

PN-AAN-560
ISN: 31750

THE CONSEQUENCES OF SMALL RICE FARM MECHANIZATION PROJECT

Working Paper No. 16

MECHANIZATION POLICY AND THE NATIONAL AGRICULTURAL
MECHANIZATION COUNCIL - PHILIPPINES

By

Reynaldo M. Lantin
Institute of Agricultural Engineering & Technology
U. P. at Los Baños

1981

The Consequences of Small Rice Farm Mechanization Project is supported by the United States Agency for International Development under Contract tac-1466 and Grant No. 931-1026.01 and is being implemented by the International Rice Research Institute and the Agricultural Development Council, Inc.

ABSTRACT

This paper presents an overview of agricultural mechanization in the Philippines by discussing a brief history of the events that led to the realization of the need for a sound agricultural mechanization policy. It also briefly discusses the present status of the Philippine agricultural machinery industry outlining the factors that contribute to the need for policies in this area and for a governing body to implement these policies. Results of the First Philippine Agricultural Mechanization Policy Workshop held on December 11-12, 1980, emphasizing the policies proposed in the workshop, are reported. The establishment of the National Agricultural Mechanization Council (NAMC), the governing body that will approve and implement the proposed and future policies on agricultural mechanization in the country is also discussed.

INTRODUCTION

The importance of having policies and strategies in agricultural mechanization has been long recognized in the Philippines by both the government and the private sector. However, only in the past few years have definite steps been taken to formulate such policies.

In the 1960's a bill seeking to constitute the "Magna Carta of Mechanized Agriculture, a progressive, massive and integrated agricultural program designed to mechanize, industrialize and commercialize Philippine agriculture" was nearly enacted into law by the defunct Congress but was taken over by Martial Law. A strong lobby by its proponents during Martial Law years (1972-1980) tried to get a Presidential Decree enacted, this time creating the "Agricultural Mechanization Authority". However, upon consultations with the local experts, the Philippine Society of Agricultural Engineers and the agricultural machinery industry, the Ministry of Agriculture did not endorse the proposed draft to the President. Arguments in favor of endorsement by the private industry came as a result of frustrations in getting the government to provide some direction or policy, imperfect though it may be, on the issue of agricultural mechanization so that the private sector and government planners could move accordingly.

Due to the strong clamor especially by the machinery industry, the Ministry of Agriculture, informally and cautiously formed an ad hoc Committee to draft policies on agricultural mechanization. Perhaps this move was a counteraction to the proposed establishment of the Agricultural Mechanization Authority which the Ministry of Agriculture opposed. In 1978, the draft policies were submitted to the Ministry of Agriculture but no action was taken. Through a process of consultations for review of the draft, the independent reviewers generally commented that the draft policies were lopsided in favor of the private machinery industry. Indeed, because of its aggressive representations during the deliberations, the Agricultural Machinery Manufacturers and Distributors Association (AMMDA) which represents the private agricultural machinery industry, succeeded in reflecting in the draft policy, statements which redound to its vested interests although it argued that what benefits manufacturers and distributors would also benefit the farmers. The counter argument and comments raised was, who would benefit the most. In conclusion, the draft policies died naturally. Nevertheless, it was a significant first step and contained many lessons and useful arguments and information which were to be a reference source in the next two years.

Action on the draft policies was held in abeyance until the acceptable revision was made.

Meanwhile, the Regional Network for Agricultural Machinery (RNAM) which started its Regional Office at UPLB in 1978 suggested to each participating government in the network the establishment of a National Farm Mechanization Committee which functions primarily as a policy-making body for agricultural mechanization. Through the Agricultural Mechanization Development Program (AMDP), the Philippine counterpart program to the PNAM, the National Agricultural Mechanization Council was proposed to be established in 1979 by the National Economic and Development Authority. Although the NAMC has not formally met, its ad hoc Technical Committee has prepared the groundwork in redrafting the policies and strategies, this time involving as many individuals from various government agencies, the private sector, the academe and the farmers, and taking advantage of international experts from PNAM, IFRI, SEARCA, FAO, ESCAP and UNIDO. Five committees were formed to work on the policies and strategies on (1) conceptual framework including institutional infrastructures, (2) research and development, (3) manufacturing and supply, (4) marketing, (5) financing and credit, and (6) education and training. Thus working papers became ready for the First Agricultural Mechanization Policy Workshop held on December 11-12, 1980.

BRIEF STATUS OF AGRICULTURAL MECHANIZATION

Labor and Employment

The Philippines is mainly agricultural. The labor force which grows at an annual rate of three percent has tended to be absorbed by agriculture. The present labor force in the rural areas is about 67% of the work population.

Displacement of labor by agricultural mechanization is a controversial issue, although studies conducted by IRRI (Duff, 1978) indicated a decrease in labor input requirement for more tedious operations (land preparation) and an increase in total labor requirement for lesser tedious operations (weeding).

The Agricultural Machinery Industry

The Philippine agricultural machinery industry is presently characterized by importation although there are efforts to substitute some parts of agricultural machinery with locally manufactured ones to reduce costs and to be competitive. However, tariffs, duties, lengthy clearance requirements, restrictions and conflicting tax policies when implemented, tended to favor more importation than local manufacturing. This results in more expensive machinery for the farmers and less incentive for the manufacturer.

Although the industry is currently in a slump it enjoyed a boom in 1975. This boom was attributed to the following factors: (1) a favorable climate contributed by then on-going Central Bank-IBRD Rural Credit Program and other government loans, (2) the high price of sugar in the world market at that time, (3) the incidence of hoof and mouth disease, (4) the maturing of industrial extension efforts of power tillers by IRRI, (5) the proliferation of credit program and corporations, (6) the enthusiasm of agricultural technicians in the introduction of HYV's and other technology packages, and (7) the introduction of the integrated area development program.

The current slump in the market is being attributed to the following: (1) the increase in oil prices, (2) the unstable price of sugar and coconut in the world market, (4) the recently imposed restrictions and taxes, (5) the low returns from farm products

In spite of the slump, small and medium scale manufacturers produce at a limited scale single-axle tractors, rice threshers, irrigation pumps, rice dryers and mills, hand tools, weeders, and other animal drawn implements. Several small fabricators either closed down or diversified to industrial machines and small contract fabrication jobs.

The AMMDA which was established to protect industry interest has membership coming from large and medium scale firms only. The small scale fabricators are practically excluded due to financial difficulties and lack of perceptible benefits derived in joining the association. Because of this, the small fabricators are practically not represented in government discussions which affect them.

A government body regulates the dealer network and spare parts supply as well as the pricing of agricultural machinery. Created in 1978 this body is called the Agricultural Machinery Distributors Accreditation Committee (AMDAC).

The Agricultural Machinery Testing and Evaluation Center (AMTEC) was established to respond to the problems of low quality and lack of standards in the local manufacture of agricultural machinery. It is expected that by subjecting commercial machinery to independent testing, financing institutions, farmers and machinery distributors shall be guided properly. The AMTEC is still preparing the test equipment and laboratory.

Areas of the industry that need improvement are the following: (1) efficiency in the procurement of raw materials and finished products (2) their manufacture, marketing and distribution, and (3) general government management especially in areas where regulations and deregulations should be more appropriate and conducive to a better business climate.

The predominantly small scale manufacturing industry needs financial, institutional and technical assistance to attain efficient production and marketing systems to increase viability of the agricultural machinery industry. There is still a long way to go towards a truly local manufacturing industry. Streamlining of sometimes conflicting government policies could be a step towards this goal.

Similarly, the absence of definite policies cannot provide a feeling of security for the entrepreneurs. Hence, their tendency is to direct their investments to other ventures of lesser risks than agricultural machinery manufacture and distribution.

Thus, until a business climate similar to or better than what prevailed in 1975 exists the agricultural machinery industry seems to be doomed to stagnation if not retrogression. It is hoped that sound agricultural mechanization policies would restore a favorable climate and benefit both the manufacturers and the farmers.

PROPOSED POLICY STATEMENTS

Realizing the need for a definite direction in the country's agricultural mechanization sector and the need for working papers for the National Agricultural Mechanization Council (NAMC), the Ministry of Agriculture, in cooperation with UPLB and the Philippine Council for Agriculture and Resources Research (PCARR) organized the "First Philippine Agricultural Mechanization Policy Workshop" on December 11 and 12, 1980 at the Ministry of Agriculture in Diliman, Quezon City. It was attended by government officials, manufacturers,

distributors, educators, fabricators, farmers, policy makers and various personnel involved in the industry.

Policy statements and strategies were formulated in the areas of: (1) research and development of agricultural machinery, (2) education and training of agricultural mechanization personnel, (3) financing and credit of agricultural machinery, (4) manufacturing and supply of agricultural machinery, and (5) its marketing and distribution. In addition, the conceptual framework for agricultural mechanization policy was established,

Although the policy statements and concepts are yet to be officially approved by the NAMC, their formulation is a big step towards the setting of the direction of the agricultural mechanization in the country.

Research and Development of Agricultural Machinery

The adoption of "appropriate mechanization technology" is the main objective of the research and development area. By appropriate mechanization technology is meant scientific methods suitable to local conditions which include technical, economic, social and political factors.

Technically, a machine may be the best of its kind but if the farmers cannot afford it or it is not economically sound then it is not an appropriate machine.

To avoid undue wastage local research should be directed towards the investigation of already existing designs and models, and modifying them to suit local conditions. An example of this is the "Chinese Reaper" which came from the People's Republic of China and was modified by IRRI or the Chinese rice transplanter which is being modified by UPLB.

It was agreed upon at the workshop that the adoption of appropriate technology should be based on these important factors:

1. Agronomic factors such as soil types and commodities being or yet to be cultivated.
2. Environmental and physical factors such as climate, locality, and extent of infrastructure development.

3. Availability of adequate energy supplies.
4. Availability of labor resources.
5. Socio-economic condition of farmers such as income levels, general skills known, educational attainment, attitude and values towards the use of new technology, access to production inputs and financial resources, and farm size.
6. Development of an institutional base in the rural areas to support cooperatives, extension of credit and training, a supply and service network, and rural-based industrial organizations.
7. Development thrusts in the regions or localities targeted.

With these factors in mind the following policy statements were agreed upon:

1. Research and development shall be directed to problems whose solutions will lead to the development of more efficient levels of mechanization whenever appropriate.
2. Research and development shall encourage further development of promising patented and farmer inventions related to agricultural machinery.
3. Research and development shall support the food and nutrition program of the government.
4. Government and private institutions shall provide more emphasis on applied research especially on developing indigenous energy resources.
5. Government shall encourage the development of promising researches related to agricultural mechanization; likewise the private sector shall be encouraged to conduct similar activities.
6. Research and development activities shall be followed through by extension work.

Education and Training of Agricultural Mechanization Personnel

Educational and training programs that will improve the competence of local engineers in the design and development of agricultural machinery shall be developed. These should embrace testing, evaluation and experimental work, developing systems and methods, design structure of equipment for machinery repair, developing machinery use and other management methods.

Local farmers also need education on the proper utilization and management of farm machinery. Training programs in this aspect should emphasize the cultivation of desired social orientation and work attitudes.

With adequate government support a continuing long-range comprehensive, and multidisciplinary education and training program shall be formulated and implemented in agricultural mechanization.

To do these more effectively, linkages with the following sectors of the industry will be established: (1) farmers' organizations to facilitate extension work and adoption of the appropriate agricultural mechanization technology; (2) universities, colleges, professional organizations and other institutions to coordinate research and extension activities; and (3) international institutions which have appropriate technology dissemination programs.

With these factors in mind, the following policy statements were formulated:

1. A continuing education and training program in agricultural mechanization shall aim to develop skills among: (1) farmers, owners and operators, (2) mechanics and technicians, (3) extension workers, (4) dealers, (5) manufacturers fabricators, craftsmen and rural artisans, and (6) engineers.
2. A long range comprehensive multi-disciplinary training program shall be instituted to ensure adequate manpower for agricultural mechanization.
3. Educational institutions offering agricultural courses shall include in their curricula the training of people who shall be competent in all phases of manufacturing and utilization of agricultural machinery.

4. The government shall provide adequate funding mechanisms to support a sustained educational and training program in agricultural mechanization.
5. Institutional linkages among public and private agencies which conduct training and research activities related to agricultural mechanization shall be established with a central body that will manage and coordinate these activities.

Financing and Credit of Agricultural Machinery

Time and again various agricultural development programs failed due partly to the absence of sound financing and credit programs. Since most farmers do not accumulate savings for the purchase of agricultural machinery, the lack of capital resources has prevented them from acquiring machinery. Hence, they incur penalty costs for not taking advantage of the benefits from agricultural mechanization.

To support a sound agricultural mechanization program the workshop participants agreed that the following factors should be taken into consideration in formulating a financing and credit program: (1) assured fund availability; (2) accredited prices set by the Agricultural Machinery Distributors Accreditation Committee (AMDAC) as benchmark prices; (3) lending to qualified farmers' association; (4) implementation of crop insurance schemes; (5) regular review of farm gate prices to determine the need for subsidies to farmers; (6) appropriate training of end-users in proper farm equipment handling and loan use; (7) promotion of crop diversification; and (8) after sales-service support to end users.

Also, to help improve the access of small farmers and manufacturers to mechanization inputs the lending programs of various credit institutions will be strengthened and re-oriented to the adoption of appropriate technologies on the farms. Linkages will also be established with lending institutions to provide credit and technical assistance; and government and private sectors to provide technical assistance, project formulation and feasibility studies.

In view of these, the following policy statements and strategies on financing and credit of agricultural machinery were agreed upon;

1. In support of the agricultural mechanization program, the government shall assure availability and proper management of funds for agricultural machinery and shall encourage public and private financing institutions to support local manufacturing, importation, distribution, retail sales and lease purchase of agricultural machines on terms and conditions advantageous to both the lenders and the borrowers.
2. Both government and private financing institutions shall take into consideration technologies and approaches appropriate to special localities.
3. Project viability and the borrower's credit status shall be given more emphasis than equity and collateral requirements.
4. Preferential interest rates and service fees shall be charged on farm mechanization loans by considering the cost of funds, administrative cost, lending risk and defaults. Private lending institutions shall be allowed a reasonable profit margin while sufficient grace period in repaying loans shall be allowed to borrowers.
5. The prices accredited by AMDAC shall be accepted as benchmark prices by government lending, servicing and auditing agencies and other instrumentalities involved in price monitoring and accrediting of suppliers.
6. The government shall continue with the incentives provided for in the Agricultural Investment Priorities Plan and the Investment Priority Plan.
7. To attain economies of scale, the government shall encourage lending to qualified "Samahang Nayan", Compact Farm Clusters, corporate farming and other farmers' associations.
8. Crop insurance shall be implemented to compensate farmers' crop losses while crop diversifications shall be encouraged to increase productivity.
9. Machinery manufacturers and distributors must ensure adequate maintenance of parts and service facilities to keep machines in good operating conditions. In case

of foreclosure, dealers shall assist financing institutions in reconditioning or reselling the equipment.

10. Farmers and end-users shall be trained by distributors/dealers in the proper handling of farm equipment and they shall be assisted by banks in efficiently allocating loan proceeds to avoid delinquency and other credit problems.
11. Farmers shall continue to receive government subsidies as exigencies arise. Farm-gate prices of farm produce shall be regularly reviewed to determine need for subsidies.

Manufacturing and Supply of Agricultural Machinery

Although most hand tools and implements are locally manufactured, powered machinery and their power units are largely imported. Except for some parts which can be substituted by locally manufactured ones, the supply is largely that from assembly of knocked-down machinery from abroad.

The government while encouraging local manufacture, realizes that it cannot entirely do away with importation of appropriate machines that are not technically and economically feasible to manufacture locally. However, due to the proliferation of brands and models of imported tractors, power tillers and engines, problems related to distribution, profitability and after-sales services are worsened and rationalization of the industry is needed. Hence, certain guidelines as to appropriateness of the machine, quality, parts and service support, price, etc. need to be established.

Local manufacturing will be streamlined with both the domestic and export markets in view. Low volumes and uneconomic production methods are brought about by lack of standards or no-enforcement of standardization guidelines. Hence, there is a need to standardize products. Tariff and taxes being instruments to encourage local manufacture need to be in consonance with the principles of comparative advantage and overall government policy.

For example, importation of used machinery while giving farmers relief in obtaining low cost machinery is disastrous to the local manufacturing industry. ASEAN cooperation shall be fostered while horizontal integration shall be encouraged to achieve specialization

and economics of scale.

International sub-contracting for the manufacture of agricultural machinery shall be encouraged.

Rural-based artisans and inventors shall be tapped to develop rural industries particularly those related to the manufacture of agricultural machinery. Cottage and small industries may play the role as suppliers of components, sub-assemblies and equipment of bigger industries.

Local manufacture of equipment to produce alternative sources of energy such as biogas shall be pursued

Linkages will also be established with agricultural machinery suppliers to assist in promoting agricultural mechanization, maintaining quality control, and reducing costs.

With these as a basis the following policy statements on the manufacture and supply of agricultural machinery were formulated:

1. To support an agricultural mechanization program, manufacturing and distribution of agricultural machinery shall operate at optimum efficiency so as to provide quality products at reasonable prices with adequate parts and services support on a continuing basis. Overcrowding shall be prevented and proper business ethics shall be observed in the industry,

2. "Tied in" clauses in international grants or loans shall adhere to the concept of rationalization.

3. The government shall encourage the local manufacture of agricultural machinery to save and earn foreign exchange and create employment opportunities. No manufacturing program with incentive shall be adopted for mere assembly operations of any product unless there is a plan of going into its actual manufacture.

4. The importation of appropriate agricultural machinery which is not economically and technically feasible for the local manufacturer shall be encouraged. Otherwise, a manufacturing program may be adopted towards a progressive increase in local content.

5. Standardization of products shall be done in cooperation with the Philippine Bureau of Standards, AMTEC and other agencies.

6. The imposition and perpetuation of tariffs and taxes shall be in consonance with the general principles of comparative advantage and over-all government policy. All raw materials and components used in manufacturing shall have lower tariff duties and taxes than finished goods or assemblies,

7. Due to their adverse effects on manufacturing industry, second-hand machines similar to locally manufactured ones shall be subjected to immediate review by AMDP and AMTEC,

8. Without preventing vertical integration or multi-purpose production units, horizontal integration shall be encouraged to achieve specialization and economics of scale and to extend assistance to small industries.

9. Rural-based artisans and inventors shall be tapped to develop rural industries particularly agricultural machinery. Assistance shall be given in the form of upgraded and appropriate production equipment, establishment of adequate support industries, training, financing and credit, etc. These rural-based shops shall be encouraged to design and produce simple tools, implements and equipment.

10. Cottage and small industries shall be encouraged to act as suppliers of components, sub-assemblies and equipment to bigger industries. Strengthening of such industries like small foundries, forges machine shops, heat treatment shops, welding shops, and others shall include upgrading of facilities. New industries would increase employment opportunities and accelerate technology transfer in the rural areas.

11. To attain ASEAN goals in economic cooperation, regional cooperation through programs for manufacturing machinery shall be fostered.

12. To assist the government's export drive, international subcontracting for the manufacture of agricultural machines and components shall be encouraged.

13. The local manufacture of equipment to produce alternative sources of energy such as biogas, solar, windmill, and others shall be encouraged.

14. A policy on driers will be worked out to solve the key problem on post-harvest technology.

Marketing and Distribution of Agricultural Machinery

The following factors were considered in formulating policies for this aspect of agricultural mechanization: (1) reasonable pricing of agricultural machinery; (2) adoption of an appropriate single accreditation system based on appropriateness and quality of product, financial capability of manufacturers/distributors, reasonable pricing, and adequate after-sales parts and service support; (3) promotion of exports of agricultural machinery with proper incentives; (4) encouragement of selling to qualified agricultural cooperatives and farmers' associations; (5) coordination between government and private sectors in terms of exchange of relevant marketing information, statistics, government plans and programs; and (6) preferential fuel allocation to the agricultural sector.

The following policy statements are based on the above factors:

1. Pricing of agricultural machines shall be at reasonable levels so that farmers can afford to buy them to increase their productivity and income and, at the same time, give the manufacturers, distributors and dealers reasonable margins to ensure that they stay in business and provide after-sales support to their customers.

The government shall adopt an appropriate single accreditation system for manufacturers, distributors, and dealers as well as tied-in loans, reciprocal trade arrangements, turn-key projects and government agricultural programs through a national accrediting body which shall set up standard guidelines for the following:

1. appropriate product of acceptable quality;
2. financial capability;
3. reasonable pricing; and
4. adequate after-sale parts and support services.

To ensure that agricultural machinery are utilized at optimum levels, AMTEC, AMDAC, the financial institutions and the industry shall evolve adequate standards of after-sale support facilities, including product warranties and strict monitoring of their implementation at the national and retail levels. Sanctions involving suspension from participating in government supported financing and procurement programs shall be prescribed.

2. Export of agricultural machinery shall be promoted and appropriate incentives shall be granted such as tax incentives or promotional expenses.
3. Selling through farmer's organizations such as cooperatives. Compact farms shall be encouraged and proper guidelines shall be evolved to ensure viability of the organization and enable them to provide necessary after-sale services to farmers.
4. Machinery distributors shall be encouraged to provide adequate support to local shops for after-sales services.
5. Government planned programs shall be shared with the industry. The gathering of marketing information and relevant statistics shall be promoted, coordinated and shared between the government and the industry.
6. The government shall give preference to the agricultural sector in the granting of fuel allocation and subsidies.

THE NATIONAL AGRICULTURAL MECHANIZATION COUNCIL

To ensure a systematic approach in the development of agricultural mechanization in each of the participating countries an overall governing body called the National Farm Mechanization Committee (NFMC) was recommended by Regional Network for Agricultural Machinery.

Creation of the NAMC

The National Agricultural Mechanization Council (NAMC) is the Philippine version of the NFMC. It was first created by the Ministry of Agriculture (MA) and the National Economic Development Authority in 1979. However, it is being elevated as a Presidential Executive Order to give it the more attention at the cabinet level that it deserves.

Functions of the NAMC

The NAMC is an inter-agency body whose main functions are the following:

1. To formulate and establish comprehensive policy guidelines for the development of agricultural mechanization;
2. To formulate short and long range programs for agricultural mechanization geared towards supporting the government's goals of a more diversified and higher level of production along with increased production efficiency and lower costs of production;
3. To coordinate, integrate and evaluate all policies, programs and activities on agricultural mechanization of all sectors and agencies charged with its implementation thereof;
4. To call on any Ministry, bureau, office, agency, and other instrumentalities of the government for assistance in the forms of manpower, financial, and other resources, as the need arises in the performance of its functions;
5. To perform such other functions as may be necessary to attain the objectives of the agricultural mechanization development programs.

Membership of the NAMC

The NAMC membership comes from both the government and the private sector.

The government sector representatives are the Ministers of Agricultural Industry, Energy, the National Science Development Board, the Director-General of the National Economic and Development Authority, the Governor of the Central Bank of the Philippines, the Administrator of the National Food Authority, and the Chancellor of the University of the Philippines at Los Baños.

The private sector representatives are the Presidents of the Agricultural Machinery Manufacturers and Distributors Association, the Philippine Society of Agricultural Engineers and the Federation of Farmers' Associations.

The Chairman of the NAMC is the Minister of Agriculture. He may call on representatives of other government and private agencies, organizations and institutions as the need arises.

The Organizational Structure of the NAMC

The Figure shows that the NAMC is advised by Technical Committee which shall be composed of five chairmen of standing committees and experts who may be appointed. The functions of the NAMC are discharged through the Executive Director who shall have full time administrative staff, consultants and five Technical Coordinators each of whom is coordinating with and is a member of the corresponding standing committee.

The Executive Director shall coordinate with heads or leaders of the different agencies, programs, projects which have or whose activities impinge on agricultural mechanization activities. Thus, the NAMC has an integrated grasp of the mechanization situation without necessarily stepping on the toes of the various government agencies,

Standing Committees of the NAMC

The NAMC has the following standing committees:
a) Committee on research and development; b) Committee on education and training; c) Committee on Manufacturing and supply; and d) Committee on Marketing; and e) Committee on finance and credit. Each of these committees have specific functions and members from government and private sectors.

Proposed Activities of the NAMC

The following tentative activities were proposed by the Ad Hoc Technical Committee to attain the objectives of NAMC:

1. Provision of full time staff headed by Executive Director to service NAMC.
2. Preparation of status papers by the executive committee on different aspects of mechanization.
3. Executive staff of technical coordinators of NAMC to meet periodically for determining farmers' and manufacturers' needs,
4. Assistance by RNAM experts and consultants to above staff whenever necessary and on request.
5. First half-yearly meeting* of NAMC in January 1982, '83, '84.
6. Second half-yearly meeting of NAMC in July, 1982, '83 '84, and submission of report to the Ministry of Agriculture.
7. Circulation of NAMC reports by the Executive Staff.
8. Strengthening linkages with other allied agencies,
9. Consultants and experts for assisting NAMC on request.

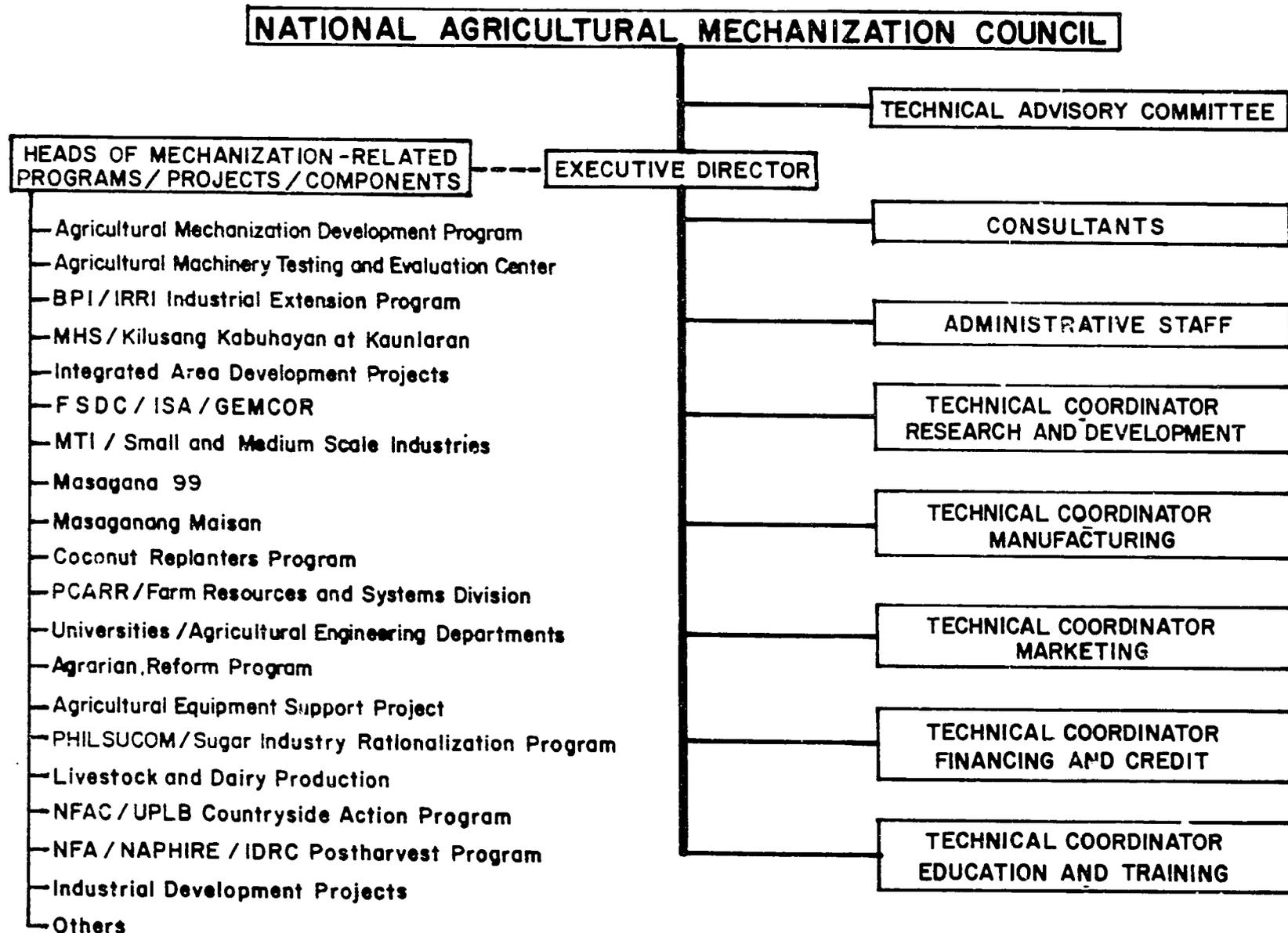
*Organizational meeting to be held in September 1981.

10. Assistance to strengthen Philippine Society of Agricultural Engineers (PSAE).
11. Regional workshops of representatives of societies of agricultural engineers on mechanization and regional cooperation.
12. Regional workshops on representatives of manufacturers' associations for regional cooperation.
13. Organize exchange of literature, journals, yearbooks, special publications, etc.

REFERENCES

1. Duff, Bart. 1978. Output, Employment and Mechanization in Philippine Agriculture. Paper presented at the International Symposium on Farm Mechanization in Asia. Tokyo, Japan.
2. Ministry of Agriculture, Philippine Council for Agriculture and Resources Research and University of the Philippines at Los Baños. 1980. Proceedings of the First Philippine Agricultural Mechanization Policy Workshop held on 11-12 December 1980. Diliman, Quezon City, Philippines.

Organizational Structure of the
NATIONAL AGRICULTURAL MECHANIZATION COUNCIL



CONSEQUENCES OF SMALL RICE FARM MECHANIZATION PROJECT

Working Papers

1. Juarez, F. and B. Duff. The Economic and Institutional Impact of Mechanical Threshing in Iloilo and Laguna. October 1979.
2. Pathnopas, R. The Economics of Rice Threshing Machines in Thailand: A Case Study of Chachoengsao and Supanburi Provinces. October 1979.
3. Gardezi, J., A. Rauf, M. Munir, K. Altaf, Q. Mohd-ud-Din, and B. Lockwood. A Study of Mechanical and Traditional Wheat Threshing in Multan District, Punjab, Pakistan: Some Preliminary Results. October 1979.
4. Habito, C. and B. Duff. A Simulation Model to Evaluate Mechanization of Rice Postharvest Operations in the Philippines. October 1979.
5. Chapman, J. The Potential of Mechanization for Crop Intensification in a Rainfed Area - Iloilo, Philippines. October 1979.
6. Thapa, G. The Economics of Tractor Ownership and Use in the Nepal, Terai. October 1979.
7. Jongswat, N. Productivity Growth and Farm Machinery Adoption in Thai Agriculture. April 1980.
8. Bernsten, R.H. and R. Sinaga. A Methodology for Identifying Lowland Rice Farms that Would Benefit from the Mechanization of Land Preparation. October 1979.
9. Bernsten, R. H. and A. Rochim. Labor Shortage as a Constraint to Increasing Cropping Intensity. Revised March 1980.
10. Ayob, A.M. The Economics and Adoption of the Combine Harvester in the Muda Region of Malaysia. October 1979.
11. Lubis, R. Impact of Cropping Pattern Technology on Income, Employment and Production: A Case Study on Expanded Crop Production in Lampung. October 1979.
12. Wicks, J. A. Modelling the Consequences of Future Mechanization: An Outline of Possible Procedures. October 1979.
13. Khoju, M.R. and J. A. Wicks. Economics of Pump-Irrigation in Eastern Nepal. August 1980.
14. Tan, Y. L., J.P.G. Webster and J. A. Wicks. The Decomposition of Differences in Output Between Two Groups of Farms. Revised 1981.

15. Herdt, R. W. Mechanization of Rice Production in Developing Asian Countries: Perspective, Evidence, and Issues. September 1981.
16. Lantin, R. M. Mechanization Policy and the National Agricultural Mechanization Council - Philippines. September 1981.
17. Lockwood, B. Farm Mechanization in Pakistan: Policy and Practice September 1981.
18. Wiboonchutikula, P. The Total Factor Productivity Growth of the Three Digit Manufacturing Industries in Thailand. September 1981.
19. Ahammed, C. S. and R. W. Herdt. A General Equilibrium Analysis of the Effects of Rice Farm Mechanization in the Philippines. September 1981.
20. Mikkelsen, K. and N. Langam. Technology Change in the Philippine Agricultural Machinery Industry. September 1981.
21. Boughton, D. Energy Use in Alternative Rice Production Systems in Nueva Ecija, Central Luzon, Philippines. September 1981.
22. Hurun, A. Financial Analysis of Power Tiller Ownership in Mariuk Village, West Java, Indonesia. September 1981.
23. Hafisah, J. The Economics of Tractor Operation and Use in South Sulawesi, Indonesia. September 1981.
24. Maranan, C. L. A Comparative Analysis of Tractor Contract Operations in Nueva Ecija, Philippines, 1972 and 1980. September 1981.
25. Monge, V. S. and B. Duff. Analysis of the Demand for Farm Power for Small Rice Farm Agriculture in Nueva Ecija, Philippines. September 1981.
26. Munir, M. An Evaluation of the Farmers' Decision-Making for Investment in Farm Machinery. September 1981.
27. Jabbar, M. A., Md.S. R. Bhuiyan and A. K. Maksudul Bari. Causes and Consequences of Power Tiller Utilization in Two Areas of Bangladesh. September 1981.
28. Juarez, F. and R. Pathnopas. A Comparative Analysis of Thresher Adoption and Use in Thailand and the Philippines. September 1981.
29. Ahmed, J. U. Labour Use Pattern & Mechanization of Paddy Postharvest Processing in Bangladesh. September 1981.
30. Colter, J. M. The Impact of Handtractors on Income and Employment Opportunities of Migrant Laborers in Java. September 1981.

31. Santoso, K. The Potential for Agricultural Mechanization and Labor Markets in East Java. September 1981.
32. Bernsten, R. H. Effects of Mini-Tractor Mechanization on Employment and Labour Use Intensity, Sidrap and Pinrang, South Sulawesi, Indonesia. September 1981.
33. Collier, W. Improved Cropping Patterns, Labor Absorption and Small Farm Mechanization in Indonesia. September 1981.
34. Moran, P. B. and E. Camacho. Consequences of Farm Mechanization Project Site Description: Philippines. September 1981.
35. Generalla, A. C. and A. Aguilar. Effects of Mechanization on Intensity of Land Use. September 1981.
36. Tan, Y. and J. A. Wicks. Production Effects of Mechanization. September 1981.
37. Sison, J. F. and P. B. Moran. Farm Labor Utilization and Employment in Two Selected Municipalities in Nueva Ecija - A Preliminary Analysis. September 1981.
38. Saefuddin, Y. Site Description: Mechanization Consequences Project in West Java, Indonesia. September 1981.
39. Handaka, S. Effects of Mechanization on Intensity of Land Use, West Java, Indonesia. September 1981.
40. Handaka, S. A Technical and Economic Evaluation of Rice Mills in West Java, Indonesia. September 1981.
41. Sinaga, R. Effects of Mechanization on Productivity: West Java, Indonesia. September 1981.
42. Sinaga, R. Effects of Mechanization on Productivity: South Sulawesi, Indonesia. September 1981.
43. Sri-Bago, A. The Impact of Mechanization on Production and Employment in Rice Areas of West Java, Indonesia. September 1981.
44. Maamun, Y. Site Description: Mechanization Consequences Project in South Sulawesi. September 1981.
45. Sarasutha, I. G. P. and R. Bernsten. Effect of Mechanization on Intensity of Land Use, South Sulawesi, Indonesia. September 1981.
46. Bockhop, C. W. and M. Nafziger. The Impact of Economics upon the Design of Machinery at IRRI. September 1981.

47. Wattanutchariya, S. Economic Analysis of Farm Machinery Industry and Tractor Contractor Business in Thailand. September 1981.
48. Hussain, K. A. An Assessment of Capacity of Workshops and Farmers To Repair and Maintain Farm Machinery in District Faisalabad: Summary of Major Findings and Policy Recommendations. September 1981.
49. Gonzales, L. A. and R. W. Herdt. Evaluating the Sectoral Impact of Mechanization on Employment and Rice Production in the Philippines: A Simulation Analysis. September 1981.
50. Khoju, M. R. The Economics of Pump Irrigation in Eastern Nepal. September 1981.
51. Sudaryanto, T. The Effect of Tubewell on Income and Employment: A Case Study in Three Villages in Kediri, East Java, Indonesia. September 1981.
52. Santoso, K. Economics of Pumpsets in East Java. September 1981.
53. Wicks, J. A. and M. A. Sumiran. Data Management for Analyzing the Consequences of Mechanization. September 1981.
54. Webster, J. P. G. An Evaluation of Mechanization Data Using the FAO's Management Data Collection and Analysis System (FMDCAS). September 1981.
55. Lingard, J. Measuring the Impact of Mechanization on Output. September 1981.

JW/hhr