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*Agric. extension*

המרכז למחקר בכלכלה חקלאית

The CENTER for AGRICULTURAL ECONOMIC RESEARCH

*Hebrew university*

Working Paper 6903

THE ECONOMICS OF THE AGRICULTURAL EXTENSION  
SERVICE\*

by

Yoav Kislev

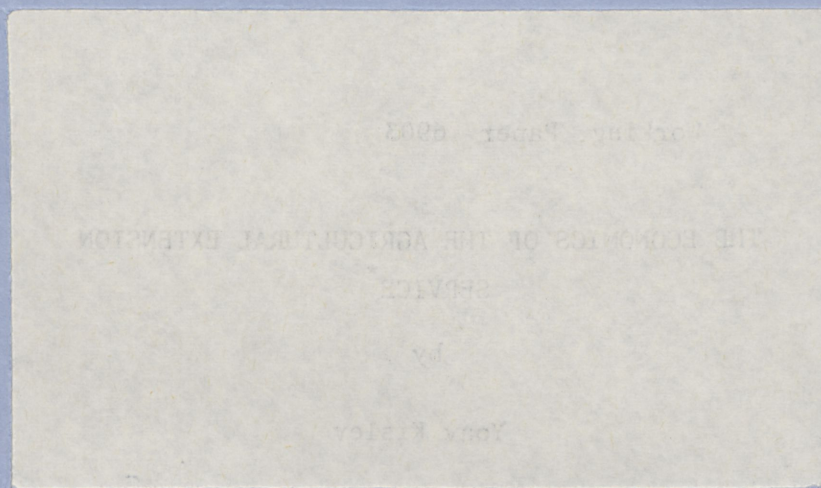
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*WITHDRAWN*





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מאמרי המחקר בסידרה זו הם דווח ראשוני לדיון וקבלת הערות ואין לצטטם ללא רשות המחברים. הדעות המובעות בהם אינן משקפות את דעות המרכז למחקר בכלכלה חקלאית.



THE CENTER FOR AGRICULTURAL ECONOMIC RESEARCH

Working Paper 6903

THE ECONOMICS OF THE AGRICULTURAL EXTENSION  
SERVICE\*

by

Yoav Kislev

Rehovot, November, 1969 .

The agricultural extension service is a system that collects, sorts, and sometimes even produces, knowledge. The knowledge accumulated by the service is redistributed to farmers. The accumulation and distribution of knowledge require substantial expenditures, diverting economic resources from other uses, while the knowledge thus transferred is of economic value as it raises productivity. Like the marketing industry, which transfers products and factors from producers to buyers, the extension service acquires knowledge from various sources and passes it on to the producers. It's main task is the transmission of information, but it also generates and produces knowledge and adds to the knowledge that passes through it. An examination of the extension services raises a number of questions. The service is usually run as a single economic and administrative unit. Why this mode of operation, rather than a system of many, small, competing extension firms. The service is usually provided by the government. Why? Why is it supplied free? Since the service is public and free, and its size is not determined by the market, how should its optimum size be determined? How should one look at the particularly complex and involved relationship between extension and research work? Can the idea and structure (and the success) of the agricultural extension service be copied by other sectors of the economy, or is the phenomenon specific to agriculture?

Immediate answers cannot be given to all the questions raised here nor to the many others that could be raised. The first stage in searching for answers to these questions should be the construction of a conceptual, theoretical framework that will show the basic activities of the extension service. This is the object of the present essay. The social, political, psychological and educational aspects of the operation of the extension service are varied and interesting, but this survey will limit itself to sketching the economic profile of the extension service. In accordance with the principle of division of labor, we leave the non-economic aspects of the service to experts in the relevant fields.

A special effort has been made to limit the use of technical terms and to explain those that had to be introduced. (A short technical discussion is relegated to the Appendix.) It is, therefore, hoped that the survey will be comprehensible to readers who are not economists.

A scientific analysis, in economics as elsewhere, is complete only with the quantification of the important magnitudes. Our survey is devoted to the construction of the conceptual framework of the subject. Quantification involves problems of measurement, some of them extremely difficult, that we could not treat here. Some empirical findings, showing the first steps taken in the direction of quantification, will be presented at the end of the survey. These will demonstrate and emphasize the obstacles to the empirical study of the problems we examine here.

#### 1. Operation of the Extension Service

The extension service employs agricultural experts, most of them with higher professional training, and runs special refresher courses and retraining programs. Extension workers, on their visits to farms, observe successful or unsuccessful production methods and report on these to meetings of the service for analysis and passing on to other workers. New knowledge

is supplied to the service by research institutions and universities. To some extent, the service produces knowledge through field experiments and observations. Figure 1 attempts to show graphically the operations of the extension service.

On examining Figure 1, one discovers the types of expenses incurred in the process of collecting knowledge. The system pays for the knowledge it obtains from educational institutions through wages and salaries. Connections with research institutions, retraining of field workers and similar activities have their price tag too. The knowledge collected on the farms is partly a by-product of the extension and distribution operations. Processing the accumulated information, selecting the correct and important from the inaccurate and trivial, and preparing new knowledge for distribution, all require costly efforts.

The aspect of the operation of the extension system is generally simple - its structure can be estimated easily. A well organized extension service will keep records in which one can recognize easily most of the items mentioned. Estimating the cost of collecting knowledge on the farms is particularly difficult and this item does not usually appear separately in the service accounts.

The cost of the knowledge collected by the system varies from source to source. The system pays the whole cost of knowledge produced in the service. If farmers are willing to cooperate, they, of course, share the costs. The system pays wages, as previously mentioned, for the knowledge acquired by extension workers as students. The knowledge produced in research institutions is obtainable free, the only costs being involved is the absorption of this knowledge by the system, just as the only cost incurred by a housewife receiving free goods is the cost of going to the market. We shall return to these points in the examination of the relationship between extension and research institutions.

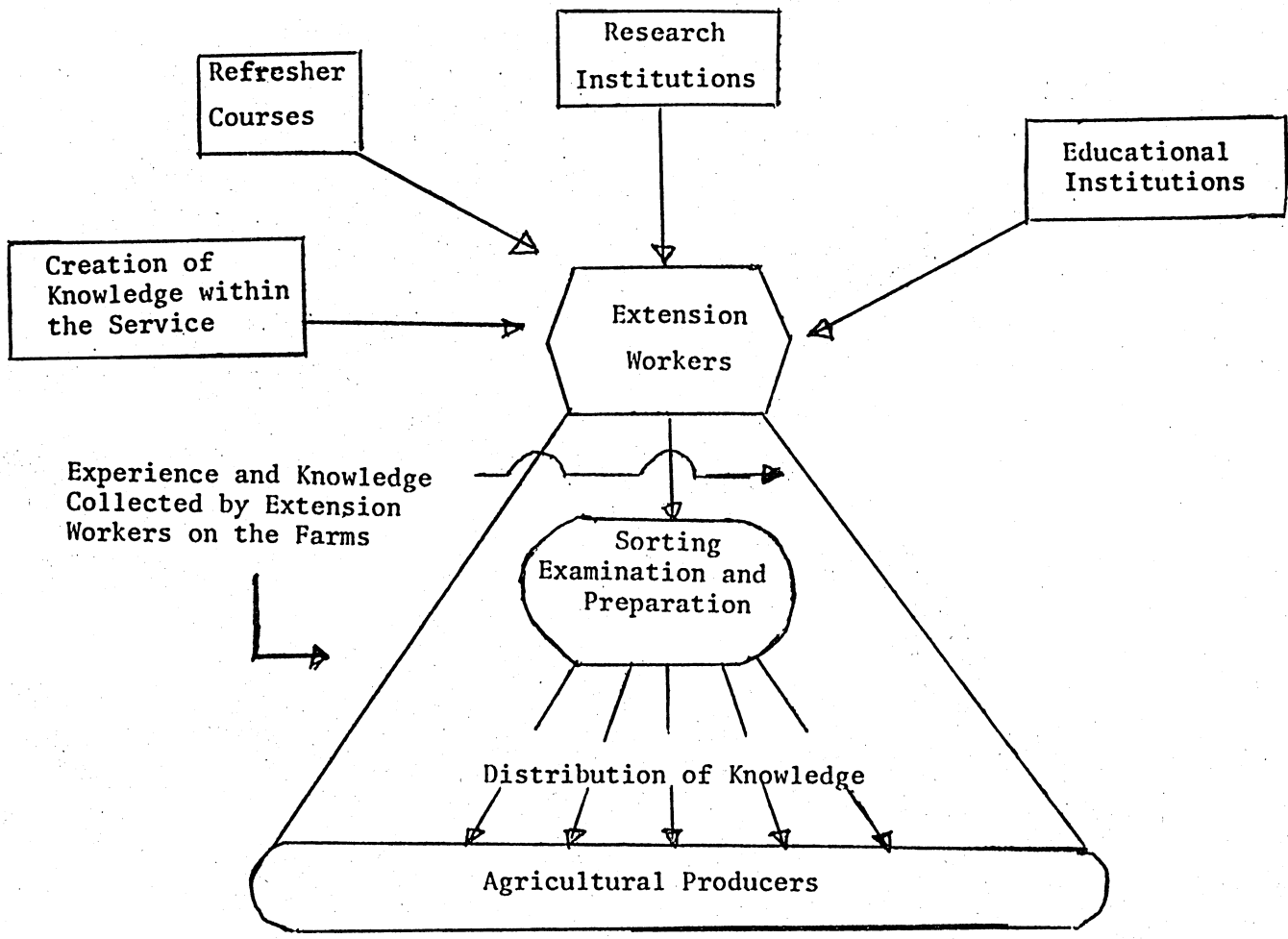


Fig. 1 : Concentration and Distribution of Knowledge.



The knowledge thus collected is distributed in many ways, the most important usually being advisory visits to farms. Other methods include field demonstrations, printed publications, radio and television. An important feature of the operation of the extension system is the fact that knowledge supplied to one farmer is in part passed on to others either verbally or by example.

## 2. The Contribution of the Extension Service

A distinction should be made between the contribution of the extension service as seen by the individual farmer, and the contribution to the agricultural sector and to the national economy. The difference between the three is considerable, and the individual farmer usually fails to realize the effect of the system on the whole sector. This fact plays an important part in the following discussion.

### The contribution to the individual farm

The knowledge supplied by the extension service is a factor of production on the farm, and as is the case with other factors, increasing it has two effects: (a) the substitution effect - some kinds of information enable the farmer to save on other factors of production; (b) the expansion effect - having more of one factor enables the farmer to expand production and use more of other factors. Sometimes one effect is stronger and more obvious than the other, but usually both are present.

The true contribution of the knowledge supplied by the extension service is the net contribution after deducting the cost incurred by changes in factor composition and expansion of production. One could calculate this (if the service operated on only a single farm or on a small group of farms) by subtracting the cost of hiring additional or new factors from the value of the additional production. It is very important to emphasize that in this way the total contribution of new knowledge is estimated, while the contribution of the extension service is mostly in the transfer of knowledge.

Without the extension service much less knowledge would be available to farmers, and its flow would be at a lower rate. In finding this net contribution of enhancing and speeding the transfer of knowledge lies one of the greatest obstacles to the quantitative estimation of the contribution of the extension service.

As the knowledge reaching the farm accumulates and affects productivity in subsequent years, its contribution cannot be calculated by observing the immediate rise in productivity alone. The contribution over the whole period of time in which the new knowledge will be effective has to be taken into account. On the other hand, knowledge becomes at least partly obsolete as new knowledge becomes available.<sup>(1)</sup>

The contribution of the extension system is not confined to raising farm productivity. Agricultural producers, particularly in modern developed economies, are not indifferent to knowledge, and invest economic resources such as time, energy and travel expenses in seeking it actively. The existence of the extension service aids this process and here also one recognizes the two effects - substitution and expansion. The supply of knowledge is, on the one hand, a substitute for individual efforts but, on the other, it also indicates where additional knowledge can best be found and so increases the efforts made by some farmers.

#### The agricultural sector

We have already stated that the extension service operates on a large number of farms in the agricultural sector and that its influence also reaches many of those producers not directly reached. If the system were to operate on only a few farms, its effect would be to raise the productivity of those farms without the additional small quantities supplied to the markets affecting prices. However, as the service operates through the whole sector, the

quantities reaching the markets increase substantially or, more exactly, the supply of agricultural products increases. This causes a fall in prices (see Figure 2; for the sake of simplicity we shall consider agriculture as the producer of a single product).

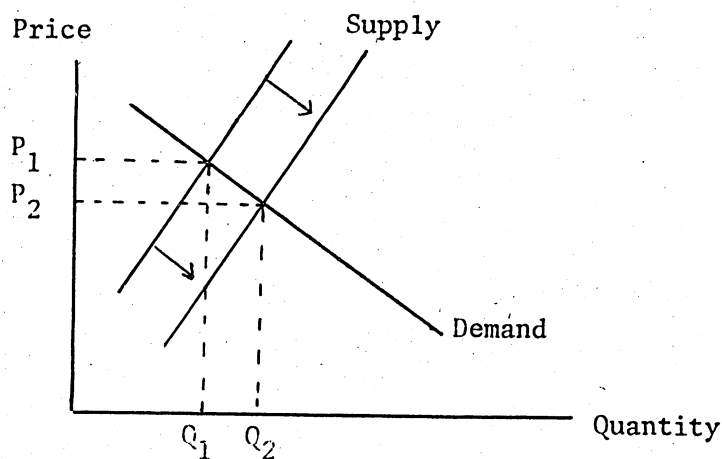


Fig. 2 : The Effect of the New Knowledge on the Market for the Agricultural Product,

When yields are increased, the farmer's income raises but when the overall supply of agricultural products increases, the reduction in prices can be so severe as to even reduce farmers' incomes. Raising productivity increases efficiency and expands production - a blessing from the point of view of the national economy. The additional welfare stemming from this added product is divided between the producers and the consumers of agricultural products. The latter receive larger quantities at lower prices, the former increase their income. However, it might happen - and definitely not only in theory - that farmers' incomes will even decline. In these cases, not only are the fruits of the additional



knowledge shared by consumers and producers, but the new knowledge will cause a redistribution of income away from farmers and to consumers. This can be put slightly differently: had the prices of agricultural products not been affected at all, the only ones to gain would have been the farmers; since prices decline, there is a process of redistribution of income. A graphical analysis of these points is given in the Appendix.

From this one would conclude that it may not be in the interest of the farm sector to expand the creation and distribution of knowledge. In some cases, this sector may even want to limit it. Such suggestions have been made, particularly in the United States. The usual explanation is that since knowledge expands production and reduces prices and farm income, in developed economies it causes the contraction of the farm sector and the migration of farmers to urban areas. This is part of the process of modernization and industrialization and is generally welcomed. However, such sectorial changes are accompanied by a drastic reduction of the incomes of those who are forced to change their occupations and from this point of view, the economic progress of the whole society is at the expense of the few - the farmers in our case. Slowing down this process will make the transition easier and will reduce the difficulties arising from the structural changes that accompany modernization. Of course, the situation may be very different in the developing countries which are impatiently waiting for any sign of an increase in production and material income and where additional production will be welcomed on the markets. However, even in these countries, unbalanced expansion of production may drastically reduce prices of some products and endanger the process of development.

Suggestions to reduce the creation and distribution of knowledge do not come from the farm sector but from outside it. Farmers' organizations usually try to restrict production in a more direct way and are not willing to forego the benefits of additional knowledge, <sup>(2)</sup>

As we shall see later, it is not plausible that individual farmers will reduce the absorption of new knowledge in order to slow the expansion of production, unless led to do so by an enforcing organization. A "buyers boycott" of the services of research and extension need not be anticipated.

### 3. The Demand for Extension Services

It is convenient to view the operation of extension as being conducted in a market for this service. In this market, the supply is determined by the extension service and more generally, by the public agencies financing it, while the demand is a function of the willingness and desire on the part of farmers to absorb new knowledge.

The extension service passes on information to the agricultural producers by visits, by issuing pamphlets, by radio broadcasts, and by other means. The absorption of new knowledge is not effortless. The farmer has to spend time talking to the field worker, listening to the radio, reading the instructions, going to model farms, or in other ways. The adoption of a new method probably also requires special psychological efforts. Since field workers also collect information on the farms, the farmer benefits from the service only if he contributes to the general pool, sometimes without seeing any direct or immediate benefit. This effort required in the absorption of new knowledge (over and above the cost of new inputs) is the cost to the farmer of acquiring new knowledge. The lower this cost, the more inclined will the farmer be to acquire new knowledge.

Like other products, extension has a quantity component and a quality component. The conceptual problems here are complex. The quantity of knowledge is difficult to define, let alone measure. However, we often speak of more or less knowledge. Thus, vague as the term is, we shall avoid definition and speak of the quantity of knowledge passed on by the service and the quantity created by it.

An important aspect of the quality of the extension service is the probability that the information is correct (think of the analogy with your doctor). An additional aspect of the quality is the amount of information that the service can transmit per action, roughly speaking, the amount the farmer receives per hour's visit by an extension worker, per five minutes of viewing television, etc.

The higher the quality of the extension service, the higher the demand for it. However, the demand also depends on the farmer himself. A progressive and knowledgeable farmer will find very little new in extension service pamphlets and little to learn from field workers. The time of such a farmer is also usually more expensive than that of his less progressive colleagues, so that he may view extension as supplying a low quality service at high cost, while they will judge the service more favorably. Thus, the greater the knowledge of the farmer, the less his demand for the service - unless the quality is improved.

It will be recalled that the contribution of the extension service should be viewed at least partly as an investment since it raises productivity in future periods. From the point of view of the receiving farmer, this is an investment in his own human capital. It follows, and experience verifies this, that younger farmers will show a greater demand for extension and new knowledge than will their elder neighbors.

Another very important factor of demand is the degree of dynamism of the farming sector. In a traditional agriculture [7] there is little change and the farmer will face fewer new problems than he would in a dynamic ever-changing sector. One notes that extension itself increases the dynamism of the farming sector and thus acts to expand the demand for its own activities. Generally, there is a high correlation between the degree of modernization and knowledge of an agricultural sector and its dynamism. This correlation may conceal the reduction in demand for the extension service which is due to the higher level of knowledge of modern farmers.



Let us return to the effect of the service on the whole sector. The reduction in prices due to the higher productivity affects first those farmers who did not acquire the new knowledge and did not increase the efficiency of their operations. To reduce the harm to his income such a farmer must then acquire this new knowledge, improving his relative position while contributing to a still further reduction in prices. Since an individual farmer has a negligible effect on the industry as a whole, while ignoring new knowledge means immediate and some times severe harm, one should not expect that farmers will voluntarily reduce their demand for new knowledge.

#### 4. Cooperation of the Producer with the Extension Service

We have already mentioned that farmers' experience is the source of much of the information accumulated by the service. The knowledge created within the service is usually created in cooperation with farmers who allow and participate in experiments made on their land. There are two reasons for a farmer's trying to limit the amount of information that he supplies to the service: (a) cooperation may be costly and bothersome; (b) by supplying information he worsens his relative position in the industry. On the other hand there are some factors encouraging active cooperation. The supplier of knowledge acquires social status, something for which people are generally willing to forego income, and there is the feeling of cooperation - today I supply information, tomorrow I shall be on the receiving end. Often the farmer sells his information in exchange for a visit by the field worker. <sup>(3)</sup>

Things are very different in the industrial sector. There the number of producers is substantially smaller and the weight of the individual producer much larger. A great part of the knowledge is specific to the industrial producer and he avoids cooperation so as not to contribute to the strength of his competitors. One often hears of the spirit of cooperation in the rural community. This, together with the fact that public

agencies often favor agriculture, may perhaps be accepted as an explanation for the prevalence of extension in agriculture and its absence in manufacturing. Yet, the economic factors which inhibit cooperation may dominate all other reasons for the present industrial distribution of extension activities.

5. The Creation of Knowledge and the Connection with the Research System.

The fact that the extension service not only distributes knowledge, but also creates it in field experiments and systematic observations, raises the question of the optimum allocation of efforts between creation and transmission of knowledge and of the division of labor between the extension and research organizations.

The creation of knowledge is a costly operation, but it increases the field worker's understanding of the problems he faces, his status and his satisfaction with his job. The extension service is closer to the field and to its everyday problems than is the research institution. The cooperation of the farmers enables immediate experimentation to tackle minor but important problems without the necessity for comprehensive research programs as may be the case in research institutions.

The research organization, on the other hand, is better equipped with instruments and knowledge. It is also likely that the knowledge from this system is more reliable than that created on the farm, which may be biased by specific local conditions.

While the service meets the full cost of knowledge created in the extension system, the knowledge it receives from the research organization is free. This may be one of the reasons for conflict between the two organizations.

Moreover, the research organizations are part of the international system producing and distributing knowledge which has developed its own standards, according to which the work of a researcher is judged by his contribution to the knowledge of the profession, mostly via publication in international journals. This method, being operated by human beings, is not perfect but there is no better indication of the scientific value of a man's work. Hence, promotion in research organizations is generally based on the amount and quality of published work. This situation creates a genuine conflict of interests between the extension worker, looking for answers to problems raised in the field today, and the research worker trying to make scientific discoveries which may seem to be rather remote from practical agriculture. This conflict is only intensified if both receive their salary from the same public coffers [5].

In fact, it seems that there are kinds of knowledge in whose creation the extension service holds a relative advantage and others in which the superiority of the research organization is unchallenged. The difficulties lie, of course, in the no man's land where neither system has an obvious advantage. It may well be that charging the extension service for knowledge that it now receives free from the research organizations will smooth relations between the two organizations. Government agencies purchase knowledge from engineering and academic institutions and there is no a priori reason why such an arrangement should not be successful in agriculture.

#### 6. The Efficiency of the Extension System as a Public Service

Efficiency has many aspects: the administrative efficiency of the service; the optimum spatial distribution of field workers; the optimum allocation of efforts between farm visits, demonstration days, publication of seasonal



instructions, etc. We shall assume that these technical problems are solved by the service in the best way [1] and concentrate our discussion on a limited number of aspects that are more interesting from the point of view of the economic structure of the extension service.

An efficient extension service will utilize the field worker for maximum effect. Each worker will be allotted a certain region in which he will work with some of the farmers and the influence of his activities will spread to other farmers in the region who do not meet him directly. Every field worker will thus have an area of influence. When a new worker joins the service, his influence (the effect of his work) will be smaller than that of those already established for two reasons: (a) the established workers will have been sent to the best locations; (b) his entering the service will reduce the areas of influence of the existing workers who will have to make room for the newcomer. In calculating the contribution of a new worker one has to make sure that these negative elements are correctly taken into account. Thus, the marginal contribution of field workers falls with the increase in their number. This is common in economics; field workers are, so to speak, a factor of production in the extension service, and augmenting the input of this factor reduces its marginal contribution.

There is certainly a range in which the marginal contribution of field workers does not fall, and may even rise. When the service is small the number of workers is limited and they are isolated from each other, so that the processing and dissemination of information within the service is limited and overhead expenses are divided among a small number of workers. In these circumstances, a new worker does not invade the territory of existing workers and increasing the number of workers will increase their marginal contribution. Such an extension service is too small. If the service should operate at all, it should be larger than the size of which the marginal contribution of field workers is still rising.

The optimum size of the extension service is that at which the number of workers, or the amount of any other factor, is such that their marginal contribution equals the cost associated with their employment.

We can now try to answer some of the questions raised at the beginning of our discussion such as the advantage of a large organization over a number of small firms and the question of a public or private service. These questions are loaded with social and political implications, but we shall limit our discussion to their economic aspects and the criterion of efficiency will play a central role.

It is not necessary for the extension service to be a single economic and administrative unit and a large scale of operation has its disadvantages [8, p. 156]. The extension service could operate in a manner similar to rural medicine or the veterinary service, which are usually run by individuals and not by large organizations. There is a great similarity between extension and medical services as both are consulting services and supply information of value, but there are also some important differences: (a) the physician can unambiguously identify the receiver of his services and collect his dues (imitating the treatment given by the doctor to neighbor is a risky and uncommon practice), but since the knowledge supplied by the extension service spreads, identification of all the beneficiaries is practically impossible; (b) the medical service is based to a much lesser degree than the extension service on knowledge accumulated by the physicians in their work. The smaller the proportion of the total knowledge supplied by the service that is acquired in educational institutions, the greater is the advantage of a centralized service in concentrating and sorting the accumulated information.

Neither is it necessary for the service to be public and run by the government. It could conceivably be a private, profit-motivated organization collecting payments from the receivers of the service. The profits of such an enterprise will be maximized when the marginal revenue gained by employing an additional field worker equals the marginal cost entailed in his employment. The extension service will collect payment only from the farmers who are in direct contact with the service, in spite of the fact that the new knowledge spreads to others too. Problems of social justice and distribution aside, a private profit-oriented organization will be too small from the point of view of economic efficiency, its size will be determined by the revenue it can collect while the benefits of its operation will be greater than indicated by this criterion. In other words, if such an organization is forced to employ another field worker, his contribution in terms of added productivity in the agricultural sector will be larger than the added revenue he will bring to the employing service. Given, for reasons discussed earlier, that a single organization is preferable to a service composed of numerous small units, a single private enterprise will, in fact be a monopoly; as such it will be even farther from its (socially) optimum size.

Both a private and a public service could finance their operation by collecting payments. (A public service, if subsidized, could collect at least part of the cost of its operation.) However, we have already seen that it is difficult to identify the beneficiaries and having to pay will probably reduce the willingness of the farmer to share the new knowledge that he has received with his neighbors, so reducing the effectiveness of the service.

A public service could also be financed by taxes levied on the farm sector as a whole in a manner unrelated to the amount of service received. The level of the tax can be determined so that it will be exactly sufficient to cover the cost of a service of optimum size. However, to the extent that



the main beneficiaries from the new knowledge are the consumers and not the farmers (apart from their role as consumers) it does not seem just to require that the farmers alone should shoulder the burden of the service.<sup>(5)</sup>

The last argument, for a free extension service, applies only to products marketed at home. Applying the same argument to farm products produced for export means that the residents of the country are required to pay for the benefits accruing to foreigners. It may be that support for export is warranted by various economic arguments, but these should not be confused with arguments for public subsidies to a sector producing for the home market.

The very disadvantages of a private extension service in agriculture can become advantages for such a mode of organization in other industries, particularly manufacturing, where it is easier to identify the receiver of the service. A small, private firm is easier to trust with secrets than a large organization which also works for competitors. Nevertheless, the benefits of the extension service are not confined to the firm receiving them directly - engineers go from one company to another, and, in manufacturing too, the increased supply benefits consumers. Therefore, it can happen here too that a private service is economically too small. There are many ways by which the service can be supported and increased: one of them might be to lower training costs by subsidizing educational institutions as engineers are probably the most important factor of production in consulting firms.

#### 7. Some Empirical Results

As examples of the empirical methods tried so far, we shall present the findings of two students of the subject: Peterson [6] and Griliches [4]. They both recognized the difference between the systems producing and distributing knowledge, but did not succeed in separating their economic effects.<sup>(6)</sup> They both studied American data. Among Western countries, the

United States is certainly the smallest importer of agricultural knowledge and this enabled them to relate the contribution of research and extension to the efforts of these systems in that country.

Peterson concentrated on the poultry industry. He reports, for example, that in 1960 public spending on research in this branch amounted to 7.7 million dollars. It is estimated that private industry spent an additional 8.3 million dollars. Costs of extension are estimated as 2.4 million dollars and the total outlay on research and extension in poultry in 1960 is therefore estimated to be 18.4 million dollars.

In order not to exaggerate the contribution of research and extension, Peterson assumes that the only effect of the additional knowledge was to raise nutrition efficiency, the latter being defined as the amount of feed per unit of product. For laying birds this rose by 20% between 1930-33 and 1955-60. The value of this rise in efficiency is estimated at 494 million dollars. Up to the mid 1930's the expenditure on research and extension was higher than their contribution in raising nutrition efficiency. This is therefore a case of continuous investment in research and extension with their contribution outweighing costs only in the later period. Peterson calculated that this process of investment yielded an internal rate of return of 21%.

Griliches' study exemplifies a different approach, that of the production function. He examined an average farm in each state of the U.S. Each such farm employs a certain "basket" of inputs: labor, land, fertilizer and others. These baskets, of course, differ from state to state. It is possible, and often the practice in econometrics, to estimate the contribution of each input to production and thus "explain" the product. Griliches added two extra items to the usual basket of inputs: the average level of schooling of the farm labor force in the state and the average public expenditure per farm on research and extension in each state. In this way he tried to separate the contributions to the product of each of the three sources:

(a) the regular physical inputs; (b) schooling; (c) research and extension. One should note that while Peterson sees research and extension expenditure as investment, Griliches sees it as a flow of inputs. He found that on the average for the U.S., increasing annual expenditure on research and extension by one dollar will raise annual farm production by \$13. This is a fantastic rate, and Griliches reduces it by assuming that private companies invest in research a sum similar to that spent by the federal and state governments. He also assumes that since the U.S. suffers from a surplus in farm products, the additional product is worth only half its market value. He thus reduces the benefit cost ratio to 3 which is still extremely high.

Griliches' study has the advantage of examining the effect of research and extension on the whole agricultural sector; this is at the cost of assuming that one can regard investment in research and extension in different states as different non-interacting projects; for example, that there is no flow of knowledge between states. There are also many differences between the agricultures of the various states, and there is always a danger in works of this kind that one does not measure what one is trying to measure.

Peterson's findings, of an internal rate of return of 21%, are among the most modest estimations of the contribution of research. Griliches found a rate of return of several hundred per cent. It may be that this wide difference reflects the difficulties of optimum allocation of funds in the unpredictable area of research and extension. However, it probably also reflects the difficulties of the empirical study of these problems. Due to measurement difficulties, the work is so biased with the personal judgement of the researcher that such divergent findings are not surprising. In any event, the reported results indicate rather high rates of returns on investment in research and development. This is usually accepted. Efforts

have even been made to find optimum levels of such investment, optimum in the sense that they will avoid the harm caused to farmers by too rapid a process of technological progress [2, 9].

#### 8. Concluding Remarks

The importance of technological progress in agriculture needs no elaboration. The agricultural extension system can, and often does, play an important role in encouraging this progress by fulfilling two main functions: spreading technical knowledge and directing farmers towards a modern outlook. The latter function would tempt one to classify the purpose of the service as educational. The extension service has a smaller role in shaping farmers' attitudes in a modern agricultural sector than it does in developing countries.

The present analysis has concentrated on the extension service mainly as a passer on of information. Application of the discussion to developing agriculture may require the completion of the analysis of the educational aspects of the work of the system.

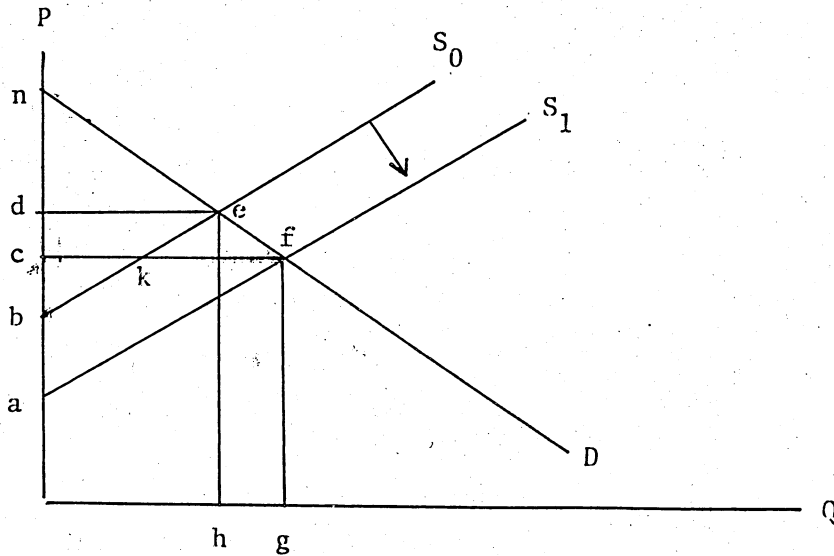
Our analysis indicates three cardinal features that dominate the mode of operation of the agricultural extension service: (a) it operates in an atomistic industry, composed of a large number of small producers; (b) the affect of its operation is not confined to those directly served; (c) much of the information that passes through the service is due to farmers' experience which the system accumulates and redistributes. The conclusions drawn in the course of the discussion are to a large extent based on these three features.

A word of caution with regard to these conclusions is in order. One often finds that in economic discussions the positive, descriptive

analysis borders on justification of the status-quo. Our work is not an exception to this rule, which is at least in part a reflection of the fact that many of the existing institutional settings are not arbitrary arrangements but natural consequences of social and economic structures. The purpose of this work was not, however, to judge the existing extension systems but to contribute toward the construction of a conceptual basis which will enable further study, discussion and analysis--especially empirical--of these subjects.



Appendix: The distribution of the effect of additional knowledge



- ben - total surplus, consumers' plus producers', before the distribution of knowledge;
- afn - total surplus after the distribution of knowledge;
- abef - surplus added by knowledge;
- cdef - surplus added to consumers;
- acf - bde-surplus added to producers (may be negative);
- cked - transfer of income from farm to consumer sector;
- kef - addition to consumer surplus due to increase in efficiency.

F O O T N O T E S

- (\* I am indebted to Sara Molcho for drawing my attention to this subject. A. Gilshon and E. Berglas read a draft of the paper and made many valuable comments. The remaining shortcomings are my own. This work was financed, in part, by a grant from the United States Department of Agriculture under P.L. 480.
- (1 The "service life" of an item of information is limited for two reasons: (a) production conditions may change so as to make some information worthless; (b) migration and retirement of farmers make necessary the renewal of information. I owe the last point to A. Gilshon, who also pointed out the importance of farmers' age in the demand for the service.
- (2 In this they follow the optimum policy of a monopolist. However, farm organizations are usually not real monopolists but more loosely-operated control agencies which only indirectly affect the supply of agricultural products and therefore have to choose the means of control.
- (3 It seems that the social and institutional setting of Israeli agriculture creates a climate in which cooperation with the service could be fastered. This is particularly evident in the kibbutz (large-scale communal settlement) where the connection between the social status of the member and the profits he makes is smaller than in other forms of organization and where cooperative ideology predominates. It is even common for members of a kibbutz to report on their experience in the farmers' periodicals.
- (4 Kibbutzim (pl. of kibbutz) draw approximately a third of their income from industry--mostly small or medium-sized enterprises. Yet despite the manifest success of the agricultural extension service in this sector, efforts to establish cooperation and extension in manufacturing among the kibbutzim have almost entirely failed.

- (5) Other inputs, fertilizers for example, also raise productivity and supply. It may seem that, by the same reasoning, they should also be financed by the consumers. However, these inputs are purchased on the market, while the supply of the extension service is determined by the government. Even if one does not favor the abolition of the market mechanism, one cannot escape the problem of the burden on financing public services.
- (6) Fishelson [3] combined extension with agricultural vocational education, viewing these and schooling as investments in human capital.

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