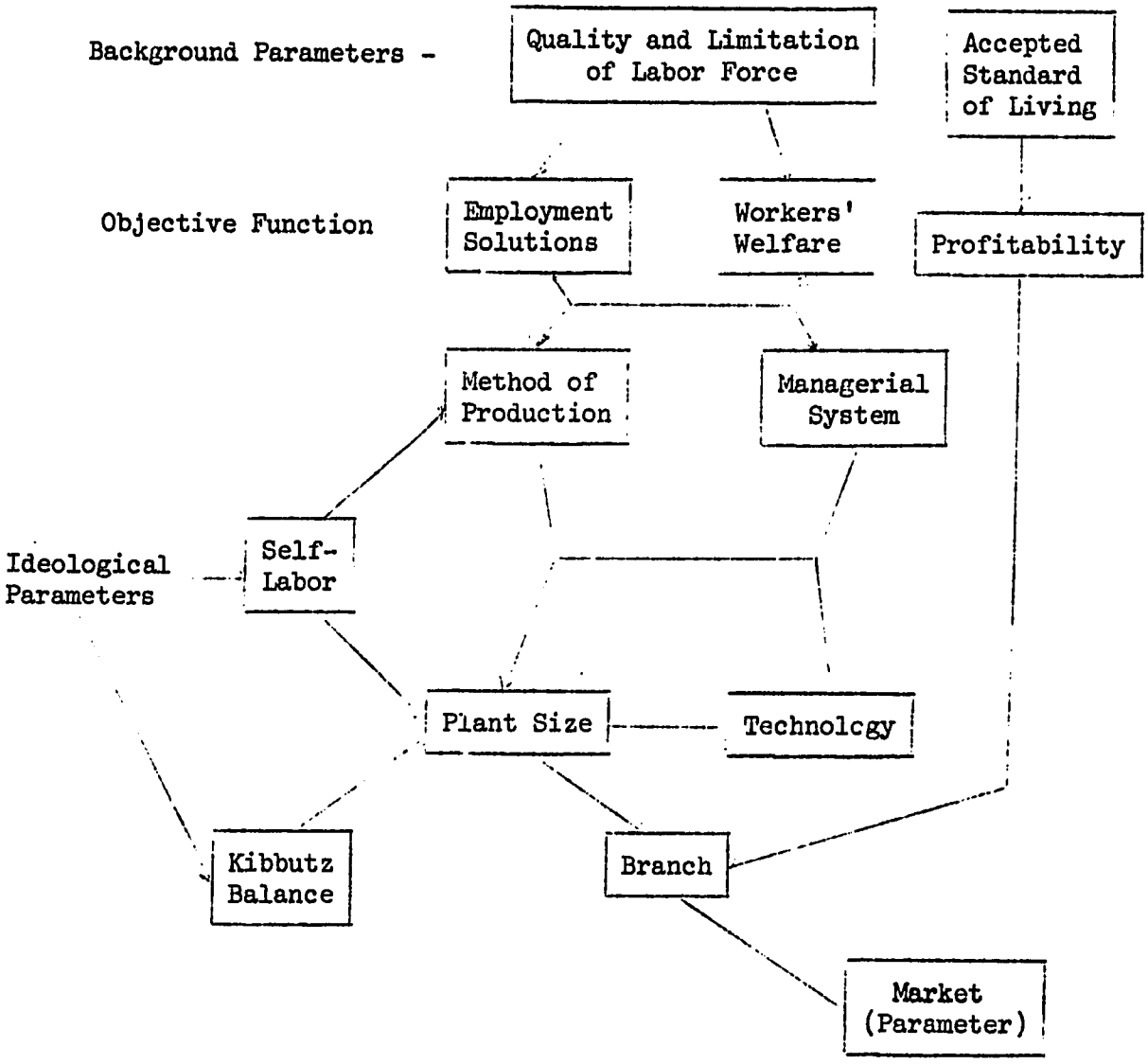



force; maximum employment of nonhierarchical, democratic management methods; maximum possible observation of the ideological constraints of the kibbutz principles; profitability, at least up to the accepted standard.

Welfare and ideological considerations led to the preference for small units, to prevent the plant from outgrowing the kibbutz and also to ease

Chart 2

Flow Chart of a Kibbutz Plant




the application of appropriate managerial methods. On the other hand, kibbutz industry in general operates under increasing returns to scale.[35]

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35. Barkai estimated that with a Cobb Douglas production function, using two inputs, returns to scale were increasing in nine of the ten investigated years. See "An Empirical Analysis of Productivity and Factor Allocation in Kibbutz Farming and Manufacturing," Mimeo., Falk Institute Discussion Paper 748 (Jerusalem, 1974).

The issue of size for new plants seems now settled. In 1974 nearly 80 percent of the plants had 50 or less employees and 93 percent had 100 or less.[36]

Table 1

Distribution of Size of Kibbutz Plants by Employees in 1974

| | Number of Employees | | | | |
|---|---|---|---|---|---|
| | 10 or Less | 11-30 | 31-50 | 51-100 | 100 or More |
| Percent of plants | 27 | 32 | 20 | 14 | 7 |
| Accumulated percentage | 27 | 59 | 79 | 93 | 100 |

Technology employed in most plants is highly capital-intensive and sophisticated machinery substitutes for size in maintaining high productivity.

Branch composition has gone through significant changes during the last thirty years. The changes indicate a pattern of losing contact with agriculture and a movement toward high technology activities. (See Table 2.) The outstanding trends are: a remarkable growth in plastics, rubber, and electronics; a drastic and persistent decline in timber and furniture, a smaller decline in food, textiles, leather, and chemicals; rapid responses

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36. Annual Report of the Interkibbutz Association for Industry for the Year 1974, p. 68. Analyzing figures from 1971 shows a slight tendency of decline in size.

| | Accumulated Percentage of Employees | | | |
|---|---|---|---|---|
| Year | 30 or Less | 50 or Less | 100 or Less | Median |
| 1971 | 49 | 75 | 92 | 30.6 |
| 1972 | 55 | 75 | 92 | 27.2 |
| 1973 | 56 | 76 | 93 | 26.0 |
| 1974 | 59 | 79 | 93 | 24.4 |

Table 2

The Development of Branch Composition in Kibbutz Industry

| Branch | Percentage of Plants | | | |
|---|---|---|---|---|
| | 1946-7 | 1952 | 1963 | 1973 |
| Metal and printing | 36.5 | 33.1 | 34.6 | 30.9 |
| Electronics | -- | -- | 4.6 | 10.2 |
| Timber and furniture | 34.1 | 16.9 | 11.5 | 7.7 |
| Plastics and rubber | -- | -- | 9.2 | 21.5 |
| Food | 11.1 | 18.2 | 13.0 | 8.9 |
| Textile and leather | 7.9 | 8.8 | 6.9 | 5.7 |
| Building material | 2.4 | 8.8 | 5.4 | 4.5 |
| Chemicals | 2.4 | 3.4 | 3.1 | 1.6 |
| Miscellaneous | 5.6 | 10.8 | 11.5 | 10.2 |
| Total | 100.0 | 100.0 | 99.8* | 101.2* |

*Due to rounding.

to temporary increases of demand (food and building material in 1952); a continuous primacy of the metal industry.[37]

Generally, a movement toward sophisticated technology and high capital intensity is clearly observable. Such shifts necessitated large volumes of capital, which were raised without particular difficulties, also as a result of the easy transferability of capital released in agriculture (itself more capital intensive than industry) in forms such as depreciation funds.[38]

This solution of relatively small, highly capital-intensive plants, which pay reasonably great attention to ideological constraints, has also proved economically remunerative. The kibbutz plant is probably more

37. Data from various sources.

38. This interesting point was made by Barkai, "Industrial Revolution in the Kibbutz - Clarifications and Notes."

efficient than its nonkibbutz counterpart.[39] Return to labor is considerably higher than, and to capital--even at the margin--not lower than the ongoing market rates. The difference must be attributed to qualitative factors, such as managerial efficiency, high quality of labor, and stronger motivation of the laborer. It is, therefore, obvious that measures which cater for quality and strengthen motivation are positively correlated with profitability.[40]

The most problematic ideological constraint is the objective to hired labor. In spite of long efforts to eradicate it, 47 percent of all employees in kibbutz industry were hired in 1974. Regarding its effects, it was suggested and statistically supported that member workers-management relations were different in plants with hired labor (less reliance, less considerateness). Likewise, the quality of member labor in plants with hired labor was found to be lower.[41]

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39. Melman found significant differences in a group of six pairs of kibbutz and nonkibbutz plants in six separate branches, in favor of the kibbutz plants. He found that "the cooperative [i.e., kibbutz Y.D.] enterprises showed higher productivity of labor (26 percent), higher productivity of capital (67 and 33 percent), larger net profit per production worker (115 percent) and lower administrative cost (13 percent)." See "Managerial versus Cooperative Decision Making in Israel," p. 52. I am not convinced that the sample and the statistical measures used by Melman justify outright quantitative statements; however, the overall results are also impressive.

40. The variables: (1) "sense of involvement" and entrepreneurial behavior; (2) "motivations"; and (3) quality of labor force are positively correlated to profit indicators ($r = 0.50$, 0.34, and 0.35, respectively). The explaining coefficient of these variables ($R^2$) with profit indicators, using multiple correlation, was 0.40. See Leviatan, "Industrialization and the Kibbutz Values." A comparative study of agricultural cooperatives in Eastern Europe came to similar conclusions. See Y. Don, "Management Patterns and Economic Results in Agricultural Cooperatives," Journal of Rural Cooperation 1 (1973): 21-30.

41. See D. Zamir, "The Effect of Hired Labor on the Kibbutz Plant," Mimeo. (1972 [Hebrew]).

It is also suggested that hired labor is negatively correlated with capital intensiveness and technology, yet it is not stated unequivocally which of the two is the independent variable. In other words, we do not know whether hired labor poses itself as an alternative to capital, or branch selection with rather rigid technology has determined the labor intensiveness of the production function.[42] The correlation of hired labor with profitability has not yet been conclusively stated. Though there are certain indications to a negative coefficient, they can also be interpreted as the results of intervening variables.[43]

There is no doubt that the industrializing experiment of the kibbutz has been successful. It brought about rather harmonic integration of agriculture and industry without changing the basically rural character of the kibbutz. These achievements were accomplished despite the fact that most recommendations of the U.N. experts were violated: inter-village industrial parks based on local provincial towns; developing only branches with clear comparative advantage, mainly agro-industry; limitation of the development efforts to a few singled-out areas. Kibbutz industry has succeeded because it has at its disposal: high standard and strongly motivated manpower; well run democratic institutions; sufficient capital.

This reasoning leads back to the U.N. experts' recommendation that rural industrialization be viewed as an integral part of a comprehensive

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42. The second hypothesis is supported by the very great difference between branches with regard to their hired labor ratio. It is the highest in timber and furniture (74.5 percent), in building materials and quarries (73.4 percent), and in food (71.5 percent). It is the lowest in plastics and rubber (16.4 percent), in electronics (20.5 percent), and in chemicals (20.6 percent). See Annual Report of the Interkibbutz Association for Industry for the Year 1974, p. 66.

43. See Leviatan, "Industrialization and the Kibbutz Values," pp. 18-19.

development process which also includes ingredients, such as land reform and appropriate legislation. In this respect the kibbutz model is in harmony with recommended patterns. Industry reached the kibbutz in most cases after agricultural and social consolidation, and after it had a satisfactory social and physical infrastructure.

What can be learned from the industrializing experience of the kibbutz? The imitation of its model would certainly lead to a disaster. The kibbutz is still a fundamentally utopian and thus somewhat out of the ordinary society. Its equalitarianism and its high quality, rather homogeneous population are also unique phenomena, incapable of being imitated even in Israel.

Nevertheless, we may probably suggest that the experience gained may be utilizable in spheres such as: experimentation with the adaptation of small- and medium-sized plants to branches; experimentation in different fashions of integration between agricultural and industrial activities; experimentation in the democratization of management methods.