PERCEPTIONS OF AGRICULTURAL EXTENSION AGENTS AS TO INCREASING AGRICULTURAL MECHANIZATION IN THE PROVINCE OF CHEFCHAOUEN, MOROCCO

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I want to dedicate this with too much love to my wife Saida, my two daughters: Hajjar and Hind, and my son Bakr As-siddique

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CHAPTER I

INTRODUCTION

Morocco is located in the western edge of the Mediterranean region. It is separated from Europe only by the strait of Gibraltar but bound by cultural, religious, and other ties to neighboring areas in North Africa. The Atlantic Ocean constitutes its western boundary while the Mediterranean Sea constitutes its northern boundary. To the east lies Algeria and to the South lies Mauritania.

As in the case of many developing countries, the agricultural sector continues to play an important role in Morocco's economy. Therefore, any increase in agricultural production is not only the main factor in motivating the rural development, but also a reliable source of employment and growth. In fact, it is an absolute requirement for the overall economic development.

Up to the present, the government of Morocco has been concentrating its efforts primarily on developing the irrigated zones. The projections of the supply and demand for foodstuff for the next decades indicate a shortage of cereals, vegetable oil, dairy products, and meat. In order to overcome such shortages, the international agricultural agencies and many agricultural expert suggest that a lot of

emphasis ought to be placed on the development of non-irrigated areas. According to Christian (1) the reasons behind these suggestions were 1] government studies indicated that rainfed agricultural production could be increased considerably if certain constraints were overcome, including the land tenure problem, inefficient farming practices, insufficient use of agricultural credit and inputs, and inadequate infrastructure (roads, water supply, etc). 2] Compared to large-scale irrigation projects, rainfed projects have lower cost per hectare. 3] Allocations of government investment towards the rainfed area would also make it possible to directly increase the income for eighty percent of the rural population who depend on rainfed agriculture. To this end, in the Province of Chefchaouen, where agriculture is characterized by primitive techniques, low yields, small holdings, and extreme dependance on the weather, a six year integrated rural project concentrating on soil conservation, forestry and pastureland development, was implemented in 1981.

The project was completed in 1987, however, a lot of work need to be done in the area of farm mechanization, especially in improving power input, which if expanded would result in a significant increase in the yield per unit area. This fact means that besides the enormous effort made through the project to improve the overall life in the rural area, there is still a high potential for increasing the productivity and stimulating the growth in the region if more attention is given to the development of farm

mechanization. In fact, farm mechanization in the Province of Chefchaouen remains dramatically underdeveloped because the majority of farmers are still using indigenous primitive tools as well as old fashioned ways of processing and storing agricultural products.

The extension service is conceived to help rural people overcome and solve these problems, and develop and produce agricultureabundantly. Indeed, the extension service has significantly contributed to the growth and development of agriculture and to the welfare of the rural people. Therefore, strengthening of the agricultural extension service, in its teaching of modern farm mechanization to farmers, is crucial for reaching the level of productivity needed. This actively, in turn, calls for increasing the number of extension agents involved, improving their skills, providing better mobility for them and supporting their efforts with research.

Statement of the Problem

There are many indications of a relatively high potential for increasing agricultural productivity in the province of Chefchaouen. The basic problems in developing this potential are to improve and expand agricultural mechanization which at present is based on large numbers of small holdings with many attendant problems, and how to make people aware of the opportunities that mechanization offers. In the present case, achieving successful results might depend ,to a considerable extent, on the qualifications of

the extension personnel in the area of agricultural mechanization as well as on how adequate the means for disseminating information to farmer are felt by the agent. For this study, therefore, information about agricultural agents' competencies and means of disseminating information are strongly needed.

Purpose of the study

The main purpose of this research effort is to determine perceptions of extension agents as to problems and potential associated with promoting increased agricultural mechanization in the province of Chefchaouen, Morocco.

Specific Objectives

In order to accomplish the purpose of this study, the following specific objectives were formulated :

1. To determine selected background and demographic data from respondents.
2. To identify perceptions as to most appropriate methods for use by extension workers in presenting information to achieve increased agricultural mechanization.
3. To determine extension agents' level of competency in related areas of agricultural mechanization.
4. To determine extension agents' training needs in the area of agricultural mechanization.
5. To identify perceptions of problems which may limit the development of mechanization in Chefchaouen.

The Agricultural Situation in Morocco

In Morocco, agricultural activities contribute for about 14 percent of GDP in 1978 which is distinctly less than 22 percent overall average achieved during 1967-70. After 1970, agricultural production fluctuated extensively owing to climate variations. However agriculture still accounts for 40 percent of all employment in Morocco (1).

Land Use

Morocco has 7.7 millions hectares with soils and moisture suitable for cropping. Together, semi-arid and mountain regions total some 20 millions hectares suitable only for grazing and forests. In 1977, it is estimated that some 720,000 hectares are irrigated permanently. About 68 percent or 5.3 million hectares of the 7.7 millions hectares of agricultural land are cultivated each year; the remainder are under tree crops (0.4 million hectares) or left fallow (2.0 million hectares) (1).

About 4.3 million hectares are planted under winter cereals, 500,000 hectares under pulses, and the 140,000 hectares under vegetables crops (14). About one-third of the agricultural value added is generated by the livestock subsector. Livestock raising is primarily extensive, based on grazing or natural pasture. Most industrial crops, forage crops, vegetables and citrus fruits are grown under irrigation, as are almost all the export crops. It is estimated that some 50 percent of Morocco's cultivated land

receives about 350 mm or less of rain fall, and is generally cultivated under a barley/fallow rotation. Most of Morocco's rainfed areas are characterized by traditional agriculture practices. Crop yields and livestock productivity are generally low due to the limited use of fertilizers, pesticides, herbicides, high-yield seed and farm machinery (1).

Land Tenure

Roughly 75 percent of Morocco's farmers have farms of 5 ha or less, and together they own 25 percent of the agricultural land. Holdings are excessively fragmented, with 1.9 million farms divided into 11.6 million parcels. The

TABLE I

DISTRIBUTION OF FARMS ACCORDING TO THEIR SIZES. (1973/74 Census)

Farm size	Area (hectares)	Percentage
less than 5 ha	1,820,300	24.5
5 ha to less than 10 ha	1,577,500	20.7
10 ha to less than 20 ha	1,559,100	21.0
20 ha to less than 50 ha	1,244,700	16.7
50 ha to less than 100 ha	532,400	7.2
100 ha and more	743,300	9.9

source (7)

average size of a parcel is 0.64 hectares, generally too small for efficient farming. Collectively owned land, generally held by tribal groups, is overgrazed, and the collective owners lack an inducement to undertake soil conservation and improvement (7).

These land tenure problems have constrained the expansion of agricultural credit use, and they are the base of the unequal distribution of agricultural credit. Farmers without productive potential do not apply for credit, and larger farmers obtain proportionally more credit than small farmers.

Erosion

The climate features of Morocco (long summer drought and heavy autumn rains), the comparative frequency of steep slopes and degraded condition of the natural vegetation, result in severe erosion that is destroying arable land at a dangerous rate.

Agricultural Research and Extension

Research. Agricultural development will be based in part of the results of agricultural research undertaken in Morocco.

Interesting results obtained to date include:

1. development of new cereal varieties,
2. production of improved varieties of seeds for cereals, forage crops, oilseed, and cotton,
3. selection and adaptation of several locally bred

varieties which are currently being promoted among farmers.

These programs are undertaken in laboratories and in central and regional research stations located throughout Morocco (25 central stations, 43 regional stations, and 20 laboratories).

Through its field activities, the Agricultural Research Service disseminates research findings to farmers. However the work of this service is believed to be inadequate in a number of areas, particularly applied research and adoptive research. This is attributable to staff and equipment shortages, the complexity of the problem, and an overly theoretical focus.

Extension. The extension services charged with spreading research findings to farmers have an important role to play in stepping up agricultural output. Since the early the seventies, with the structuring and initial establishment of the extension services largely completed, the focus of their activities has shifted away from marketing of inputs toward dissemination of information. However, the extension services operating in non-irrigated areas are not very effective, since the extension agents do not have practical experience, are ill-organized, lack resources and equipment, and are inadequately trained in extension techniques. Their efforts are scattered and lack continuity. The extension services operating in the modern irrigation zones are generally more effective due to larger budgets, and have

more and better staff.

The new Master plan of agricultural extension will include a major reform of the extension service, based in large part on the scheme shown in Figure no 1. In this new system extension agents will be relieved of most administrative tasks, and concentrate on creating service cooperatives to which the agents provide advice on agricultural matters and aid in obtaining credit and input. Important considerations will be given to in-service training for extension agents under this new system (8).

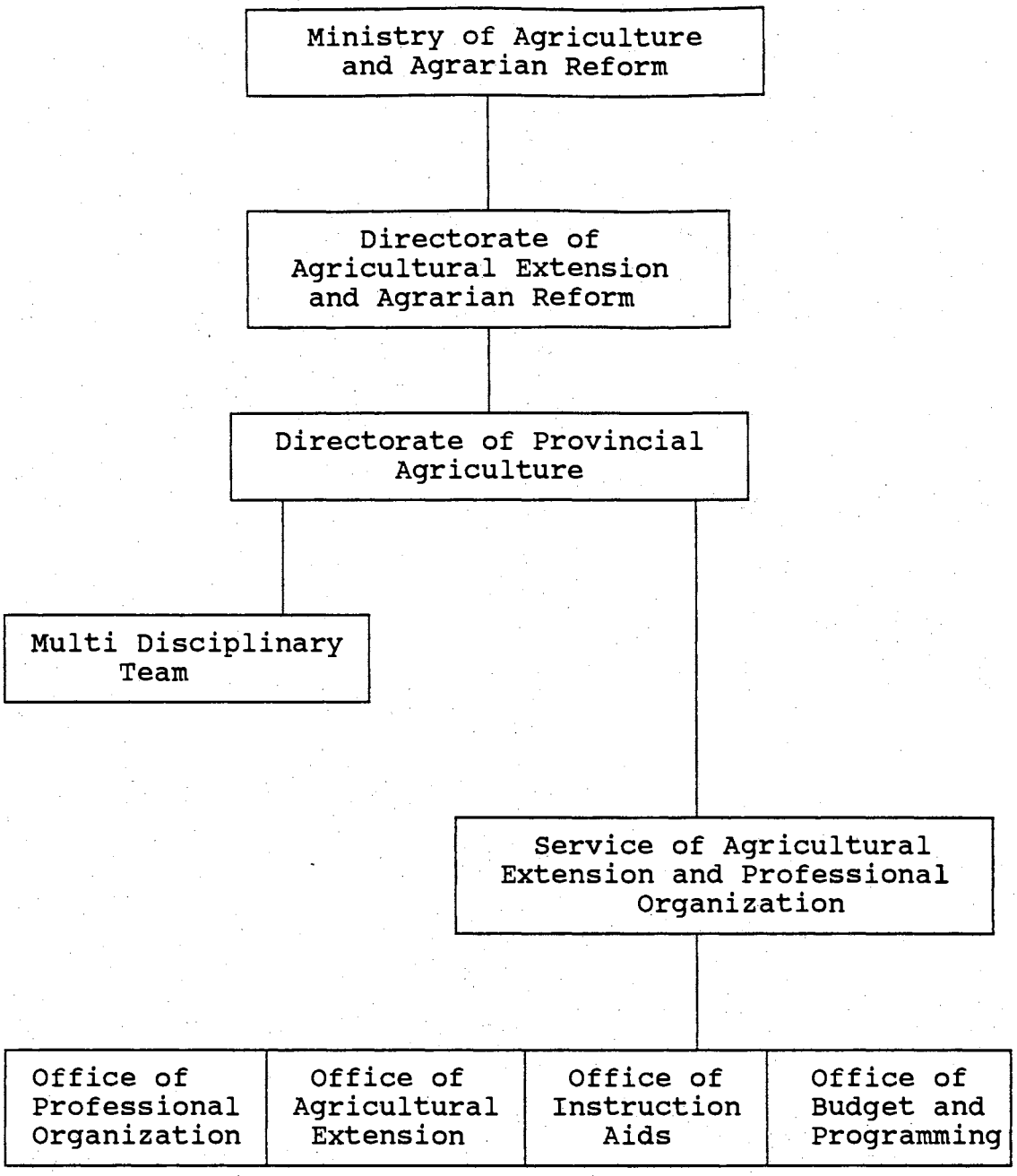

Figure 1: Organizational Chart of Provincial Service of Agricultural Extension and Professional Organization

Scope of the study

This study was carried out during the period between the 1st and the 21st of January, 1989, in the province of Chefchaouen, in extreme northwest Morocco. All the thirthy extension agents working at the four extension centers of the province were interviewed.

Assumptions

Since the investigator used to work in the place where the study was conducted, it was assumed that:

1. The responses from the respondents were honest expression of their opinions.

2. Securing permission from local authorities for conducting the interviews would be without any problem.

Definition of Terms

Agricultural Mechanization: It embraces the manufacture, distribution and operation of all types of tools, implements, machines and equipment for agricultural land development, farm production, and crop harvesting and primary processing. It includes three main power sources: human, animal and mechanical. Based on these three power sources, the technological levels of mechanization have been broadly classified as hand-tool technology, animal draught technology and mechanical power technology.

Province: is an administrative unit for governmental

purposes. It is the largest sub-division of areas in Morocco. There are 47 provinces which correspond to states in the United States; each is headed by a Governor.

Agricultural Extension Worker: A specialist in agriculture at village, district, or divisional level who is trained in the basic and also current, up-to-date agricultural practices. He delivers this knowledge to the farmers to help them increase their agricultural production.

Extension Center: A small-scale extension service of the province level, which is located in a rural area and serves a number of villages. There are four such centers in the Province of Chefchaouen.

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CHAPTER II

REVIEW OF RELATED LITERATURE

A review of the literature regarding agricultural mechanization in developing countries describes the impact role, problems, and development of mechanization in these countries. This literature review is intended to support the objectives of this study.

Background Information for the Study

To further clarify the problem under consideration, it is useful to examine briefly some background characteristics of the province of Chefchaouen and Morocco.

The province of Chefchaouen is located in the northwest part of Morocco. It is an integral part of the Rif mountains which are extremely dissected, but not very high. Rocks, mostly shales but in places limestones or fine sandstones are highly folded and fractured. Winter rains range from 800 mm/year in the sheltered valleys to more than 2,000 mm on the highest ranges. The population density is one of the highest in rural Morocco. Cultivations of grains together with some arboriculture raisins, dried figs, and prunes in wet areas, olives on sandy soils and almonds in arid locations, are largely practiced (21).

Agriculture plays a decisive role in the life of the population. More than 75 percent of Chefchaouen region's population live in rural areas, about 225,000. This ratio exceeds the national average of 62 percent, which means that agriculture is the largest employer of the labor force whose potential is far in excess of the proper needs of this sector (14).

Economically, the agricultural sector, particularly forest, arboriculture and livestock, remains the first productive sector.

Regarding exchange with others sectors is the integration of agriculture in the national economy (wood industry, cork, dry fruit, charcoal...), which although humble at the present time, can play an important role in the future.

The task of facing a growing food demand is becoming more and more difficult due to an increasing demographic growth and shortage of cereals which constitute the basic element of nutrition for the population.

The total population is about 300,000, of which 45,000 are farmers. Some common characteristics of this population are:

1. high population density (53 per/km^2) which is increasing by one percent each year.

2. number of persons per family equals to 6.1

3. 85 percent of the families have an income below the absolute poverty level (14).

The agricultural production is founded primarily on an

agriculture of subsistence. This production is very low and stagnant, because farmers are still using very old methods to cultivate their land.

The total available land is estimated at 98,000 Ha of which: 53,000 hectares is cultivated under cereals, 15,000 hectares under pulses, 4,000 hectares under forage, 2,000 hectares under vegetables, and 24,000 hectares under arboriculture (15).

The area under cultivation and production of selected crops in the Province of Chefchaouen for the year 1984 are shown in Table II.

TABLE II

AREA UNDER CULTIVATION AND PRODUCTION OF SELECTED CROPS IN THE PROVINCE OF CHEFCHAOUEN YEAR 1984

Crops	Area under cultivation (Hectares)	Total Production (Tons)
All cereals of which:	52000	55180
wheat	21700	23870
barely	17100	17100
maize	900	810
sorghum	1000	1000
Pulses	20400	14300
Sugarbeet	60	140
Tobacco	400	40
Forage Crops	2800	50800
Grapes	1000	2000
Olives	14700	14700
Figs	6800	20400

Source: (16)

The Rural Development Projects

The development of the Province is likely to be in an agriculture directed towards fruit trees, forestry and livestock. Promotion of such specialized agriculture would entail a breaking away from the present subsistence economy and a turning of the farmers' thinking towards the monetary and market economy. This was the objective of the two rural development projects implemented in the area. The first called DERRO has been in existence since 1961 and the second one called rural development project of Lookkoss which lasted from 1981 to 1987.

DERRO Project. The economic and rural development in Western Rif, called DERRO, has started 1961 in the seven northern provinces of Morocco, including the Province of Chefchouen. The program, under the Ministry of the Interior, deals with an integrated development program of a little developed mountain region. The goals of this development program are: 1) Protection against erosion in the Rif mountains, 2) Raising living standards by improved use of the available land areas and modernization of methods of agricultural cultivation; and 3) by implementing (1) and (2) to reduce emigration by the population in these areas (9)

Project of Lokouss. Some of Morocco's poorest subsistence farmers in the Province of Chefchaouen (Lokouss Basin) received aid through a World Bank Loan to help the Lookkoss Rural Development Project.

This six-year project (1981-1987) is under the direction of the Ministry of Agriculture and Agrarian Reform. It included agricultural and livestock development as well as soil erosion control.

The project comprised of a) agricultural and livestock and erosion control works, including establishment of permanent pasture, and rehabilitation of small scale irrigation works and pasture improvement; and b) establishment of 35,000 hectares of pine plantations and maintenance of existing plantation in some forest areas. Construction of about 180 km of all weather territory and farm access roads, primary schools, health centers, rural water supply, and village market (20).

The Present Status of Farm Mechanization in the Province of Chefchaouen

The vast majority of farmers still rely upon the traditional hand tools. Most of the basic cultivating tools are of the handled, digging and weeding hoe type. There is a wide range of local variations, many of which are well adapted to local soil conditions. Most of the tools are made of scrap metal by village blacksmiths and the working part have a very short useful life span, although hoe handles may be used for several seasons.

Although the use of animal (oxen) for draught is widely spread, farmers still refuse to use improved animal-drawn implements. In fact, many attempts were made by different governmental agencies to introduce these

implements. Unfortunately the use of such implements is still very limited to a few farmers and completely ignored by the rest. Farmers are still using the wooden plow which is made locally.

Tractors were introduced into the Province of Chefchouen soon after the independence of Morocco 1956. However, because most fields are dispersed in small plots and slopes occupy more than 65 percent of the land in the Province the use of tractors is very limited. Out of the seventy machines existing in the Province, about fifty belong to the government, most of which are just standing idle or used for other purposes sush as transportation.

TABLE III

NUMBERS OF FARMS IMPLEMENTS AND DRAFT ANIMALS IN THE PROVINCE OF CHEFCHAOUEN

Designation	Number
Tractors	70
Sprayers(knapsack and Engine-operated)	1000
Farm pumps	60
Wooden Plows	34000
Animal Plows(metallic)	2800
Pair of draft animals	35000

Source: (16)

So, mechanization which was expected solve the problems of typical farmers, did not make any progress and is still widely not accepted. As it is indicated in Table III,mechanization in the province is still limited to a few modern machines and rely largely upon the traditional form which is characterized by the wooden plows and animal power. On the whole, agricultural practices in the Province are still for the most part quite simple with much hand labor.

Impact and Role of Mechanization in Agriculture

According to Donaldson (4) the process of mechanization has been a major characteristic of agricultural development for more than 2000 years and will clearly remain an integral part of the development process in the future. He indicated that the role of mechanization in improving agricultural productivity needs no emphasis, and he stated that "mechanization contributes to agricultural growth by increasing the power, expanding the process and improving the precision employed in farming operations" (p 11). He further emphasized that the process of mechanization acts as an enabling factor for other changes in the technology. He also indicated that mechanization facilitates structural changes in agriculture. As an example he mentioned that mechanization augments land available by permitting difficult or idle land to be brought into production.

David (3) maintained that the impact of mechanization

goes beyond its impacts upon agricultural production. He indicated that: "mechanization influences rural employment patterns, urban-rural migration, concentration of land holding, forms of social organization, the replacement of family by hired labor, and loss of differentiation" (p 2). He later emphasized that mechanization must be viewed within a broader national context than solely from the view point of agricultural production. According to Peter (18) higher crop yields are usually related to a high degree of mechanization and vice-versa. However, as indicated by David (3), it should be kept in mind that mechanization is only one of many inputs to agriculture and should be viewed as such.

Major Problems in Agriculture Mechanization in Developing Countries

According to Lonnemark (13), there are both social and technical difficulties common to many developing countries which tend to inhibit rapid advances in agriculture mechanization. He indicated that most of the farmers in developing nations use small farm indigenous implements as well as other farm appliances for working the soil. The farms in these nations are mostly small and may be divided into several separate and scattered plots. Cheap labor with low value or low yield crops cannot carry the costs of mechanized production under a system of small scattered farms. The majority of farmers have neither the capital nor the necessary credit for the purchase of expen-

sive powered machinery such as tractors. Imported machines and implements may be totally unsuitable for conditions that prevail, and in addition there is diversity of specialized types which inevitably increases replacement difficulties and costs of operation.

Lonnemark maintained that the majority of farmers lack the knowledge in the correct use of farm machines and cannot cope with special problems that are likely to arise. Satisfactory workshops for repairs, maintenance, and servicing may be lacking, while the supply of spare part may be quite inadequate. Other unfavorable conditions which exist to complicate problems with machinery include poor or nonexistent roads; high costs of operation and maintenance, rapid depreciation, wear and tear; and excessive unproductive traveling.

Recently Gifford (5) pointed out that the major areas of concern are the lack of:

> 1. An appropriate government body which is adequately staffed and financed, and which has the capability, prestige and authority to guide the planning and execution of mechanization introduction, support and use;
>
> 2. A mechanization research program which is structurally and functionally able to generate the information necessary for making decisions and mechanization inputs into the development process, and which is properly integrated with other rural development research activities;
>
> 3. Adequate short and long term training and education programs to develop the manpower required for mechanization, and
>
> 4. An extension structure and approach which recognizes the role of mechanization in the agricultural production process, and provides the needed guidance for mechanization introduction and use at the farm level (p 59).

Development of Agricultural Mechanization in Developing Countries

According to Hiilst (10) one of the main reasons for the high level of agricultural productivity in developed countries is the diversity and extent of mechanization. Unfortunately, this does not generally apply to the case of developing countries. He indicated that by the next century there will be over 330 million farm families. They will be farming about 675 million hectares of land, but many of them depend only on hand tools and animal drawn implements to carry out their farming operations. At the same time, governments in these countries are anxious to promote mechanization and raise the standard of living for their people, according to Lonnemark (13). However, according to many authors, including the two mentioned above sources, the food production targets cannot be met without access to more and better farm power, and the improved implements and equipment to utilize that power effectively and efficiently.

The need for increased levels of mechanization in the developing countries is obvious. The desire of farmers for more and better mechanization inputs is beyond question. The problem is how to translate this obvious need and desire into effective demand and how to meet it.

According to Gifford (5) it would be unrealistic to attempt to give specific recommendations to developing countries on what their mechanization strategy should be.

Situations are different from one country to another. Nonetheless, he maintained that there are several issues which experience has shown to be common to most developing countries. To this end he suggested the following points are to be taken into consideration for developing agriculture mechanization in these countries :

1. The most suitable type, level and role of mechanization in agriculture is determined by the farming situation (including social and political factors) which is specific to individual towns, villages, regions, areas, sectors or conditions within a country;

2. Capital investment in mechanization (of all types and levels) should be conditional on measures to ensure levels of utilization and efficiency that are economically sound;

3. Agricultural machinery should be manufactured locally to meet local market demands in conformity with a realistic appraisal of technical and financial capabilities;

4. Importation of machinery, spares and supplies for agricultural mechanization should be systematically organized in accordance with foreign exchange priorities, on the basis of technical evaluation and with clear lines of authority and responsibility for importation and distribution;

5. It should be recognized that while credit is an instrument of policy, the purpose for which it is used are policy issues. Measures should be taken, therefore, to ensure that credit use is aimed at achievement of specific goals within the broad aims of national policy;

6. To ensure that mechanization contributes to agricultural development, measures both long and short-term, must be taken to train farmers and government support staff in management and technical skills;

7. The possible effect on mechanization of statutory wage rates applied to the agricultural labor force should be carefully considered when formulating labor or wage policies;

8. Support for the development and extension of mechanization should be within the overall effort to improve farming systems. Mechanization is only one element in those systems and should not be considered in isolation;

9. Measures should be taken to ensure the needed logistics support for agricultural mechanization;
10. Regulations and amounts of taxes and tariffs, as applicable to agricultural machinery should clearly reflect the government's desire to either encourage or discourage mechanization;

11. Policies concerning the allocation of commercial energy to different sectors of the economy should reflect a realistic evaluation of both share of agriculture in total energy use and the energy likely to be needed if agricultural production is to be increased sufficiently to meet demand and

12. There cannot be too much emphasis on the need to plan for adequate sales, distribution and service of agricultural machinery if mechanization is to be successfully selected, introduced and sustained as a growth favorable Agricultural and rural development (p 74).

In another study Gifford (6) indicated that agricultural mechanization research and development programs need to break away from the concepts followed by most crop and animal research efforts. He maintained that mechanization is a service input, not a production enterprise. The research must be taken solely in a problem, as they exist at the farm level. According to him, mechanization researchers must concentrate their efforts at the farm level and stop trying to develop farm machinery solely in an isolated institutional complex.

Hiilst (10) pointed out that research, education and training for extension agents are needed in greater quantity and quality to overcome the constraints on mechanization in order to achieve its potential effect on development.

An appropriate extension strategy for conveying the new technology is needed. Kline and others (12) indicated that the competence of local extension service is extremely important where any form of improved mechanization is considered in an area with a generally low level of education. He indicated that a well trained extension agent can fill serious gaps in the technical knowledge of farmers. Similarly, David (3) pointed out that a mechanization extension specialist is the focal point of information flow and for the adoption of new machines services.

Summary

After reviewing the related literature, several specific problems may be identified for the development of agricultural mechanization in Chefchaouen. In Chefchaouen, as the case in other places in developing nations, mechanization implements fall into three broad categories: hand-powered, animal-drawn, and machine power. Improvement of hand - and animal-operated farm implements is very important, as it is one of the first steps that can be taken to raise crop yields and farm income.

Since the majority of farmers lack the skills and supportive services, an adequate information system must be established to develop agricultural mechanization. There are many factors which contribute to providing and maintaining this extension or information system that will support the development of agricultural mechanization in Chefchaouen. However, as an urgent first step, the exten-

sion system needs to be improved and strengthened in the areas of extension organization, training of extension workers, and extension teaching.

CHAPTER III

PROCEDURE

The purpose of this chapter is to describe the procedures used in conducting this study. The design presented is based on the main purpose of the study, which is to determine perceptions of extension agents as to problems and potential associated with promoting increased agricultural mechanization in the Province of Chefchaouen.

The Study Population

The choice of this study was essentially born of a preoccupation felt in years of professional practice by the investigator. As an officer responsible for the equipment section in agricultural extension centers under the Provincial Directorate of Agriculture at the Province of Chefchaouen, a combination of many problems were seen to result in a system of limitating factors to introduction of mechanized methods. In order to help alleviate part of this problem, the investigator felt that an intensive study dealing with perceptions of extension worker serving in the Province as to problems and potential associated with promoting increased agricultural mechanization in the region was badly needed.

The population of this study was comprised of all agricultural extension agents who were working in the four extension centers of the Province. These centers are under the extension service of the Provincial Directorate of Agriculture at Chefchaouen. At the time the study was performed, the total population was 30 extension agents.

Development of The Instrument

The researcher believed that because of the small population, the most suitable means of obtaining information about the perceptions of agricultural extension agents was to interview these agents.

According to Babbie(2):

> Interview surveys typically attain higher response rates than mail surveys. A properly designed and executed interview survey ought to achieve a completion vote of at least 80 to 85 percent. It would seem that respondents are more reluctant to turn down interviewers standing on their door step than they are to throw away a mail questionnaire.
>
> Within the content of the questionnaire, the presence of an interviewer generally decreases the number of "I don't know" and "No answer" responses (p.338).

The interview survey, therefore enabled the investigator to collect information about various aspects related to the accomplishment of that purpose, including information about appropriate information dissemination methods as well as training needs of extension workers in the area of mechanization.

The interview schedule was developed for use in gathering data for this investigation (see appendix). In

formulating the statements used in the instrument, the researcher reviewed related literature and instruments which had been used by previous investigators. An instrument was then developed by adapting selected parts of the one developed by Raoufi (14) and of another one developed by Mirza (17).

The investigation attempted to secure many suggestions from agricultural personnel in the college of Agriculture at Oklahoma State University. Consultations with Maghrebian (Moroccan, Algerian, Tunisian) students attending the Oklahoma State University were also sought. Since agricultural agents did their studies in French, the questionnaire was translated from English into French rather than Arabic which is the native language. These measures were taken in order to insure adequate communication between the investigator and the respondents.

Collection of Data

The investigator chose to attempt to interview personally the extension agents. To this end he traveled to Morocco, then to the Province of Chefchaouen from December 31, 1988 to January 21, 1989. In order to hold the interviews, arrangements were made with the Directors of provincial Agriculture of Chefchouen as well as with the director of extension centers included in the study. These centers were 26-01 of Bouhamed, 26-02 of Chefchouen, 26-03 of Moukrissat and 26-04 of Asjen. The investigator was kindly assisted by the person responsible for extension service at

the provincial level.

All extension workers who were present on the job the day of the visit constituted the respondents in each of the four extension centers. For those who were absent, the investigator had to return to interview them the next day.

Each respondent was requested to respond to the interview schedules shown in the appendix. However in few occasions the investigator interviewed more than one respondent at the same time. In terms of time, the completion of all interview sessions, took almost ten days. This period included time to secure permission from the responsibles in the provincial Directorate of Agriculture in Chefchouen and time to secure transportation.

Treatment of Data

Since the research effort was primarily of descriptive nature, statistics such as percentages, arithmetic average and mean responses were selected as appropriate means of describing the findings. Identified objectives made necessary the construction of a dozen tables. Means and percentages were calculated and were largely used to determine the importance of the respective findings.

Analysis of Data

The instrument contained three main parts with the first part being subdivided into seven different questions regarding certain personal and professional background

information. The seventh question, however, was comprised of seven selected methods of information dissemination. Extension workers were asked to indicate their perceptions as to the value of selected methods for use by them in presenting information to achieve increased agricultural mechanization. This part allowed respondents to indicate their feelings on a five point Likert-type scale having a continuum from "Great" through "none". Numerical values assigned to each category to permit statistical treatment were as follows : Great- 5 (actual limit 4.50 - 5.0); Much- 4 (actual limit 3.5 - 4.49); Some- 3 (actual limit 2.50 - 3.49); Little- 2 (actual limit 1.50 - 2.49); None- 1 (actual limit 0.0 - 1.49).

The second and major portion of the instrument comprised of 43 items directed toward various aspects of agricultural mechanization. Extension workers were each asked to rate each of the items according to their perception regarding the following:

1) To what extent do you have knowledge and skill about these subjects?
2) To what extent do you need knowledge and skills about these subjects?

The present knowledge and skills needed in these 43 items as perceived by the extension workers were measured with the help of a four-point Likert type scale having a continuum from "Great" to "none". Numerical values assigned to each category to permit statistical treatment were as follows: Great- 3 (actual limit 2.50 - 3.00); Much- 2

(actual limit 1.50 - 2.49); Some- 1 (actual limit 0.50 - 1.49); and None- 0 (actual limit 0.00 - 0.49).

A final portion of the instrument was comprised of 25 items, directly related to the nature and extent of selected practices in agricultural mechanization. In order to determine the extent these selected items tend to constitute limitations for the future development of agricultural mechanization, respondents were asked to judge their potency as possible limiting factors. For this part of the instrument a five point Likert type scale having a continuum from "Great" through "none" was used. Numerical values assigned to each category to permit interpretation of the calculated mean responses were as follows: Great- 5 (actual limit 4.50 - 5.00); Much- 4 (actual limit 3.50 - 4.49); Some- 3 (actual limit 2.50 - 3.49); Little- 2 (actual limit 1.50 - 2.49); and None- 1 (actual limit 0.00 - 1.49).

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Introduction

This chapter is confined to the presentation and analysis of data which was collected through use of an interview schedule. As presented, these data comprise responses made by all extension agents who were located at the time of the interview in the four extension centers in the province of Chefchaouen. These extension centers, the Center 26.01 of Bouhamed, Center 26.02 of Chefchaouen, Center 26.03 of Moukrissat, and Center 26.04 of Asjen, are under the direction of the extension service in the city of Chefchaouen which is also the provincial capital.

Population

The population of this study was comprised of all extension workers serving in the four extension centers in the province of Chefchaouen.

There was a total of 30 extension workers. Thus a total of 30 (100 percent) of the interview schedules were conducted.

Findings of the Study

Background Information of Respondents

This section of the chapter presents the background information concerning demographic status of respondents as well as selected items of job function. Twenty-three respondents of the total group were married. It was also found that extension workers' number of years experience in the extension service ranged from 0 - 5 for sixteen respondents, 6 - 10 years for five, 11 - 18 years for six, and 19 years for one. Each member of the extension workers is usually required to stay in extension activities for two years at least, before he can apply for moving to other places in the country. These measures were taken by the government in order to insure certain continuity and regularity of the work.

Regarding the level of education, twenty-three of them are agricultural high school graduates, six of them holding a Bachelor's degree in agriculture, and one holding a Bachelor's degree in general education.

Among the extension workers interviewed, twenty three received their training in the capital of the province as well as in Ministry of Agriculture in Rabat, and fifteen extension workers had training in the National Center of Extension Research and Studies.

Educational Level Needed By Extension Workers

The data, as summarized in Table IV, show perceptions

of the respondent group with regard to educational levels felt needed by extension workers.

TABLE IV

JUDGMENTS OF RESPONDENTS GROUPS WITH REGARD TO EDUCATIONAL LEVELS NEEDED BY EXTENSION WORKERS

Educational Levels	Distributions of Response:N=30	
	N	%
General high school	0	0.00
Agriculture high school	20	66.66
B.S.(General Agriculture)	6	20.00
B.S.(Specialized Agriculture)	2	6.67
General high school (with minimum of 6 months training in extension)	2	6.67
TOTAL	30	100

Inspection of the data as reported in Table IV indicates that a total of 20 (66.66 percent) of the respondents felt graduation from an agricultural high school to be an appropriate level of education for attainment by extension workers. Eight (26.67 percent) of the respondents felt that extension workers should be holding a B.S. in agriculture, and two (6.67 percent) of the respondents felt graduation from a general high school with a minimum of 6 months in extension training to be an appropriate level of education for extension workers.

Table V summarizes the degree of cooperation and/or coordination that exists between the extension service and agricultural colleges as perceived by extension workers.

TABLE V

PERCEPTIONS OF RESPONDENTS AS TO THE DEGREE OF COOPERATION AND COORDINATION EXISTING BETWEEN AGRICULTURAL COLLEGES AND THE EXTENSION SERVICE

Distribution of Responses By Degree of coordination												
Degree of Cooperation & Coordination	None		Little		Some		Much		Great		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
	20	66.67	6	20	4	13.33	0	0	0	0	30	100

The interpretation of data in this table indicate,most extension workers perceived, that desirable cooperation and/or coordination didn't exist between extension workers and the agricultural colleges, with two-third of them alleging that no coordination exists. Another 20 percent perceived that only a "Little" coordination occurs, while only 4 (13.33 percent) felt that "Some" coordination took place. None of the respondents indicated the "Much" or "Great Deal" categories of coordination.

Perceptions of Respondents as to most appropriate Extension Methods

One objective of the study was to identify perceptions as to most appropriate methods for use by extension workers in presenting information to achieve increased agricultural mechanization. This was accomplished by the analyses of respondents' data covering seven selected methods of information dissemination. Findings related to this objective are presented in Table VI. A cumulative mean for each of the suggested number of responses appropriate methods was calculated by multiplying the number of responses in each rating order category by the value of the category and then totaling these products. These values were divided by the total number of responses to secure an average mean or mean response.

Overall, the highest valued extension method was Results Demonstration which received an overall mean response of 4.70 or "Great". This was followed in order by Individual Visits, 4.3, and T.V., 3.6, in the "Much" category. Small Group Meeting, 3.4 and Radio, 3.3, both are classified as "Much", Extension Bulletin, 2.43 and Newspaper, 1.67 both fit the "Little" category of value.

TABLE VI

PERCEPTIONS OF THE VALUE OF SELECTED EXTENSION METHODS OF INFORMATION DISSEMINATION

	Distribution of Responses by Value Category											
	Great		Much		Some		Little		None		Total	Mean
Methods	N	%	N	%	N	%	N	%	N	%		Resp.
Results Demonstration	25	83.3	1	3	4	13.3	0	0	0	0	30	4.70
Radio	6	20	7	23.3	9	30	6	20	2	6.6	30	3.30
T.V.	9	30	9	30	6	20	3	10	3	10	30	3.60
Newspaper	0	0	0	0	5	16.6	8	26.6	17	56.6	30	1.67
Small Group Meeting	6	20	6	20	13	43.3	5	16.6	0	0	30	3.40
Extension Bulletin	0	0	0	10	17	56.6	10	30	3	10	30	2.43
Individual Visits	14	46.6	13	43.3	2	6.6	1	3	0	0	30	4.30

Self-assessment of Present Knowledge Held and Knowledge Needed in Agricultural Mechanization

This section of the chapter is devoted to analysis of the self-assessments of the present knowledge and the train ing needed as felt by the extension workers regarding to specific subjects in agricultural mechanization.

Agricultural Shop work: - - Mean responses as to the relative present knowledge and training needs of extension workers in the areas of agricultural shop work are given in Table VII. On the average, respondents perceived their level of present knowledge in the areas of selecting and using Hand and Power Tools and Safe Working Habits could be categorized as "Much" as determined by the respective numerical mean responses of 1.70 and 1.40 respectively. For all the remaining areas, their perceived levels of present knowledge could be placed in the "Some" category. However, for these there was a rather wide range of mean numerical responses, from 1.40 for Developing a Home Shop for Agricultural Mechanics, to .50 for Welding by the Oxyacetylene Process. Rated very close to the latter and also near the lower limit of the "Some" category were Welding with Electric Arc, Cutting, Bending and Fastening Sheet Metal and Soldering. These received mean responses of .53, .57, and .73 respectively.

On the average, respondents perceived that their knowledge needed in all areas of Agricultural Shop Work could be categorized as "Much" as determined by numerical

mean responses. As also reported in Table VII, these values ranged from 1.57 for Safe Working Habits, to 2.23 for Selecting and Using Hand and Power Tools. Rated very close to the latter and also near the higher limit of the "Much" category were Developing a Home Shop for Agricultural Mechanics, Selecting, Repairing and Sharpening Tools, Welding with Electric Arc, and Welding by the Oxyacetylene Process. These received mean of responses of 2.20, 2.10, 2.17, and 2.13 respectively. Rated relatively close to the lowest mean response of 1.57 for Safe Working Habits were Cutting, Bending and Fastening Sheet Metal, and Soldering. These received the respective mean responses of 1.90 and 1.93 respectively.

In term of ranking, three areas in which the extension workers felt the greatest need for knowledge were identified as:

1) Developing a Home Shop for Agricultural Mechanics.
2) Selecting and Using Hands and Power Tools.
3) Welding with Electric Arc.

TABLE VII

SELF-ASSESSMENT BY EXTENSION WORKERS AS TO PRESENT KNOWLEDGE AND KNOWLEDGE NEEDED IN AGRICULTURAL SHOP WORK

Area of Agricultural Shop Work	Present Knowledge Mean Responses		Knowledge Needed Mean Responses	
A. Shop tools and Equipment				
Developing a home shop for agricultural mechanics	1.40	(Some)	2.20	(Much)
Selecting and using hands and power tools	1.70	(Much)	2.23	(Much)
Repairing and sharpening tools	1.13	(Some)	2.10	(Much)
Safe working habits	1.57	(Much)	1.57	(Much)
B. Welding				
Welding with electric arc	.53	(Some)	2.17	(Much)
Welding by the oxyacetylene process	.50	(Some)	2.13	(Much)
C. Hot and cold Metal work				
Cutting, bending and fastening sheet metal	.57	(Some)	1.90	(Much)
Soldering	.73	(Some)	1.93	(Much)

Agricultural Power, Machinery and Practices: - - mean responses as to the relative present knowledge and training needs of extension workers in the areas of agricultural power, machinery, and practices are shown in Table VIII. On the average, for most areas, the respondents perceived levels of present knowledge could be placed in the "Much" category. However, for these there was a rather wide range of mean numerical responses, from 2.23 for Tillage Practices, to 1.53 for Selecting and Storing Tractor Fuels and Lubricants, and Seeding Machines. Rated very close to the latter and also near the lower limit of the "Much" category were Harvesting, and Seeding Machines which received respective mean responses of 1.60 and 1.77. Rated close to Tillage Practices and also near the upper limit of the "Much" category were Seeding Practices, and Chemical Weeds Control, where both of them received the same mean response of 2.10. Rated near the middle of the limits of the "Much" category were Fertilizer machines, and Fertilizer Practices, with mean responses of 1.93 and 1.97 respectively. For most of the remaining areas, perceived levels of present knowledge could be placed in the "Some" category. However, except for the area of Maintaining and Servicing Transmitting Power by Belts, Chains, Gears, and Clutches, which received a mean response of .83, all other areas received a rather small range of mean numerical responses ranging from 1.27 for Minor Tractor Repair, to 1.47 for Servicing Tractor. Rated very close to the latter and also near the upper limit of the "Some" category were

Fundamental Principles of Engine, Operating and Lubricating Engines, and Maintaining and Servicing Internal Combustion Engine. Which have received mean responses of 1.40, 1.33 and 1.20 respectively.

On the average, respondents perceived their training needs in Minor Tractor Repair, and in Selecting and Storing Tractor Fuels and Lubricants as "Great" as determined by the respective numerical mean responses of 2.50 and 2.83. For all the remaining areas, their perceived needs for training could be placed in the "Much" category. However, the range of mean numerical responses, for these areas were narrow, ranging from 2.17 for Harvesting, to 2.43 for Maintaining and Servicing Transmitting Power by Belts, Chains, Gears and Clutches. Rated very close to the latter and also near the upper limit of the "Much" category were Fundamental Principles of Engine, Maintaining and Servicing Internal Combustion Engine, Seeding Machines, Tillage Implements, and Chemical Weeds Control. These received mean responses of 2.40, 2.40, 2.40, 2.37, and 2.33 respectively. Rated very close to Harvesting were Seeding Practices, Fertilizer Practices, Servicing Tractor and Fertilizer Machines. Which received mean response of 2.30, 2.27, 2.27 and 2.23 respectively.

The greatest needs for training were indicated by extension workers in the following:

1) Selecting and Storing Tractor Fuels and Lubricants;

2) Minor Tractor Repair; and

3) Maintaining and Servicing Transmitting Power by Belts, Chain, Gears, and Clutches.

TABLE VIII

SELF-ASSESSMENT OF EXTENSION WORKERS AS TO PRESENT KNOWLEDGE AND KNOWLEDGE NEEDED IN AGRICULTURAL POWER,MACHINERY AND PRACTICES

Area of Agricultural Power, Machinery, and Practices	Present Knowledge Mean Response		Knowledge Needed Mean Response	
A. Agricultural power fundamentals				
Fundamental principles of engine	1.40	(Some)	2.40	(Much)
Operating and lubricating engines	1.33	(Some)	2.23	(Much)
Maintaining and servicing internal combustion engine	1.20	(Some)	2.40	(Much)
B. Tractor Maintenance				
Servicing tractor	1.47	(Some)	2.27	(Much)
Minor tractor repair	1.17	(Some)	2.50	(Great)
Selecting and storing tractor fuels and lubricants	1.53	(Much)	2.83	(Great)
C. Farm Machinery and Practices				
Maintaining and servicing transmitting power by belts, chain, gears & clutches	0.83	(Some)	2.43	(Much)

TABLE VIII (continued)

Area of Agricultural Power, Machinery, and Practices	Present Knowledge Mean Response		Knowledge Needed Mean Response	
Tillage implements	2.03	(Much)	2.37	(Much)
Tillage practices	2.23	(Much)	2.27	(Much)
Seeding machines	1.77	(Much)	2.40	(Much)
Seeding practices	2.10	(Much)	2.30	(Much)
Fertilizer machines	1.93	(Much)	2.23	(Much)
Fertilizer practices	1.97	(Much)	2.27	(Much)
Chemical weeds control	2.10	(Much)	2.33	(Much)
Harvesting	1.60	(Much)	2.17	(Much)

Agricultural Buildings and Conveniences: - - mean response as to the relative present knowledge and training needs of extension workers in the areas of agricultural buildings and conveniences are presented Table IX. On the average, respondents perceived their present knowledge in all areas of agricultural buildings and conveniences to be placed in the "Some" category. However, for these areas there was a relatively wide range of numerical mean response, varying from 1.47 for Making Simple Sketches, to .67 for Sewage

Disposal Systems. Rated very close to the latter and also near the lower limit of the "Some" category were Concrete Technology, Using Block Concrete, Sand and Concrete, and Plumbing Equipment which received mean responses of .70, .73, and .80 respectively. Rated very close to Making Simple Sketches and also near the upper limit of the "Some" category was Reading Blue Prints which received a mean respond of 1.40. Rated at the middle of both limits of the "Some" category was Water Supply System, receiving a mean response of 1.00.

On the average, respondents perceived that their training needs in all areas of Agricultural Buildings and Conveniences were in the "Much" category. However, for these respondents there was a slightly wide range of mean numerical responses, from 2.30 for Water Supply System, to 1.87 for Sewage Disposal Systems and Using Concrete Block, Sand and Concrete. Rated very close to the two latter were Concrete Technology and Making Simple Sketches with mean responses of 1.90 and 1.93 respectively. Rated close to Water Supply System were Reading Blue Prints, and Plumbing Equipment which recorded means of 2.13 and 2.16 resptively.

The areas in which, respondents felt the most needs were identified as:

1) Water Supply System;
2) Reading Blue Prints; and
3) Plumbing Equipments.

TABLE IX

SELF-ASSESSMENT BY EXTENSION WORKERS AS TO PRESENT KNOWLEDGE AND KNOWLEDGE NEEDED IN AGRICULTURAL BUILDINGS AND CONVENIENCES

Area of Agricultural Buildings & Conveniences	Present Knowledge Mean Response		Knowledge Needed Mean Response	
A. Concrete Work				
Concrete technology	0.70	(Some)	1.90	(Much)
Using concrete block, sand and concrete	0.73	(Some)	1.87	(Much)
B. Sketching and Drawing				
Making simple sketches	1.47	(Some)	1.93	(Much)
Reading Blue Prints	1.40	(Some)	2.13	(Much)
C. Farm Conveniences and Sanitation				
Water Supply System	1.00	(Some)	2.30	(Much)
Plumbing Equipments	0.80	(Some)	2.16	(Much)
Sewage disposal Systems	0.67	(Some)	1.87	(Much)

Farm Electrification: - - mean responses relative to present knowledge and training needs in the areas of farm electrification are shown in Table X. On the average,

respondents perceived that their levels of present knowledge in Electric Sources Terms, and Electric Motors were "Much" as determined by the respective mean responses of 1.67 and 1.70. For the two remaining areas, respondents perceived their levels of present knowledge in Electrical Safety and Basic Electrical Wiring to be "Some" as determined by the respective mean responses of 1.20 and .93 respectively.

Table X

SELF-ASSESSMENT BY EXTENSION WORKERS AS TO PRESENT KNOWLEDGE AND KNOWLEDGE NEEDED IN FARM ELECTRIFICATION

Area of Farm Electrification	Present Knowledge		Knowledge Needed	
	Mean Response		Mean Response	
Electric sources terms	1.67	(Much)	2.13	(Much)
Electrical safety	1.20	(Some)	2.07	(Much)
Basic Electrical Wiring	0.93	(Some)	2.27	(Much)
Electric Motors	1.70	(Much)	2.30	(Much)

On the average, respondents perceived that their training needs in Electric Sources Terms, Electrical Safety, Basic Electrical Wiring and Electric Motors could be categorized as "Much".

In terms of ranking, three areas in which extension workers felt the greatest need for training they identified the following:

1) Electric Motors;

2) Basic Electrical Wiring; and

3) Electric Source Terms.

Soil and Water Management: - - Mean response relative to present knowledge and training needs of extension workers in the areas of soil and water management are shown in Table XI.

On the average, respondents perceived their levels of present knowledge in Recognize Soil and Water Conservation Technique, Land Leveling, Irrigation Crops, and Methods of Applying Water to the soil as being in the "Much" category as determined by the respective mean responses of 1.60, 1.53, and 1.87 and 1.80 respectively. For all the remaining areas, perceived levels of present knowledge could be placed in the "Some" category. However, for these areas there was a slightly wide range of mean numerical responses, from 1.23 for Ditch Construction, to 1.47 for Farm Drainage. Rated very close to the latter and also near the upper limit of the "Some" category were Recognize Soil Conservation and Water Management Problems and Irrigation Water Required with mean responses of 1.37, 1.33 respectively.

TABLE XI

SELF-ASSESSMENT BY EXTENSION WORKERS AS TO PRESENT KNOWLEDGE AND KNOWLEDGE NEEDED IN SOIL AND WATER MANAGEMENT

Area of Soil and Water Management	Present Knowledge		Knowledge Needed	
	Mean Response		Mean Response	
Recognize soil conservation and water management problems	1.37	(Some)	2.33	(Much)
Recognize soil and water conservation techniques	1.60	(Much)	2.20	(Much)
Layout terrace	1.30	(Some)	2.30	(Much)
lines construct and maintain them				
Land leveling	1.53	(Much)	2.17	(Much)
Irrigation water required	1.33	(Some)	2.23	(Much)
Irrigation crops	1.87	(Much)	2.23	(Much)
Methods of applying water to the soil	1.80	(Much)	2.23	(Much)
Ditch construction	1.23	(Some)	2.00	(Much)
Farm drainage	1.47	(Much)	2.07	(Much)

On the average, respondents who perceived training needs in all areas of soil and water management are to be in the "Much" category. However, for these areas there was a

slightly wide range mean responses varying, from 2.00 for Ditch Construction to 2.33 for Recognize Soil and Water Management Problems. Rated very close to the latter were Recognize Soil and Water Conservation Techniques, Irrigation Water Required, Irrigation Crops, Methods of Applying Water to the soil, and layout Terrace Lines Construct and Maintain them with mean responses of 2.20, 2.30, 2.23, 2.23, and 2.23 respectively. Rated very close to Ditch Construction were Land Leveling and Farm Drainage, having mean response of 2.17 and 2.07 respectively.

In terms of ranking, three areas in which extension workers felt most needs for training were identified as:

1) Recognize Soil Conservation and Water Management;
2) Layout Terrace Lines Construct and Maintain them; and
3) Irrigation Water Required.

Perceptions of Respondents as to Possible Limitations to Mechanization Development

One objective of the study was to identify perceptions of problems which may limit the development of mechanization in the Province of Chefchaouen. This was accomplished by the analysis of respondents' data covering 23 selected possible limitations. Two other possible limitations were added by some respondents which make a total of 25 possible limitations. Findings related to this objective are presented in Table XII. A cumulative rating for each of the suggested possible limitations was calculated by multiplying

TABLE XII

PERCEPTIONS OF EXTENSION WORKERS AS TO POSSIBLE MAJOR LIMITATIONS TO MECHANIZATION DEVELOPMENT

	Distribution of Responses by Value Category											
	Great		Much		Some		Little		None		Total	Mean
Limiting Factor	N	%	N	%	N	%	N	%	N	%		Resp.
Lack of water	5	16.67	6	20	10	33.33	4	13.3	5	16.6	30	3.06
Conditions of Roads	11	36.66	10	33.33	6	20	3	10	0	0	30	3.96
Lack of trained personnel in the agricultural sector	9	30	10	33.33	5	16.6	5	16.6	1	3.33	30	3.70
Lack of adequate capital and credit in the agricultural sector	11	36.66	10	33.33	4	13.3	3	10	2	6.66	30	3.73
Lack of effective extension program	6	20	7	23.33	11	36.3	3	10	3	10	30	3.33
Lack of cooperation between different agencies serving agriculture	7	23.3	9	30	7	23.3	5	16.6	2	6.66	30	3.46
Illiteracy among farmers	14	46.66	5	16.6	4	13.3	5	16.6	2	6.66	30	3.80

TABLE XII (Continued)

Limiting Factor	Distribution of Responses by Value Category										Total	Mean Resp.
	Great		Much		Some		Little		None			
	N	%	N	%	N	%	N	%	N	%		
Lack of industrial extension programs to educate village artisans in the running of small-scale industries	9	30	10	3.33	6	20	4	13.3	1	3.33	30	3.73
Absence or inadequancy of service and maintenance centers and repair shops	10	33.33	10	33.33	7	23.3	3	10	0	0	30	3.90
Lack of trained technical cadres in the area of mechanization	9	30	12	40	5	16.6	4	13.3	0	0	30	3.86
Low priority given to agricultural mechanication by government agencies	1	3.33	13	43.33	9	30	2	6.66	5	16.6	30	3.10
Inadequent animal drawn implements	6	20	11	36.66	5	16.6	6	20	2	6.66	30	3.43

TABLE XII (Continued)

Limiting Factor	Great N	Great %	Much N	Much %	Some N	Some %	Little N	Little %	None N	None %	Total	Mean Resp.
	Distribution of Responses by Value Category											
Lack of industrial extension programs to educate village artisans in the running of small-scale industries	9	30	10	33.33	6	20	4	13.3	1	3.33	30	3.73
Absence or inadequancy of service and maintenance centers and repair shops	10	33.33	10	33.33	7	23.3	3	10	0	0	30	3.90
Lack of trained technical cadres in the area of mechanization	9	30	12	40	5	16.6	4	13.3	0	0	30	3.86
Low priority given to agricultural mechanization by government agencies	1	3.33	13	43.33	9	30	2	6.66	5	16.6	30	3.10
Inadequate animal drawn implements	6	20	11	36.66	5	16.6	6	20	2	6.66	30	3.43
Inadequate loan policy	8	26.66	6	20	10	33.3	4	13.3	2	6.66	30	3.46

TABLE XII (Continued)

Limiting Factor	Distribution of Responses by Value Category										Total	Mean Resp.
	Great		Much		Some		Little		None			
	N	%	N	%	N	%	N	%	N	%		
Combination of many factor	11	36.66	11	36.66	4	13.3	4	13.3	0	0	30	3.96
Low level of knowledge on the part of farmers and their families	9	30	11	36.66	5	16.6	5	16.6	0	0	30	3.80
Lack of knowledge in the area of agricultural mechanization by extension agents	10	33.33	16	53.33	2	6.66	2	6.66	0	0	30	4.13
Plots are far from each other	10	76.92	2	15.38	1	7.69	0	0	0	0	13	4.69
Topography of the region is difficult	9	64.28	4	28.57	1	7.14	0	0	0	0	14	4.57

the number of responses in each rating category by the value of the category and then totaling these products. These cumulative ratings were divided by the total number of responses to secure an average rating. The overall rank order was established on the basis of the order of these average ratings. All respondents were included in the total number of respondents for all the 23 items selected by the investigator since no one failed to respond to any of these items. For the other two items, suggested by some respondents, those who failed to suggest any of these two were not included in the total number of respondents for that particular item.

Extension workers' responses were such that five of the 25 selected items were classified as being of "Great" limitation, and 13 in the "Much" classification, with the remaining 7 classified as "Some".

Reference to group mean scores allowed the rank ordering of the following items as limitations of the first order or "Great" in term of their limiting capacity:

1) Fragmentation of holding in small plots.(4.70)
2) Plots are far from each other.(4.69)
3) Lack of effective research in the area of agricultural mechanization.(4.66)
4) Topography of the region is difficult.(4.57)
5) High cost of machinery.(4.50)

Those items which, in the judgement of respondents were of second order or "Much" in terms of their limiting capacity, ranked in order of the mean responses were:

6) Lack of knowledge in the area of agricultural

mechanization by the extension agents.(4.13)

7) Condition of Roads.(3.96)

7) Combination of many factors.(3.96)

9) Low purchasing Power of Farmers.(3.93)

10) Lack or inadequacy of service and maintenance centers and repair shops.(3.90)

11) Lack of cooperation and/or coordination between agricultural colleges and extension center.(3.86)

11) Lack of trained technical cadre in the area of agricultural mechanization.(3.86)

13) Lack of capital and credit in the agricultural sector.(3.83)

13) Inadequate rural electrification.(3.83)

15) Illiteracy among farmers.(3.80)

15) Low level of knowledge on the part of farmers and their families.(3.80)

17) Lack of industrial extension program to educate village artisans in the running of small-scale industries.(3.73)

18) Lack of trained people in the agricultural sector.(3.70)

Seven of the suggested limiting factors were judged by the respondents as of "Some" importance in terms of possible limiting capacity. The ranking of these items by mean responses was found to be as follows:

19) Inadequate loan policy.(3.46)

19) Lack of cooperation between different agencies serving agriculture.(3.46)

21) Inadequate animal drawn implements.(3.43)

22) Limitation of manufacturing to big implements.(3.36)

23) Lack of effective extension program.(3.33)

24) Low priority given to agricultural mechanization development by government agencies.(3.10)

25) Lack of water.(3.06)

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents a summary and review of the study within the context of the problem, the design and the conduct of the study, with emphasis upon the major findings. Also presented are conclusions and recommendations which are based upon analysis and synthesis of data secured.

Purpose

The main purpose of the study was to determine perceptions of extension workers as to problems and potential associated with promoting increased agricultural mechanization in the Province of Chefchaouen, Morocco.

Specific Objectives

The specific objectives of this study were as follows:

1. To determine selected background and demographic data from the respondents.
2. To identify perceptions as to most appropriate methods for use by the extension workers in presenting information to achieve increased agricultural mechanization.
3. To determine extension agents' level of competency in related areas of agricultural mechanization.
4. To determine extension agents' training needs in the area of agricultural mechanization.

5. To identify perceptions of problems which may limit the development of mechanization in the Province of Chefchaouen.

Procedures

Following the review of literature pertinent to the problem, the major tasks involved in the design of the study were as follows: 1) determining the population of the study; 2) developing an instrument for data collection; 3) developing a procedure for data collection; and 4) determining methods of data analysis.

The study population consisted of 30 extension workers who were working at the Province of Chefchaouen at the time of conducting the study. An instrument was developed for interviewing these people and all respondents were interviewed. Since the total population was used, only descriptive statistical techniques were appropriate. So, analysis of data involved calculating percentages, rank order, and response mean scores.

Findings of the study

A summary of findings of the study is presented in the following categories: 1) background information; 2) perceptions of value of selected extension methods; 3) self-assessment of respondents as to present knowledge held and knowledge needed; and 4) perceptions of respondents as to possible limitations to mechanization development.

Background Information

Analysis of demographic data collected from the respondents revealed that 23.77 percent of them were married. It was found that 21.70 percent of those interviewed had 10 years experience or less in the extension service. Out of those 30 respondents 23 had graduated from agricultural high school. Twenty of the group felt this was the appropriate level of preparation required of extension workers.

Among the extension workers who have responded, 23 received training in the capital of the Province as well as in the Ministry of Agriculture in Rabat (the capital of Morocco), while only 15 had training the National Center of Extension Research and Studies.

With regard to cooperation between the extension service and the agricultural colleges, two-thirds of the extension workers alleged that no cooperation/coordination exists. Therefore, none of them felt a level greater than "Some" took place.

Perceptions of Respondents as to most Appropriate Extension Methods

Data presented in Table XIII summarize mean responses as to perceptions of respondents regarding the most appropriate extension methods.

Overall, the highest valued extension method was Results Demonstration which was followed in order by Individual Visits; TV; small group meeting; and Radio. These were classified as "Much", while Extension Bulletin; and

Newspaper both were classified as of "Little" value.

Table XIII

A SUMMARY OF PERCEPTIONS OF THE VALUE OF SELECTED EXTENSION METHODS

Methods	Mean Response
Result Demonstration	4.70 (Great)
Individual Visits	4.30 (Much)
TV	3.60 (Much)
Small Group Meeting	3.40 (Much)
Radio	3.30 (Some)
Extension Bulletin	2.43 (Little)
Newspaper	1.67 (Little)

Self-assessment of Present Knowledge Held and Knowledge Needed

Table XIV was developed to illustrate groupings of the areas of agricultural mechanization investigated by the perceived levels of present knowledge. Both the numerical and category mean response are presented.

TABLE XIV

GROUPING OF AGRICULTURAL MECHANIZATION TOPICS BY LEVEL OF PERCEIVED PRESENT KNOWLEDGE

Agricultural Mechanization Topics	Present Knowledge Mean Responses
Tillage Practices	2.23 (Much)
Seeding Practices	2.10 (Much)
Chemical Weeds Control	2.10 (Much)
Tillage Implements	2.03 (Much)
Fertilizer Practices	1.97 (Much)
Fertilizer Machines	1.93 (Much)
Irrigation Crops	1.87 (Much)
Methods of Applying Water	1.80 (Much)
Seeding Machines	1.77 (Much)
Selecting and Using Hand and Power Tools	1.70 (Much)
Electrical Motors	1.70 (Much)
Electrical Sources Terms	1.67 (Much)
Harvesting	1.60 (Much)
Recognize Soil and Water Conservation Techniques	1.60 (Much)
Safe Working Habits	1.57 (Much)
Selecting and Storing Tractors Fuels and Lubricants	1.53 (Much)
Land Leveling	1.53 (Much)
Farm Drainage	1.47 (Some)
Making Simple Sketches	1.47 (Some)
Servicing Tractor	1.47 (Some)
Reading Blue Prints	1.40 (Some)

TABLE XIV (continued)

Agricultural Mechanization Topics	Present Knowledge Mean Responses
Fundamental Principles of Engine	1.40 (Some)
Developing a Home Shop for Agricultural Mechanics	1.40 (Some)
Recognize Soil Conservation and Water Management Problems	1.37 (Some)
Operating and Lubricating Engines	1.33 (Some)
Irrigation Water Required	1.33 (Some)
Layout Terrace Lines Construct and Maintain Them	1.30 (Some)
Ditch Construction	1.23 (Some)
Electrical Safety	1.20 (Some)
Maintaining and Servicing Internal Combustion Engine	1.20 (Some)
Minor Tractor Repair	1.17 (Some)
Repairing and Sharpening Tools	1.13 (Some)
Water Supply System	1.00 (Some)
Basic Electrical Wiring	0.93 (Some)
Maintaining and Servicing Transmitting Power by Belts, Chains, Gears, and Clutches	0.83 (Some)
Plumbing Equipment	0.80 (Some)
Soldering	0.73 (Some)
Using Concrete Block Sand and Concrete	0.73 (Some)

TABLE XIV (continued)

Agricultural Mechanization topics	Present Knowledge Mean Responses
Concrete Technology	0.70 (Some)
Sewage Disposal Systems	0.67 (Some)
Cutting, Bending, and Fastening Sheet Metal	0.57 (Some)
Welding With Electric Arc	0.53 (Some)
Welding by the Oxyacetylene Process	0.50 (Some)

Table XIV was constructed in order to present a grouping of the agricultural mechanization areas according to perceived levels of needed knowledge.

TABLE XV

GROUPING OF AGRICULTURAL MECHANIZATION TOPICS BY LEVELS OF PERCEIVED KNOWLEDGE NEEDED

Agricultural Mechanization Topics	Knowledge Needed Mean Responses
Selecting and storing Tractor Fuels and Lubricant	2.83 (Great)
Minor Repair Tractor	2.50 (Great)
Maintaining and Servicing Transmitting Power by Belts, Chains, Gears and Clutches	2.43 (Much)
Fundamental Principles Of Engine	2.40 (Much)
Maintaining and Servicing Internal Combustion Engine	2.40 (Much)
Seeding Machine	2.40 (Much)
Tillage Implements	2.37 (Much)
Chemical Weeds Control	2.33 (Much)
Recognize Soil Conservation and Water Management Problems	2.33 (Much)
Layout Terrace Lines Construct and Maintain them	2.30 (Much)
Water Supply System	2.30 (Much)
Seeding Practices	2.30 (Much)
Electric Motors	2.30 (Much)
Basic Electrical Wiring	2.27 (Much)
Servicing Tractor	2.27 (Much)
Fetilizer Practices	2.27 (Much)
Tillage Practices	2.27 (Much)

TABLE XV (continued)

Agricultural Mechanization Topics	Knowledge Needed Mean Responses
Basic Electrical Wiring	2.27 (Much)
Irrigation Water Required	2.23 (Much)
Fertilizer Machine	2.23 (Much)
Operating and Lubricating Engines	2.23 (Much)
Selecting and Using Hands and Power Tools	2.23 (Much)
Irrigation Crops	2.23 (Much)
Methods of Applying Water To The Soil	2.23 (Much)
Recognize Soil and Water Conservation Techniques	2.20 (Much)
Developing A Home Shop for Agricultural Mechanics	2.20 (Much)
Land Leveling	2.17 (Much)
Welding With Electric Arc	2.17 (Much)
Harvesting	2.17 (Much)
Plumbing Equipment	2.16 (Much)
Blue Prints	2.13 (Much)
Electric Sources and Terms	2.13 (Much)
Welding by the Oxyacetylene Process	2.13 (Much)
Repairing and sharpening Tools	2.10 (Much)
Farm drainage	2.10 (Much)
Electrical Safety	2.07 (Much)
Ditch Construction	2.00 (Much)

TABLE XV (continued)

Agricultural Mechanization Topics	Knowledge Needed Mean Responses
Making Simple Sketches	1.93 (Much)
Soldering	1.93 (Much)
Cutting, Bending, and Fastening Sheet Metal	1.90 (Much)
Concrete Technology	1.90 (Much)
Sewage Disposal Systems	1.87 (Much)
Using Concrete Block, Sand and Concrete	1.87 (Much)
Safe Working Habits	1.53 (Much)

Data in table XVI indicate summary of the overall ratings of the respondents' of the five areas of agricultural mechanization considered in this study. Present knowledge held and knowledge needed by the respondents are both presented in this table.

TABLE XVI

SUMMARY OF OVERALL RATINGS OF RESPONDENTS' PERCEPTIONS OF AMOUNT OF PRESENT KNOWLEDGE HELD AND KNOWLEDGE NEEDED IN AREAS OF AGRICULTURAL MECHANIZATION

Areas of Agricultural Mechanization	Present Knowledge Mean Response	Knowledge Needed Mean Response
1. Agricultural Shop Work	0.87 (Some)	2.04 (Much)
Shop tools and equipment	1.45 (Some)	2.03 (Much)
Welding	0.51 (Some)	2.15 (Much)
Hot and cold metal work	0.65 (Some)	1.93 (Much)
2. Agricultural Power, Machinery and Practices	1.51 (Much)	2.33 (Much)
Agricultural power fundamental	1.31 (Some)	2.40 (Much)
Tractor maintenance	1.39 (Some)	2.30 (Much)
Farm machinery and practices	1.84 (Some)	2.30 (Much)
3. Agricultural Buildings and Conveniences	0.98 (Some)	2.01 (Much)
Concrete work	0.71 (Some)	1.89 (Much)
Sketching and drawings	0.43 (Some)	2.03 (Much)
Farm conveniences and sanitation	0.82 (Some)	2.11 (Much)
4. Farm Electrification	1.37 (Some)	2.11 (Much)
5. Soil and Water Management	1.50 (Much)	2.20 (Much)

Perception of Respondents as to Possible

Limitations to Mechanization Development

Of the 25 selected items presented to respondents requesting reactions as to the extent each might be a possible limitation to mechanization development, five were classified as "Great"; thirteen as "Much" and the remaining seven as "Some". The respective items, grouped according to the extent they were perceived to be possible limitations to the development of further agricultural mechanization are listed in Figure 2. The mean rating of each item is as provided:

I. "Great" Potential Limitations

A. Fragmentation of holding in small plots.(4.70)
B. Plots are far from each other.(4.69)
C. Lack of effective research in the area of agricultural mechanization.(4.66)
D. Topography of the region is difficult.(4.57)
E. High cost of machinery.(4.50)

II. "Much" Potential Limitations

A. Lack of knowledge in the area of agricultural mechanization by the extension agents.(4.13)
B. Condition of Roads.(3.96)
C. Combination of many factors.(3.96)
D. Low purchasing Power of Farmers.(3.93)
E. Absence or inadequacy of service and maintenance centers and repair shops.(3.90)
F. Lack of cooperation and/or cooperation between agricultural and extension.(3.86)
G. Lack of trained technical cadre in the area of agricultural mechanization.(3.86)
H. Lack of capital and credit in agricultural sector.(3.83)
I. Inadequate rural electrification.(3.83)
J. Illiteracy among farmers.(3.80)
K. Low level of knowledge on the part of farmers and their families.(3.80)
L. Lack of industrial extension programs to educate village artisans in the running of small-scale industries.(3.73)
M. Lack of trained people in the agricultural sector.(3.70)

III. "Some" Potential Limitations

A. Inadequate loan policy.(3.46)

B. Lack of cooperation between different agencies serving agriculture.(3.46)
C. Inadequate animal drawn implements.(3.43)
D. Limitation of manufacturing to big implements.(3.36)
E. Lack of effective extension program.(3.33)
F. Low priority given to agricultural mechanization development by government agencies.(3.10)
G. Lack of water.(3.06)

Figure 2 : Perceptions of Extension Workers as to Possible Limitations to Mechanization Development

Conclusions

Based upon an analysis of the findings of this investigation, the author felt certain conclusions could be drawn. Among them would be the following:

1. The group is rather stable because most of the respondents are married. They are rather young and most of them have had the level of formal education which is considered appropriate for extension workers. Finally, most of have received training in extension works.

2. As perceived by respondents, inadequate amount of cooperation and coordination exist, during the time of the study, between agricultural colleges and the extension service.

3. The most appropriate methods to promote increased agricultural mechanization are those which could be classified as being more personal in nature such as "Results Demonstrations" and "Individual Visits".

4. Level-wise the educational system is set up to provide for agricultural mechanization skills development.

However, the system has been less than successful in accomplishing such a goal. This conclusion is based upon findings that although in all of the areas of agricultural mechanization investigated, respondents perceived they had at least "some" present knowledge, they also perceived their present knowledge to be considerably below the knowledge needed for most of the areas.

It was concluded that extension workers definitely feel their present knowledge held in agricultural mechanization is limited and that more knowledge and training is needed.

5. Since for all the areas of agricultural mechanics skills investigated respondents perceived on the average that they needed "much" knowledge, it is concluded all of these areas are of importance for future development of agricultural mechanization.

The areas and topics of agricultural mechanization, in order of need of emphasis for training and thus their priority for training efforts would be as follows:

A. Agricultural power, Machinery and Practices
   a) tractor maintenance
   b) agricultural power fundamental
   c) farm machinery and practices
B. Soil and Water Management
C. Farm Electrification
D. Agricultural Shop Work
   a) shop tools and equipment
   b) welding

c) hot and cold metal work

E. Agricultural Buildings and Conveniences

a) concrete work

b) sketching and drawing

c) farm conveniences and sanitation

6. Respondents perceived themselves more highly skilled in the area of Agricultural Power, Machinery, and Practices and in the area of Soil and Water Management . In other areas such as, Agricultural Work Shop, Agricultural Buildings and Conveniences, And Farm Electrification they perceived themselves as being less skilled.

7. Improvement in agricultural mechanization is fundamental to the overall improvement of agriculture in the province, both to help ensure enough foodstuff for the growing population by bringing more land under cultivation and to developing the economy so that some segments of the population are released from the structure of subsistence livelihood. Experimentation and improvement programs of mechanization are inherently long-term and relatively expensive in relation to other types of agricultural research and improvement activities, moreover, such work types must be continuous. Besides, for these programs to be effective they should have adequate provision for technical laboratories in servicing the experimental and field work.

From regional standpoint, the greatest need at the present time would appear to be to strengthen the research system in the province of Chefchaouen, where its population density is one of the highest in Morocco; meanwhile, its in-

come levels are very low, because it is highly dependent on agriculture, and unfortunately research facilities is absent. The region's problems are aggravated by:

a) a combination of lack of research, high initial cost of the machinery and the size, location and topography of holdings, are perceived as the potential limitations to agricultural mechanization which are of the greatest concern.

b) limitations associated with the overall educational concerns particularly in agricultural mechanization, inadequate infrastructure and facilities, lack of adequate funds, and combination of many factors, are perceived as the potential limitations to agricultural mechanization which are of much concern.

c) a combination of inadequate loan policy, lack of cooperation between agricultural agencies, lack of appropriate implements,lack of effective extension program, inadequate mechanization development policy, and lack of water ,are perceived as the potential limitations to agricultural mechanization which are of some concern.

d) it may be further concluded that in the perceptions of extension workers many factors can be recognized as definitely limiting the development of agricultural mechanization in the Province of Chefchaouen and that these factors seem to be respectively concentrated in geographical, educational, and economical aspects.

Recommendations

The researcher may present the following recommendations, based upon an analysis of findings of the study.

Recommendation Related To the Extension Service Function

1. The data analysis indicates little, if any, perceived coordination between research extension and agricultural colleges. It is, therefore, recommended that the authorities design a coordinating body for these vital activities.

2. Since methods which could be classified as being more personal in nature such as "Results Demonstrations" and " Individual Visits" were highly valued as means of information dissemination of new ideas and practices, an increased use of these methods by extension workers is recommended in order to be of great benefit to the farm producer.

Recommendations Related to the Training of Extension Workers

1. The present in-place extension worker training program is at the proper level but the content should be altered to include emphasis on agricultural mechanization.

2. The agricultural mechanization portion of this program should incorporate training in the five areas of agricultural mechanization as established by this study in priority order as follows:

A. Agricultural Power, Machinery and Practices
   a) tractor maintenance
   b) agricultural power fundamental
   c) farm machinery and practices
B. Soil and Water management
C. Farm Electrification
D. Agricultural Shop Work
   a) shop tools and equipment
   b) welding
   c) hot and cold metal work
E. Agricultural buildings and conveniences

Recommendations Related to the Agricultural Mechanization Development

Since certain factors were identified as possible limitations to the agricultural mechanization development, and because considerable identification of needs was given in the background information as well as in the introduction, the researcher wishes to make the followings recommendations:

1. At the national level, it is recommended that the government should attempt to provide the necessary financial and moral support to maintain concrete long-term schemes required to bring about mechanization improvement in the country.

2. At the provincial level, it is recommended that high priority should be given to develop one research center in this province and to the application of science and tech-

nology to solve the problems of the region.

3. Given the dimensions of the problems it would seem quite reasonable if an appropriate regional or provincial committee or any group of specialists are given the responsibility of developing a long-term program in terms of agricultural mechanization research and development.

4. It is recommended that the government make funds available to facilitate the purchase of improved equipments and take urgent steps to arrange for small farmers to have satisfactory access to institutional credit.

5. The adoption of improved farming practices including new form of farm mechanization generally depends upon the availability of improved tools which require well trained and careful operators. It is recommended, therefore, that extension centers be regarded as the most appropriate training medium for small farmers.

6. The technical efficiency of the farmer should be improved through the assistance of the extension and advisory service which should receive technical instruction on appropriate techniques from the competent specialists in the field of farm mechanization, appropriate technology, and farm machinery. Therefore, it is recommended that additional training in these fields should be provided for extension workers.

7. Parts and repair facilities for locally-made tools are generally available, since they are made from scrape metal and local timber. Parts and repair facilities imported or factory-made metal tools are less available in

the urban area and not available at all in rural areas. Therefore, it is recommended that the authorities carefully consider this problem and work on providing a solution to it.

8. Large-scale commercial operations can stimulate the development of local infrastructure which gradually orients the small and less-mechanized agricultural activities in the province to the market economy. It is recommended, therefore, that the government make serious efforts to incorporate the cooperation of such commercial organizations.

9. A comprehensive study will be necessary to better understand the farmers behavior towards mechanization in general and improved small machines in particular.

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APPENDIX

DATA COLLECTION INSTRUMENT

Introduction: You are assured that your responses to this interview will be held in complete confidence. However, if you consider any of the questions to be too personal or to deal with sensitive issues, you may free not to respond.

BACKGROUND INFORMATION

Are you married? Yes_____No_____

How many years have you worked in your present job? (Years of experience in extension)_____

What is your level of education acquired?
_____Elementary School_____Secondary School
_____Secondary Agricultural School_____B.S.(General) _____
B.S.(Agriculture)_____M.S.(Agriculture)

Please check the name and place of organization from which you acquired extension training.
_____Agricultural Service in Provincial Capital
_____Ministry Of Agriculture (Rabat)
Others_____

In your opinion extension workers should have completed preparation in : General High School_____Agricultural High School_____B.S. in General Agriculture
_____B.S. (Specialized Agriculture)_____General High School with minimum of 6 months training in extension
Others_____

At present, what degree of coordination and/or cooperations is there between extension services and agricultural colleges?
None_____Little_____Some_____Much_____Great deal

Please consider each of the methods of getting information listed below and react to it concerning its importance to help farmers to adopt new ideas and practices by circling the number.

	Great	Much	Some	Little	None
Result Demonstration	5	4	3	2	1
Radio	5	4	3	2	1
T.V.	5	4	3	2	1
Newspaper	5	4	3	2	1
Small Group Meeting	5	4	3	2	1
Extension Bulletins	5	4	3	2	1
Individual Visit	5	4	3	2	1

INSTRUCTIONS : Please consider each of the subject areas listed in the center column and react to it concerning your knowledge in the subject area. The left column of rating is for you to indicate the amount of knowledge you have in that subject area at the present time by circling the number.

The right hand column is for you to indicate the amount of additional knowledge or training you need about that subject area.

Please circle two ratings for each subject (present and desired)

To what extent do you now have knowledge about these subjects?					To what extent do you need more knowledge about these subjects?			
Great	Much	Some	None	Subject Area	Great	Much	Some	None
				Agricultural Shop Work				
				Shop Tools and Equipment				
3	2	1	0	1.Developing a Home Shop for Agricultural Mechanics.	3	2	1	0
3	2	1	0	2.Selecting and Using Hand and Power Tools.	3	2	1	0
3	2	1	0	3.Repairing and Sharpening Tools.	3	2	1	0
3	2	1	0	4.Safe Working Habits.	3	2	1	0
				Welding				
3	2	1	0	5.Welding with Electric Arc.	3	2	1	0
3	2	1	0	6.Welding by the Oxy. Process	3	2	1	0
				Hot and Cold Metal Work				
3	2	1	0	7.Cutting, Bending and Fastening Sheet Metal.	3	2	1	0
3	2	1	0	8.Soldering.	3	2	1	0

To what extent do you now have knowledge about these subjects?					To what extent do you need more knowledge about these subjects?			
Great	Much	Some	None	Subject Area	Great	Much	Some	None
				Agricultural Power, Machinery and practices				
				Agricultural power fundamental				
3	2	1	0	9. Fundamental Principles of Engines	3	2	1	0
3	2	1	0	10. Operating and Lubricating Engines.	3	2	1	0
3	2	1	0	11. Maintaining and Adjusting Internal Combustion Engines.	3	2	1	0
				Tractor Maintenance				
3	2	1	0	12. Servicing Tractor	3	2	1	0
3	2	1	0	13. Minor Tractor Repair	3	2	1	0
3	2	1	0	14. Selecting and Storing Tractor Fuels and Lubricants.	3	2	1	0
				Farm Machinery and Practices				
3	2	1	0	15. Maintaining and Servicing Transmitting Power by Belts, Chains, Gears and Clutches.	3	2	1	0
3	2	1	0	16. Tillage Implements	3	2	1	0
3	2	1	0	17. Tillage Practices	3	2	1	0
3	2	1	0	18. Seeding Machines	3	2	1	0
3	2	1	0	19. Seeding Practices	3	2	1	0
3	2	1	0	20. Fertilizer Machines	3	2	1	0
3	2	1	0	21. Fertilizer Practices	3	2	1	0
3	2	1	0	22. Chemical Weed Control	3	2	1	0
3	2	1	0	23. Harvesting	3	2	1	0

To what extent do you now have knowledge about these subjects?					To what extent do you need more knowledge about these subjects?			
Great	Much	Some	None	Subject area	Great	Much	Some	None
				Agricultural Buildings and Conveniences				
				Concrete Works				
3	2	1	0	24. Concrete Technology	3	2	1	0
3	2	1	0	25. Using Concrete Blocks and Concrete	3	2	1	0
				Sketching and Drawing				
3	2	1	0	26. Making Simple Sketches	3	2	1	0
3	2	1	0	27. Reading Blue Prints	3	2	1	0
				Farm Conveniences Sanitation				
3	2	1	0	28.Water Supply System	3	2	1	0
3	2	1	0	29.Plumbing Equipment	3	2	1	0
3	2	1	0	30.Sewage Disposal System	3	2	1	0
				Farm Electrification				
3	2	1	0	31.Electrical Sources and Terms	3	2	1	0
3	2	1	0	32.Electrical Safety	3	2	1	0
3	2	1	0	33.Basic Electrical Wiring	3	2	1	0
3	2	1	0	34.Electric Motors	3	2	1	0
				Soil and Water Management				
3	2	1	0	35.Recognize Soil Conservation and Water Management Problems	3	2	1	0
3	2	1	0	36.Recognize Soil and Water Conservation Techniques	3	2	1	0

To what extent do you now have knowledge about these subjects?					To what extent do you need more knowledge about these subjects?			
Great	Much	Some	None	Subject Area	Great	Much	Some	None
3	2	1	0	37. Lay out Terrace Lines, Construct and Maintain them	3	2	1	0
3	2	1	0	38. Land Leveling	3	2	1	0
3	2	1	0	39. Irrigation Water Required	3	2	1	0
3	2	1	0	40. Irrigation Crops	3	2	1	0
3	2	1	0	41. Methods of Applying Water to the Soil	3	2	1	0
3	2	1	0	42. Ditch Construction	3	2	1	0
3	2	1	0	43. Farm Drainage	3	2	1	0

To what extent do you feel the following factors are limitations for agricultural mechanization improvement?

	Great	Much	Some	Little	None
1. Lack of Water	5	4	3	2	1
2. Conditions of Roads	5	4	3	2	1
3. Lack of Trained Personnel in the Agricultural Sector	5	4	3	2	1
4. Lack of Adequate Capital and Credit in Agricultural Sector	5	4	3	2	1

	Great	Much	Some	Little	None
5. Lack of Effective Extension Program	5	4	3	2	1
6. Lack of Cooperation Between Different Agencies Serving Agriculture	5	4	3	2	1
7. Illiteracy among Farmers	5	4	3	2	1
8. Lack of Effective Research in the Area of Agricultural Mechanization.	5	4	3	2	1
9. Fragmentation of Holdings in Small Plots.	5	4	3	2	1
10. Lack of Cooperation and/or Coordination between Agricultural Colleges and Extension Services	5	4	3	2	1
11. High Cost of Machinery	5	4	3	2	1
12. Low Purchasing Power of Farmers	5	4	3	2	1
13. Limitation of Manufacturing to Big Implements	5	4	3	2	1
14. Inadequate Rural Electrification	5	4	3	2	1
15. Lack of Industrial Extension Programs to Educate Village Artisans in the Running of Small-Scale Industries	5	4	3	2	1
16. Absence or Inadequacy of Service and Maintenance Centers and Repair Shops	5	4	3	2	1
17. Lack of Trained Technical Cadres	5	4	3	2	1
18. Low Priority Given to Agricultural Mechanization Development by Government Agencies	5	4	3	2	1

	Great	Much	Some	Little	None
19. Inadequate Animal Drawn Implements	5	4	3	2	1
20. Inadequate Loan Policy	5	4	3	2	1
21. Combination of many Factors	5	4	3	2	1
22. Low Level of Knowledge on the part of Farmers and their Families	5	4	3	2	1
23. Lack of Knowledge in the Area of Agricultural Mechanization by Extension Agents	5	4	3	2	1

Introduction: Vous ete assurez que vos reponses a cet interview seront gardes on strict confidence. Cependant si vous jugez n'importe quelle question d'etre personnelle ou traitant un sujet sensible, vous pouvez ne pas repondre.

Ete vous marie? Oui_____Non_____

Combien d'annees avez vous travaille dans votre present poste? (Annees d'experience dans la vulgarisation)_____

Quel est votre niveau d'education aquis?
_____Ecole primaire_____College_____College Agricole
_____Universite_____Ingenieur d'application
_____Ingenieur d'etat

Veuillez indiquer le nom et le lieu des organismes ou vous avez effectue un stage de vulgarisation
_____Service de la mise envaleur agricole au niveau de la DPA
_____M.A.R.A
Autres_____

A votre avis le vulgarisateur doit avoir au moins:
_____Baccalaureat Generale_____Baccalaureat Agricole
_____Ingenieur en agriculture General_____Igenieur specialise_____Niveau Baccalaureat plus un stage de 6 mois minimum
Autres_____

Actuellement quel est à votre avis le degre de coordination et/ou cooperation entre les services de vulgarisation et les ecoles agricoles?

Nul_____faible_____Moyen_____Fort_____Tres Fort

Veuillez examiner chacune des methodes de vulgarisation citer ci-dessons et evaluer les selon leur importance et efficacite

	T. Efficace	A. Efficace	M. Efficave	P. Efficace	N. Efficace
Demonstration	5	4	3	2	1
Radio	5	4	3	2	1
T.V.	5	4	3	2	1
Journaux	5	4	3	2	1
Exposees	5	4	3	2	1
Bulletins	5	4	3	2	1
Visits	5	4	3	2	1

Instructions: Veuillez examiner chacune des matieres de formation en mecanisation agricole indiquee ci-dessous centre, et classer la selon votre connaissance dans la matiere. la colonne d'evaluation gauche est reservee pour evaluer vos connaissances en la matiere en question actuellement en entourant le chiffre correspondant.

La colonne d'evaluation droite est reservee pour indiquer vos besoins de connaissance en la matiere en question en entourant le chiffre correspondant.

Jusqu' a quel point maitrisez vous ces matieres?					Jusqu'a quel point estimez vous vos besoins dans ces matieres?			
Beaucoup	Assez	Moyen	Nul	Matieres	Beaucoup	Assez	Some	Nul
				Atelier Mecanique				
				Outils et Equipements				
3	2	1	0	1. Equipement et Organisation d'un Atelier Mecanique	3	2	1	0
3	2	1	0	2. Choix et Utiliation des Outils a Main et des Outils Mecaniques	3	2	1	0
3	2	1	0	3. Reparations et Aiguisement des Outils	3	2	1	0
3	2	1	0	4. Precaution de Travail	3	2	1	0
				Soudure				
3	2	1	0	5. Soudure a l'Arc Electrique	3	2	1	0
3	2	1	0	6. Soudure a l'Oxyacetylene	3	2	1	0
				Manipulation du Metal Froid et Chaux				
3	2	1	0	7. Coupage, Pliage et Serrage des Feuilles Metaltiques	3	2	1	0
3	2	1	0	8. Soudure	3	2	1	0

Jusqu' a quel point maitrisez vous ces matieres?					Jusqu' a quel point estimez vous vos besoins dans ces matieres?			
Beaucoup	Assez	Moyen	Nul	Matieres	Beaucoup	Assez	Moyen	Nul
				<u>Puissance Agricole, Machines et Techniques Culturales</u>				
				<u>Principes Fondamentaus des Puissances Agricole</u>				
3	2	1	0	9. Principes Fondamentaux des Moteurs	3	2	1	0
3	2	1	0	10. Mise en Marche et Lubrication des Moteurs	3	2	1	0
3	2	1	0	11. Entretien des Moteurs a Combustion Interne	3	2	1	0
				<u>Entretien du Tracteur</u>				
3	2	1	0	12. Maintenance du Tracteur	3	2	1	0
3	2	1	0	13. Petites Reparations	3	2	1	0
3	2	1	0	14. Choix et Stockage du Carburant et du Lubrifiant du Tracteur	3	2	1	0
				<u>Machines Agricoles et Techniques Culturales</u>				
3	2	1	0	15. Entretien des Systems de Transmission par Courroie, Chaine, Boite a Vitesse et Embrayage	3	2	1	0
3	2	1	0	16. Material de Travail du Sol	3	2	1	0
3	2	1	0	17. Techniques des Travaux du Sol	3	2	1	0
3	2	1	0	18. Semoirs	3	2	1	0
3	2	1	0	19. Techniques de Semis	3	2	1	0

Jusqu' a quel point maitrisez vous ces matieres?					Jusqu' a quel point estimez vous vos besoins dans ces matieres?			
Beaucoup	Assez	Moyen	Nul	Matieres	Beaucoup	Assez	Moyen	Nul
3	2	1	0	20. Epandeurs d'Engrais	3	2	1	0
3	2	1	0	21. Techniques d'Epandage d'Engrais	3	2	1	0
3	2	1	0	22. Luttle Contre les Mauvaises Herbes	3	2	1	0
3	2	1	0	23. Moisson	3	2	1	0
				<u>Batiment Agricole, Annexes Beton</u>				
3	2	1	0	24. Technologie du Beton	3	2	1	0
3	2	1	0	25. Utilisation du Beton Block et Sable	3	2	1	0
				<u>Croquis et Dessins</u>				
3	2	1	0	26. Realisation de Simple Croquis	3	2	1	0
3	2	1	0	27. Lecture des Plans	3	2	1	0
				<u>Commodites et Installations Sanitaires de la Ferme</u>				
3	2	1	0	28. Adduction de l'Eau Potable	3	2	1	0
3	2	1	0	29. Plomberie	3	2	1	0
3	2	1	0	30. Systeme des Eaux des Agents	3	2	1	0
				<u>Electrification de la Ferme</u>				
3	2	1	0	31. Sources d'Energie Electrique et nomenclature	3	2	1	0

Jusqu' a quel point maitrisez vous ces matieres?					Jusqu' a quel point estimez vous vos besoins dans ces matieres?			
Beaucoup	Much	Moyen	Nul	Matieres	Beaucoup	Assez	Moyen	Nul
3	2	1	0	32. Precautions de Travail	3	2	1	0
3	2	1	0	33. Instalations Electriques	3	2	1	0
3	2	1	0	34. Moteurs Electriques	3	2	1	0
				<u>Amenagement des Sols et des Eaux</u>				
3	2	1	0	35. Identifier les Problemes de Conservation des Eaux et des Sols	3	2	1	0
3	2	1	0	36. Identification des Techniques Appropriees de la Conservation des Sols et des Eaux	3	2	1	0
3	2	1	0	37. Realisation des Terrasses et des Banquettes	3	2	1	0
3	2	1	0	38. Nivellement du Sol	3	2	1	0
3	2	1	0	39. Determination des Besoins en Eaux	3	2	1	0
3	2	1	0	40. Irriguation des Cultures	3	2	1	0
3	2	1	0	41. Techniques d'Irriguation	3	2	1	0
3	2	1	0	42. Ouvrages de Derivation	3	2	1	0
3	2	1	0	43. Drainage	3	2	1	0

Jusqu'au quel point ponsez-vous que les facteurs suivant sont limitatifes pour le developement du la mecanisation Agricole.

	T. Limitant	A. Limitant	M. Limitant	P. Limitant	N. Limitant
1. Manque d'eau	5	4	3	2	1
2. Conditions des routes	5	4	3	2	1
3. Manque du personel qualifie dans le domaine agricole	5	4	3	2	1
4. Manque de capital et de credit pour le secteur agricole	5	4	3	2	1
5. Manque de programmes efficace de vulgarisation	5	4	3	2	1
6. Manque de cooperation entre les differents organismes agricoles	5	4	3	2	1
7. Analphabetisation des agriculteurs	5	4	3	2	1
8. Manque des recherches efficaces dans le domaine de la mecanisation agricole	5	4	3	2	1
9. Morcellement des parcelles	5	4	3	2	1
10. Manque de cooperation et/ou coordination entre les ecoles d'agriculture et le service de vulgarisation	5	4	3	2	1
11. le cout des machines agricoles est tres eleve	5	4	3	2	1
12. le pouvoir d'achat est faible	5	4	3	2	1
13. Disponibilite de la game du gros materiel agricole uniquement	5	4	3	2	1

	T. Limitant	A. Limitant	M. Limitant	M. Limitant	N. Limitant
14. Electrification rurale est insuffisante	5	4	3	2	1
15. Manque de programmes industriels de vulganisation pour la promotion des petites unites artisanales et industrialles	5	4	3	2	1
16. Manque des ateliers de reparation	5	4	3	2	1
17. Manque de techniciens en machinisme agricole	5	4	3	2	1
18. les organismes agricoles accordent peu d' interet au development de la mecanisation agricole	5	4	3	2	1
19. le material a traction animal est inadequat	5	4	3	2	1
20. La politique de distributions de credits est inadequate	5	4	3	2	1
21. Combinaison de plusieurs facteurs	5	4	3	2	1
22. le niveau intellectueI des agriculteurs et de leur familles est faible	5	4	3	2	1
23. Manque de connaissances concernant la mecanisation chez le vulgarisateur	5	4	3	2	1

VITA

Abdelhamid Mesbah

Candidate For The Degree Of

Master Of Science

Thesis: PERCEPTIONS OF AGRICULTURAL EXTENSION AGENTS AS TO INCREASING AGRICULTURAL MECHANIZATION IN THE PROVINCE OF CHEFCHAOUEN, MOROCCO

Major Field: Agricultural Education

Biographical:

Personal Data: Born in Tefraouen, Province of Chefchaouen, Morocco, October 19, 1956, the son of Abdullah Mesbah and Rahma Hayoun.

Education: Graduated from AbdulMalek Assadi high school, Kenitra, Morocco, in June 1977; received the diploma in Agricultural Engineering at the Hasan II Agronomic and Veterinary Institute of Rabat, Morocco, in July 1982, completed the requirements for Master of Science Degree in Agricultural Education at Oklahoma State University, in December 1989.

Professional Experience: Five years working in the Directoriate of Provincial of Agricultural of Chefchaouen as Head of the Equipment Section of Agricultural Extension Centers (1983-1985), then as Head of Management Control Office of Agricultural Extension Center (1986-1987).