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RESEARCH ON THE EFFECTS
OF POWER PACKS ON COLOMBIAN VILLAGES

PHASE II

Progress Report No. 2

(15 September 1965 to 15 June 1966)

to the

Agency for International Development

Contract No. AID/csd-755

Stanley Lichtenstein

INTERNATIONAL RESEARCH INSTITUTE

July 1966

RESEARCH ON THE EFFECTS
OF POWER PACKS ON COLOMBIAN VILLAGES

PHASE II

Progress Report No. 2

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• Introduction

The chief purpose of this study is to determine the social, economic, and psychological impacts of the introduction and use of electricity generators in small rural villages, and to delineate the factors which influence these impacts. The study was initially conceived by the sponsoring agency as an observational project (i.e., one which would utilize interviews, observations, questionnaires, or other "passive" research techniques to learn of the "natural" impacts of electricity). In the report to AID covering Phase I, a four-week feasibility phase,* the research staff recommended a different research approach in order to maximize the utility of the research effort. It was proposed that an "active," or experimental, element be introduced, and that observations be made of the results of research-directed attempts to increase the positive effects of the electrical generators in several of the villages with minimal additional capital inputs. This general plan was accepted by the sponsoring agency as the basis for proceeding with Phase II. (See Memorandum of 11 March 1965, "Review of Contractor's Report on Phase I under Contract No. AID/csd-755, Research on the Effects of Power Packs in Colombian Villages.") Thus the focus of research was changed from observation of the simple introduction of electrical generators to experimental determination of particular motivational, organizational, and educational factors which could lead to effective local development when generators are made available.

On the basis of the revised research approach, data collection efforts, beginning with the first survey conducted in the summer of 1965,

* Spector, Paul, & Torres, Augusto. Phase I Report, AID/csd-755, 18 March 1965.

included procedures for identifying the organizational, motivational, and economic resources and potential of the towns. Information was thus gathered on production, consumption, use of time, available skills, attitudes and preferences, and other factors bearing on potential economic and educational practices related to the use of electrical power.

This report covers the period from 15 September 1965 to 15 June 1966. During this period the principal efforts were devoted to: (a) analysis of survey information, (b) development and use of interview and observation methods to obtain further information particularly in reference to the economic sphere of the communities and to related psychological and social factors, (c) analysis of these data, (d) development of administrative and technical procedures for providing training for both the proper operation and maintenance of the generators and for the overall administration of the power system, and (e) collection and analysis of information on potential markets for tentative economic innovations. Summaries of each of these tasks are presented below.

Survey Information

The questions asked and the categories used for analysis of the responses were presented in a previous report.* All responses were coded and machine tabulated. Frequency and percentage distributions were obtained separately for each community and for all communities combined. Means and standard deviations were also computed for the quantitative variables, and data on several new variables, based on combinations of the basic variables, were generated in the course of the computer analysis.

Comparison of communities indicated that, in general, the towns cover a wider range with respect to demographic and economic variables than with regard to attitudinal variables. For example, the percentage of families who have never been in debt ranges from 25 per cent in one community to 89 per cent in another, whereas 93 per cent of the families

*Lichtenstein, Stanley, Torres, Augusto, & Spector, Paul. Phase II, Progress Report No. 1, AID/csd-755, 21 September 1965.

in the former community and 88 per cent in the latter expressed favorable attitudes toward the use of credit.

The primary use of the survey data was to develop preliminary plans for realistic and feasible practices that might be suggested for specific communities. Generalizations (across communities) concerning attitudes and aspirations were summarized in a paper presented to the Tenth Inter-American Congress of Psychology in April. This paper is shown in Appendix A attached to this report.

• Interviews and Observations

In November and December 1965, the communities were revisited to obtain detailed information on economic resources and practices in the community and related psychological and social data. Samples of interviewees in each community were selected, on the basis of the survey data, to insure representation of each of three socio-economic classes. The criteria used included education, size of home, land and tool ownership, and age (number of family members under 12 or over 60 years of age). Of the total population in the 13 villages studied, 24 per cent of the families were classified in the highest socio-economic group, 33 per cent in the middle, and 43 per cent in the low group. In each village, approximately 15 per cent of each socio-economic group was selected for intensive interview, and observations were made of a variety of village conditions. Information was also obtained at this time with regard to each village's experience with the electrical generator.

The topics investigated during this period are shown in outline form in Appendix B, attached to this report. The findings on the generators, and recommendations based on these findings, were summarized in a supplementary report prepared in January 1966 and submitted to USAID/Colombia. A copy of this report is shown in Appendix C. Data on attitudes and aspirations concerning change were incorporated in the paper shown in Appendix A, and extensive analyses were done on production

and consumption patterns. These analyses, together with preliminary conversations held with key individuals in the villages, provided specific information on new economic practices that might be adopted in several of the villages. Analyses of other portions of the data collected at this time are still in process.

Training

On the basis of the findings and recommendations summarized in Appendix C, meetings were held with officials of USAID/Colombia and three Colombian institutions: Instituto Nacional de Recursos Hidraulicos y Electrificación (Electraguas), Accion Comunal, and SEMA (a national training organization). A coordinated plan was developed for training generator operators and administrators and for preparing training materials. The materials and detailed training procedures have been developed, and training in the villages is planned to begin early in July.

Market Information

On the basis of the preliminary research, it was estimated that generators could potentially contribute significantly to the development of six of the 15 towns in the sample with minor additional capital inputs. Interviews were conducted with industrial and individual consumers and with wholesalers and retailers for each of the tentatively identified economic practices. These interviews were held in the most realistic market area for each village. The questions used in these interviews, shown in Appendix D, were adapted from standard procedures developed and utilized in Colombia for national market surveys.

Market information was obtained about the following products or practices:

- a. Industrial starch derived from yucca. Two of the sites currently grow yucca and are favorably situated in relation to industrial consumers of starch (textile and clothing manufacturers and bakeries). Information was obtained on purchasers,

potential volumes, and prices. Preliminary analysis indicated that growers of yucca can double their income if they produce starch. In one village, for example, with 85 producers of yucca, the current annual income from the sale of yucca of about \$9,500 could probably be increased to \$18,000. It is estimated that about \$3,000 of capital investment would be required for the equipment necessary to make and market

- b. Changes in tomato production and marketing. In one village, currently growing tomatoes on a one-harvest-per-year basis, it is estimated that a staggered harvest and a shift in market from a local food processing company to city retailers on large-volume consumers (such as restaurants) could result in a five-fold increase in income, with no increase in the amount of tomatoes produced. Possibilities of increasing production were investigated and favorable conditions were identified. The shift in marketing would necessitate the purchase of transportation equipment and the utilization of appropriate packaging methods. Approximately \$3,000 is the estimated requirement for this innovation.
- c. Purchase and use of ice-making equipment. In one of the fish-producing sites, located near an urban market, it is estimated that the income derived from the sale of fish could double if ice-making equipment were available. In the current marketing system, the villagers are dependent upon several wholesalers who bring the ice to the village and purchase only the most recently caught fish. With their own equipment, it would be possible to market and sell their entire catch and to receive a better price from the wholesaler. Capital investment of about \$2,000 would be needed to increase the village's "fish" income from \$15,000 to \$30,000 per year.
- d. Manufacture of Clothing. It is estimated that in one community as much as \$9,000 per year could be earned by making dresses,

men's work clothes, and children's apparel and marketing these throughout the local municipio. Interest in this practice is very high. The local 4-H Club has begun training 24 women and girls, the community has begun construction of a building for a sewing center, and the local priest has been making arrangements for distribution of the clothing through the retail outlets of the Coffee Growers Federation. It is estimated that approximately \$3,000 would be required, chiefly for electrical sewing machines.

- e. Motion pictures. In several communities which lack marketable products, it may be possible to utilize the available electrical power for showing motion pictures. The market data indicate that in one community approximately 60 per cent of the population attends movies at least once a week. These movies are presented three days per week by an itinerant group. To establish this practice, it would be necessary to organize a group of townspeople to select and rent the films, to manage the admission income and expenses, to handle publicity, and to operate the projectors. Approximately \$2,000 would be required for the purchase of equipment.

• Next Steps

It is planned to continue the organizational and training efforts in the experimental towns in conjunction with Accion Comunal and other Colombian agencies, maintaining maximal host national participation in the development projects. Systematic records will be kept of the steps taken, the problems encountered, their solutions and their ultimate outcomes within the period of the project. Specifically, the communities will continue to be involved actively in the fund-raising, planning, and implementation of new practices.

One of the major research questions to be investigated in this period is the hypothesis that habits, attitudes and values which have been

assumed to promote economic and social development will be strengthened by participation in even a moderately successful new enterprise. To test this, work has begun on the development of a series of procedures to measure such characteristics as: acceptance of change, willingness to interact with others, willingness to assert one's rights, self-confidence, objectivity, risk-taking, knowledge of and willingness to use alternatives, and other psychological characteristics. It is planned to measure these characteristics before and after the communities embark on the new enterprises. Standard measures of these parameters will be made in both "active" and control villages.

Another major set of hypotheses concerns the steps that need to be taken to induce participation in new practices. What sources of motivation must be tapped; what forms of organization and training must be offered; what types of guarantees or assurances must be offered in order to meet the local conditions prevailing in the experimental towns? The general approach which we plan to continue in the next period has been to introduce information and other assistance to the towns on a systematically graded basis and to record the type and degree of interest and participation evinced by the people. For example, residents were asked initially for their ideas on the potential uses of the generators. In some cases, additional ideas were introduced by members of the staff. Similarly, townspeople were asked to consider necessary practical steps, and problems in implementing new practices, and when necessary, alternatives and possible solutions were suggested, e.g., use of credit, sources of credit. This design permits determination of the minimal external assistance along the various dimensions required by the different types of communities in order to capitalize on the generators which were made available to them. It is planned to correlate the results of this experiment with the before and after measures of psychological characteristics and to validate both against the objective criteria of innovational effectiveness.

APPENDIX A

RURAL PEOPLE'S ATTITUDES AND ASPIRATIONS CONCERNING CHANGE

APPENDIX A

RURAL PEOPLE'S ATTITUDES AND ASPIRATIONS CONCERNING CHANGE

Stanley Lichtenstein, Augusto Torres, and Paul Spector

March 1966

Presented at Tenth Interamerican Congress of Psychology,
Lima, Peru, 3-7 April 1966

This paper is based upon a small portion of data collected in the course of a current research study, sponsored by the United States Agency for International Development, on the impacts of introducing electrical generators into small villages in Colombia which have previously not had any electricity. Broadly stated, the research is directed at answering such questions as: What difference does the introduction and use of electricity make to the community -- socially, economically, psychologically? What factors influence the specific impacts? What factors help to determine whether the benefits will exceed the problems or other negative effects that may occur? Beyond these questions, we are also interested in determining what positive development efforts can be introduced, in addition to the generators, in order to further general community development. In more specifically psychological terms, we are concerned with the motivation of the people which may hinder or promote change, and with the organization, training, communication, and reinforcements that can interact with the existing motivational picture to promote the adoption of new development activities.

The study is thus concerned with such questions as: Do poor people in the rural areas want to change? If yes, in what aspects of their lives? What conditions or opportunities are necessary to implement these changes? In short, what are their attitudes and motivations regarding change, and how may these best be mobilized to help bring about the changes which they desire? These questions can only be answered with the help of empirical data obtained directly through

observations, interviews, or other techniques specifically developed for use in the communities themselves, and our current research is necessarily concerned with both substantive and methodological issues, of which there are many. This paper will deal chiefly, however, with some of the findings, rather than with methodological problems. In general, our approach to such problems is pragmatic and empirical, as we feel it must be in field studies of this kind.

By way of background information, the 14 communities in which our interviews and observations are being carried out vary in population from 166 to 1300 people. The smallest village contains 28 households. It is a high-altitude general-farming-and-cattle community accessible from a major city by a one-hour car ride and a 90-minute horse ride. The largest village contains 209 households and is a fishing village on the coast 45 minutes from a major city by means of an excellent road. As would be expected from such facts, the villages differ with regard to many demographic variables. For example, average family size varies from 4.85 to 7.72. In certain other respects, however, they are similar. For example, 95% of the people in each village had fewer than six years of formal education. Taking the 6100 people as a whole, 56% of the population had no formal schooling at all. Of the 80% of the population above pre-school age, 45% have had no formal schooling at all. In general, however, the diversities exceed the similarities. For example, the percentage of households with a radio varied from a low of 15% to a high of 89%, and the percentage of households in debt at the time of interview ranged from a low of 4% to a high of 57%. In fact, the greatest similarity appeared in the interviewers' judgments of the degree of cooperation shown by the interviewees -- which was uniformly high in every village.

The heterogeneity of the villages has at least two highly important implications. First, it illustrates the difficulties and necessary cautions involved in conducting "experimental" field research.

The second implication of the inter-village diversity is that some of the attitudes toward change, and opinions concerning the conditions which require changing, stand out and assume particular significance because of their uniform occurrence from village to village. For example, when samples in each community were asked what conditions they hoped would improve, approximately two-thirds of the respondents in each village answered in economic terms such as "higher pay" or "increased opportunities for work." Similarly, when asked "What must you do to change things?" two-thirds in each village said they must work more. These opinions were neatly combined by one individual who said: "Si uno tuviera forma de ganar dinero trabajando mas!"

The predominant picture that emerges from the data regarding change is that the people in these villages have essentially a realistic picture of their lives and their futures. Incidentally, to the surprise of some big-city sophisticates, only one individual out of 134 said that the way to change things would be to win a lottery. They expect that things will change only a little, and that progress will be slow. (As one man said, "A poor man can't wish for a lot.") Their wishes or aspirations concerning improvements are correspondingly modest: a cow, a wooden floor, a roof, some chickens. They believe that the future is chiefly in their own hands, but that help is also needed -- from their children, from the government, or from unnamed others. Only 10% said that the future depended on God, and most of these responses involved themselves as active agents as well. A typical response along these lines was "Things will improve if God grants me better health so that I may work." Again, realistically, the older people were more pessimistic than the younger. In the absence of medical attention, sickness and infirmity last a long time, and the bank won't extend credit to an old farmer who has no one to help him. Further, they well realize that there are few incentives for the younger people to stay, and that their departure will add to their problems.

In response to a question concerning what they would do if they had enough money, 40% of 1024 people said they would improve their housing, and 37% said they would buy land. A similarly realistic outlook was also shown in the responses to a question concerning the changes needed for village improvement, where the modal response was potable water, followed by medical assistance and educational improvements. The most frequently mentioned change desired for personal betterment was private ownership of land, followed by credit and improved work opportunities. It is of interest to note that only 4% of the respondents gave the same response concerning changes needed for village improvement and changes needed for personal betterment. This stems primarily from the fact that the village question was answered in terms of realistic village needs -- for example, potable water in villages where it was lacking. These responses necessarily varied from village to village. On the other hand, the responses to the personal betterment question were much less varied and, as previously indicated, centered on the economic difficulties -- which tended to be relatively similar from village to village.

The interview schedule asked each householder what changes he thought most of the other people in the village believed to be necessary for improving conditions in the village. He was also asked what changes he thought most of the others believed to be necessary for their own personal betterment. Comparing each respondent's own opinion with his opinion about the views of others, it was found that in 58% of the cases there was agreement between what a man thought was needed for town improvement and what he believed most of the others thought was needed. In contrast, in only 23% of the cases was there agreement between one's own view of personal betterment needs and one's view of the opinion of others concerning personal betterment. While this finding requires further analysis, it is of interest to note that the most frequent responses about the views of others are identical to the responses concerning one's own views -- namely, ownership of land, work opportunities, and credit, despite the fact that so few individuals said that the others want precisely the same thing that he himself wants.

With regard to prospects for development and improvement, these data are most encouraging. They suggest that responses to properly introduced change opportunities will be positive -- provided that the people's capabilities, fears, and obligations are recognized and met -- at least as well as they themselves apparently recognize them. Often, questions are asked concerning whether the rural poor are optimistic or pessimistic? Or, do they have an active or a passive orientation? Are they fatalistic or oriented towards personal control of their environments? Our data strongly suggest that these questions may be somewhat irrelevant. The important point is that their attitudes depend upon their experiences and the reality of their conditions. If they are depressed, it is likely to be because efforts at improvement have failed. If they are dependent or lack initiative, it is likely to be because there is actually no way to improve simply by one's own efforts. Reality can not be avoided, especially if you are poor. And if change-agents, together with the people themselves, can show a change in reality, the probability is that the people's attitudes and motivations will undergo a corresponding change. Just as failure may discourage, success may encourage. We have no doubt that the necessary underlying willingness to improve is already present.

The field of social and economic development contains a multiplicity of highly complicated problems. It requires contributions from many of the traditional disciplines, and ultimately, in all probability, from combinations of disciplines which are not commonly found at the present time. It is our opinion that many of the problems of social and economic change are actually problems of "people" change, and that these problems will not be solved without the assistance of psychologists. These may not be immediately recognizable as psychologists in the traditional university departments, but they would nevertheless be people who understand the motivations, attitudes, and capabilities of those who need to develop, and at the same time understand the social, economic, and geographic forces which have a decisive influence on these psychological factors. For psychologists, and for behavioral scientists in general, there is not, in our opinion, a more challenging or more important field in which to work.

APPENDIX B

TOPICS FOR THE FIRST PERIOD OF OBSERVATION

(Translation)

APPENDIX B

TOPICS FOR THE FIRST PERIOD OF OBSERVATION

I. Land Ownership*

(For each plot of land)

- A. Name or property owner
- B. Size of property

II. Capital - Equipment

A. Tools

- 1. Type of tools sold
- 2. By whom sold
- 3. Unit price of tools

B. Buildings or sites for production

- 1. Type of building
 - a. Composition of roof
 - b. Composition of walls or enclosures
 - c. Composition of floor
- 2. Size or dimensions
- 3. General condition
- 4. Ownership
- 5. Present use
- 6. Approximate rent
- 7. Present value

III. Work

A. General Information

- 1. Interviewee's occupation
- 2. Interviewee status
 - a. Economic head of household or not

* Procedure: This data will be obtained from the local records office.

III. A. 2. (Continued)

- b. Sex
- c. Age (adult/youth)

B. Use of time

(Obtain data for two days: yesterday and either a busy day or an idle day.)

1. Hour
2. Work for other or for self
3. Type of activity
4. Description of the activity
5. Interviewee's impression of the value of his investment of time
 - a. Very well spent
 - b. Fairly well spent
 - c. Poorly spent

IV. Production

A. Producer

1. Specific product
 - a. Primary product
 - b. Secondary product
 - c. Tertiary product
2. Type of producing organization (operating units)
3. Location of the center of production
 - a. Primary location
 - b. Secondary location
 - c. Tertiary location
4. Number of families in each operation unit
5. Total number of families involved in production

B. Capital

1. Land
 - a. Area
 - b. Tenancy
 - (1) Owner occupancy
 - (2) Rental
 - (3) Aparcero

IV. B. 1. (Continued)

- c. Value or rent of the land
 - (1) Yearly rental value
 - (2) Commercial price of the land
 - 2. Current value of equipment
 - a. Tools
 - b. Buildings or sites
 - c. Vehicles
 - 3. Monetary investment (cost of operation, marketing, etc.)
- C. Production volume and product destination
- 1. Quantity of product in physical units per year
 - 2. Consumption of product in physical units per year
 - 3. Sales
 - a. Primary product sold
 - (1) To whom
 - (2) Unit price
 - (3) Quantity (volume)
 - b. Secondary product sold
 - (1) To whom
 - (2) Unit price
 - (3) Quantity (volume)
 - c. Tertiary product sold
 - (1) To whom
 - (2) Unit price
 - (3) Quantity (volume)

V. Family Consumption

- A. Article or Service
 - 1. Specific name
- B. Origin of the article or service purchased
 - 1. Produced
 - a. Total quantity
 - b. Unit price
 - 2. Purchased
 - a. Total quantity
 - b. Unit price

VI. Water for Irrigation or Industrial Use

A. Name of users

1. For irrigation
2. For industrial use

B. Source of water

1. Place
2. Distance of site from water source
3. Estimated water volume used in terms of total output of source

C. Potential water sources

1. Place
2. Distance of site from water source
3. Estimated water volume used in terms of total output of source

VII. Transportation

A. Roads

1. Route
 - a. From (origin)
 - b. To (destination)
2. Type, distance, and time of travel
 - a. Asphalt roads
 - (1) Kms. of the trip
 - (2) Travel time
 - b. Unimproved roads
 - (1) Kms. of the trip
 - (2) Travel time
 - c. Travel by horseback (paths)
 - (1) Kms. of the trip
 - (2) Travel time
 - d. Travel by waterway
 - (1) Vehicle type
 - (2) Schedule or frequency
 - (3) Travel time
 - e. Air travel
 - (1) Vehicle type
 - (2) Schedule or frequency of flights
 - (3) Travel time

VII. A. 2. (Continued)

- f. Ferry travel
 - (1) Schedule or frequency
 - (2) Travel time

3. Special characteristics

B. Vehicles

- 1. Design
- 2. Size in tonnage
- 3. Present condition
- 4. Vehicle ownership
- 5. Present use
- 6. Approximate rental cost
- 7. Present commercial value
- 8. Fares, prices
 - a. Passengers
 - b. Cargo

C. Communications (telephone, telegraph, etc.)

- 1. Medium of communication
- 2. Destination of communication
- 3. Ownership
- 4. Charges for communication
- 5. Frequency of service

D. Other services present (banks, schools, clinics, etc.)

- 1. Type of service
- 2. Location
- 3. Ownership
- 4. Charges for service
- 5. Frequency

VIII. Electricity

A. Administration and history of the generator

- 1. Name of the administrator

VIII. A. (Continued)

2. Kolowatts
 - a. Generated
 - b. Consumed
3. Periods of operation or shutdown
 - a. Dates
 - b. Causes for shutdown

B. Operation and maintenance

1. Man-hours of labor (per month)
 - a. Number of employees
 - b. Wage or salary
2. Fuel consumption (per month)
 - a. Fuel type
 - b. Quantity
 - c. Unit price
3. Conditions of fuel supply
 - a. Supply in site
 - b. Supply outside of site
4. Repairs (during the entire period since installation)
 - a. Date
 - b. Type
 - c. Quantity
 - d. Unit price

C. Possible sources of electrical power close to the site

1. Closest source
2. Distances
 - a. To lines or networks of electrical power
 - b. To the closest source
3. Cost (kilowatt hours) of electricity at closest source

D. Public consumption (no payment)

1. Place
2. Electricity consumed (in kilowatt hours)

IX. Attitudes Toward Change

A. Personality

IX. A (Continued)

1. Pessimism - Optimism

(Do you expect the general condition of your life to improve or become worse?)

- a. If improvement is expected:
 - (1) In what conditions do you expect improvement?
 - (2) Do you expect slight improvement, or great improvement?
- b. If worse conditions are expected:
 - (1) Which conditions do you expect to become worse?
 - (2) Do you expect them to become only slightly worse, or much worse?

2. Active - Passive

(Do you believe that your future depends mostly upon your efforts or not?)

- a. If your future is not in your hands, on whom or what does it depend most?
- b. If your future is in your own hands, what do you believe you ought to do to change things?

B. Influence of a leader in social and moral problems

(Describe three situations:)

1. Positive (in which the leader was effective)

- a. Where did it happen?
- b. When did it happen?
- c. What was the situation?
- d. Who participated?
- e. Exactly what happened?
- f. How did it end?
- g. Why did it happen this way?
- h. In what form was the matter left?

2. Negative (in which the leader was ineffective)

- a. Where did it happen?
- b. When did it happen?
- c. What was the situation?
- d. Who participated?
- e. Exactly what happened?
- f. How did it end?
- g. Why did it happen this way?
- h. In what form was the matter left?

IX. B (Continued)

3. Negative (in which there was no leader)

- a. Where did it happen?
- b. When did it happen?
- c. What was the situation?
- d. Who participated?
- e. Exactly what happened?
- f. How did it end?
- g. Why did it happen this way?
- h. In what form was the matter left?

C. Influence of the leader on new practices recently offered in the site?

1. Name of the group or individual
2. Proposal or project
3. Assistance
 - a. Who did they help?
 - b. From whom was it obtained?
 - c. Class or type?
4. Collaborations in development of the project
5. Results obtained
6. Reasons
 - a. For success
 - b. For lack of success

APPENDIX C

SUPPLEMENTARY PROGRESS REPORT
(Translation)

CURRENT STATUS OF THE
GENERATORS AND CONDITIONS OF ADMINISTRATION

Submitted to:

Instituto Nacional de Recursos Hidraulicos y
Electrificacion, Electraguas, y
Agencia para el Desarrollo Internacional, AID, Colombia

by

Augusto Torres
Stanley Lichtenstein

January 1966

APPENDIX C

CURRENT STATUS OF THE GENERATORS AND CONDITIONS OF ADMINISTRATION

SUPPLEMENTARY REPORT: January 1966
(Translation)

This report is submitted in response to the verbal agreement made with officials of Electraguas and the USAID Mission in Colombia to provide a summary of the present conditions of the generators distributed in the program known as "Power Packs." The information contained in this report is based on data obtained during the last visits made to the sites by field personnel of the International Research Institute, of the American Institutes for Research, during the months of November and December 1965. The report deals mainly with the following topics:

- A. Current conditions and status of the generators.
- B. Economic and administrative experiences with the generators in the various sites.
- C. Suggestions concerning future activities, based upon consideration of the factors presented in A and B above.

A. Current Status of the Generators

This information is based exclusively on the information furnished by persons in charge of the operation and the administration of the generators in the various sites. The reasons given as causes for the breakdown of generators are not (in the majority of cases) the true electrical or mechanical causes for such failures; this discrepancy is due to deficiencies in training for generator operations and administration. In fact, from all the data obtained, it is inferred that there is a great necessity for technical training of operators to keep the generators functioning properly.

Taking the total time that a generator has functioned as a percentage of the total elapsed time since it began functioning at the onset of its functioning, one recognizes a large difference among sites with respect to the functioning periods and breakdown periods. This time varies from those sites in which the generator has functioned more than 90 per cent of the total potential time, to others in which the generator has functioned less than 30 per cent of the total possible time. Considering all of the generators together, the average amount of time in which the generators have been functioning has been 70 per cent of the total possible time.

Figure A found on the following pages shows the estimated periods of breakdown for each generator and lists the causes for these breakdowns as given by the informants.

B. Economic and Administrative Factors

Another of the factors limiting the effectiveness of the generators appears to be a lack of on-site organization capable of administering the generator and of being responsible for seeking technical assistance for necessary maintenance and repairs as well as for collecting payments from electricity users for the service.

In the majority of cases the lack of a local organization with sufficient executive power and perhaps with personeria and legal responsibility, appears to be critical for the functioning of the generators. Either there is a lack of funds (to buy fuel, to pay for repairs, or to pay for other expenses), or there is a lack of a person or a group interested in a responsible fashion in these matters or in attempting to obtain the assistance of the cognizant Electrificadora.

FIGURE A

HISTORY OF THE FUNCTIONING OF THE GENERATORS

SITE	1964				1965														
	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
1. Caracoli	----	xxx	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2. Pitalito	-----
3. Santa Rita	-----
4. Lomarena	-----
5/ Apure	-----
6. Guazo	-----
7. Brasil	-----
8. Libano	-----
** 9. Mundo Nuevo
10. Punto Soldado
11. Itaibe	-----
** 12. San Andres
*** 13. Pescado

* Inaug. - Feb. '66 ** Jun. '64 *** March '64

KEY: ----- = not yet installed
 = functioning (marche)
 xxxxx = not functioning z (paro)

FIGURE A (Continued)

CAUSAS DE LOS PAROS

- 1 Empleo de lubricante usado
- 2 Se descarga la bateria
- 3 Polea muy larga
- 4 Falta de combustible
- 5 Radiador sucio
- 6 Cortocircuito
- 7 Sistema de combustible mal instalado
- 8 Dano del bendix
- 9 Dano del pivot shaft de bomba de inyeccion
- 10 "Un ruido creo falsa alarma" y apagaron
- 11 Bujias
- 12 Tornillo flojo en el tablero
- 13 Se fundio la resistencia
- 14 Inundacion del pueblo, caida de postes
- 15 Fundicion de bielas
- 16 Rotura del block
- 17 Dano del arranque
- 18 Falta de conocimiento en mantenimiento
- 19 Bobina quemada
- 20 Platinos quemados
- 21 Dano del sistema de encendido

NOTA: Estas causas son las dadas textualmente por los informantes.
(Reasons stated by informants for non-functioning of generators.)

Causes Given for Non-functioning

<u>Site</u>	<u>Cause(s)</u>	<u>Periods of Non-functioning</u>
Caracoli	1, 2	September 1964, March, November 1965
Pitalito	3, 4	November 1965
Santa Rita	5, 6, 4	March, April, November, December 1965
Lomarena	7, 8, 9	June-December 1965
Apure		
Guazo	10	June 1965
Brasil	8, 11, 12	April, July 1965
Libano	4	September-November 1965
Mundo Nuevo	4	October-December 1965
Punto Soldado	13, 18, 14	November 1964, February- December 1965
Itaibe	15, 16	February-December 1965
San Andres	17, 18, 19, 20	July-November 1964, January-December 1965
Pescado	19, 21, 2,	November-December 1964 February, April, June, August, October 1965

FIGURE A
(Continued)

<u>SITIOS</u>	<u>KWS.*</u>	<u>FUNCIONAMIENTO**</u>
1. Caracoli	20	91%
2. Pitalito	15	99
3. Santa Rita	8	84
4. Lomarena	20	75
5. Apure	15	--
6. Guazo	8	97
7. Brasil	20	91
8. Libano	5	70
9. Mundo Nuevo	8	88
10. Punto Soldado	10	35
11. Itaibe	20	28
12. San Andres	10	26
13. Pescado	10	88

NOTA: El % de funcionamiento esta en relacion al total del tiempo que el generador estuvo en el sitio, tomado desde la fecha de inauguracion de la Planta, hasta la ultima fecha en que un Observador salio del sitio.

* Kilowatt power

** Percentage of time generator working

In the 12 sites¹ in which the generators are being used as sources of home lighting, a total of 633 families are subscribers to the service. This constitutes an average of 42 families per generator, and represents approximately 60 per cent of the total number of families in the sites. The average cost per family for this service is approximately 10 pesos per month.

The variation among sites is somewhat large. For example, the percentage of subscribers ranges from 24 per cent to 91 per cent and the average cost per family ranges from 5 to 29 pesos. (There are those who said they pay only two pesos and those who said they pay 70 pesos.)

The greatest variation is found in the cost of operation and maintenance of the generators. Even though the cost depends to some extent upon the capacity of the generator, it appears that other factors are much more significant. These include factors such as: the frequency and type of breakdowns; the efficiency with which the equipment can be operated and maintained; the administrative arrangements for obtaining, using, and conserving fuel and oil. For example, in some sites it appears that the oil is changed every 70 hours of operation although the instructions recommend only that the oil filter be changed every 70 hours and that the change of oil be made at intervals of 1,000 hours. With equal schedules of service, the monthly costs range from 180 pesos (in the site which is spending the least amount of money) to 775 pesos (in the site spending the most money).

The income from payment of subscribers covers a range from 125 pesos per month to 935 pesos. This assumes that all subscribers pay their monthly bills. On the basis of this supposition, three of the sites should obtain an income of around 250 pesos monthly, and in eight of the sites there are losses very close to 350 pesos per month. Since it appears that not all of these subscribers pay punctually for their service,

¹Of the 15 sites contained in the over-all project, one is in process of installing the generator, another is in the process of having the generator assigned, and a third is utilizing the generator in a very different fashion from the others. These three sites are therefore not included in the current report.

it is apparent that all of the generators are being operated on a very precarious economic basis. It would be impossible to pay for any costly repair.

It may readily be concluded that improving the training for operation and improving the efficiency of administration will facilitate the ability of the people to finance their generators and, perhaps, even to retain some of the income as profits.

C. Recommendations for Future Activities

The following suggestions are based on the considerations noted above.

1. Complete training for two residents in each site as operators of the generator.
2. Organization and training of a group which might be a cooperative or the current Junta de Accion Comunal, in practices of administration, maintenance of records, and control of the functioning of the generator. It also appears necessary to acquire the status of personeria juridica which would enable this group to suspend service for lack of payment, to extend the service, etc.
3. Introduction of adequate practices at the various sites for the purpose of realizing the optimal economic utilization of the generator which represents a great potential source of value.

Considering the importance of these points, training of the operators is of basic importance, not only to assure service but to obtain service in a more economic manner. In suggesting that this training be given to at least two residents in each site, we are anticipating the natural mobility of the population at these sites and the emigration which is associated with limited incentives in these sites. (If one of these two persons emigrates from the site, a fully trained operator would still be available.)

This requires careful selection of the candidates for training from among persons with the greatest social and economic ties in the site, assuring probable permanency at the site. The International Research Institute of the American Institutes for Research can assist in this selection, employing the information obtained on several dimensions, including experience, aspirations, social and economic relations of the people in these sites, etc.--information that can be placed at the disposal of Electraguas and the departmental Electrificadoras who would provide the technicians necessary for this training.

In the training of the operators, the International Research Institute can cooperate with the instructors in developing effective and rapid training methods. In the field of instruction, the International Research Institutes of the American Institutes for Research has at its disposal a series of studies which provide insight and wide experience in the methodology of education and communication.

It appears desirable that the training be given in the same location, to take advantage of the presence of the technician and to resolve the variety of problems which have arisen in each site, whether these be in the generators, the external lines, or the private installations of the users (especially after suspension of service).

Lacking an alternative, and subject to their availability, it would be desirable to have four instructors based in Neiva, Cali, Medellin and Barranquilla, who would attend to instruction in the following manner:

1. Instructor from Neiva for Pescado, San Andres, and Itaiibe.
2. Instructor from Cali for Punto Soldado.
3. Instructor from Medellin for Libano, Brasil, and Guazo.
4. Instructor from Barranquilla for Caracoli, Santa Rita, Pitalito, Lomarena, and Apure.

(For Mundo Neuvo it would be possible to obtain an instructor from Bogota.)

Simultaneously with this training for generator operators and the establishment of social organization for administration of the generators, it would appear to be necessary to help them to adopt economic practices, in order to accumulate funds. These funds would be available to meet the immediate demands involved in administering the generators; such demands would include difficulties arising from the economic conditions of users, the attempt to make the best possible use of the electrical energy resource, the initiation of new practices to improve the economic and social conditions of the community.

If Electraguas together with departamentales electrificadoras can manage and sponsor the training of the operators and the social organization. (such as having the Juntas de Accion Comunal increase their administrative capacity and acquire the status of personeria juridica), the International Research Institute would be able to exercise its function of introducing new practices for economic improvement in the community. (Concerning this aspect, the International Research Institute will submit a wider plan in a separate report at a later date.)

Suggestions Concerning the Plan for Training of Operators and
for Organizing Administrators

1. An advisor from the American Institutes for Research, together with technicians in electrification and cooperatives, would plan a special course both for the instruction of the electrical generator operators and for the organization and instruction of administrators.
2. This planning would involve the production of audio-visual materials which would be used for training that instructors will give in the field, utilizing pictures, transparencies, and schedules will permit them to accomplish the most clear, efficient, and simple training in accord with the cultural capacity and limited level of education of the people in the sites. The materials would also provide operators and administrators with a permanent source of recommendations for periodic maintenance taking them through a cycle of a one-year period.
3. The advisor from the American Institutes for Research would consult on and plan this work with technicians in Bogota and supervise the production of the audio-visual materials. With these materials he would go to the respective departments, where agreement has been made to make instructors available on a regional basis, to train these instructors in the use of these materials.
4. The regional instructors--one in electro-mechanics and the other in cooperatives--would travel to all the sites to give instruction for eight to ten days at each site, and leave the instructions for a period of one year. The electro-mechanical instructor would also assist in repair of lines and other problems in the public networks at the sites and in the particular installations in each of the sites.

Tentative Budget for Training

		<u>Cost in Pesos</u>	
		<u>Possibly Available</u>	<u>Contributions Necessary</u>
4	Advisors in electro-mechanics for 140 man-days, with an average of 90 pesos per day	C\$12,600	
4	Advisors in cooperatives, for 140 man-days, at an average of 100 pesos per day	14,000	
	Per diem for these advisors, 280 days at an average of 70 pesos per day		C\$19,600
	Transportation costs estimated for the most expeditious route		6,000
1	AIR advisor for training of instructors and planning the production of training materials and necessary schedules, for approximately 22 days	8,000	
	Per diem and transportation for this advisor		5,000
	Cost of materials of instruction, transparencies, bulletins, pictures, schedules, etc.		5,000
	Totals	C\$34,600	C\$35,600
	GRAND TOTAL		<u>C\$70,200</u>
	Estimation in dollars and exchange of 18 pesos per dollar	US\$1,922	US\$1,978
	GRAND TOTAL		<u>\$3,900</u>

APPENDIX D

INTERVIEW FORM(S) FOR MARKET SURVEYS

(Translation)

INTERVIEW FORM(S) FOR MARKET SURVEYS

(Translation)

Schedule I - Middlemen: Wholesaler and Retailer - May 1966

Interview with _____ on marketing of _____ (e.g. fish)

A. 1. The _____ that you buy now - do you receive it here or do you have to obtain it yourself?

Providers (sources):

a) Those products received here:

1. Where from?
2. What volume?
3. What price?
4. How often?
5. From producers?
6. From middle-men? (Specify address)
7. If through middle-men, where is the product from?

b) Those products obtained by self:

1. Where from?
2. What volume?
3. What price?
4. How often?
5. From producers?
6. From middle-men? (Specify address)
7. If through middle-men, where is the product from?
8. What is the cost for transportation?
9. What type of carrier is used?

2. Besides what you buy, do you produce some of _____?

- A. 3. If you produce some:
- a) Where do you produce it?
 - b) Name the qualities and varieties of _____
that you produce.
1. _____ 2. _____ 3. _____
 - c) Do you sell all the _____ that you produce
and buy?
 - d) If not all is sold, what other uses do you make of it
and in what quantities?
Uses: _____
Quantities: _____
- B. 1. Do you store _____?
2. How do you store it? _____
3. Where do you store it? _____
4. For how long? _____
- C. 1. How is the _____ packed when you receive it?
2. What system of packing or packaging (display) do you use
when you sell it? _____

3. If using any other type of packing (display):
- a) What is the process of packaging (display) employed?

 - b) What is the cost of this process per volume?

D. What other costs are involved in your business with _____?

E. To whom do you sell? _____

Buyers:

1. Where from?
2. What volume?
3. How often?
4. Is he a consumer?
5. Is he a middle-man?
6. If middle-man, what is his address?
7. Are you selling it in your own locale?
(Is it cash-and-carry?)
8. Or do you have to deliver it?
9. If delivered:
 - a) How is it distributed?
 - b) Price on delivery?

F. 1. Name the qualities and varieties of _____ that you sell here.

Name: _____

Price per unit of volume: _____

2. Among the qualities of _____ that you sell, which do you think is best? _____

Why? _____

3. What kind of _____ is most frequently requested by your customers? _____ Why? _____

G. 1. Are you working independently or in a company? _____

2. If in a company, how is it organized? _____

3. How much capital do you count on? _____

G. 4. Do you use credit? _____

5. Are you interested in enlarging your business?

6. If yes:

a) Why? _____

b) What do you need in order to do so?

7. If no, why? _____

H. 1. How many other sellers of _____ do you think
are operating (selling) in this area? _____

2. What is your opinion about the situation of current
business with this product? _____

NOTES: _____

Schedule II

Interview with industrialists using _____ (e.g. particular product)

May 1966

- A. The _____ that you buy, do you receive it at your location or do you obtain it yourself?

Products:

1. Those products received here:

- a) Where from?
- b) What quantity?
- c) What price?
- d) How often?
- e) Obtained from producers?
- f) Or through middle-men? (Specify address)
- g) If through middle-men, where is the product from?

2. Those products obtained by self:

- a) Where from?
- b) What quantity?
- c) What price?
- d) How often?
- e) Obtained from producers?
- f) Or through middle-men? (Specify address)
- g) If through middle-men, where is the product from?
- h) How much do you spend for transportation?
- i) What type of transportation (carrier) is used?

- B. 1. Do you produce some of _____ besides what you buy?

2. If you produce some of your own:

- a) Where do you produce it?
- b) Name the qualities and varieties of that you produce:

- C. 1. Do you store _____?
2. How do you store it? _____
3. Where do you store it? _____
4. For how long? _____

- D. 1. What are you doing with it?
- Uses: _____
- Volume: _____
- Time: _____

Subproducts

2. Do you use all the _____ that you produce and buy? _____
3. If not all of _____ is used what other uses do you make of it and in what quantity?
- Uses: _____
- Quantity: _____
4. Besides the uses you make of it, what other uses do you think could be made of _____?
5. Why are you not doing so? _____
6. If you don't use the _____, could you use it?

D. 7. How would you like to receive the _____?

- a) Packing _____
- b) Quality _____
- c) Price _____
- d) Distribution channel _____
- e) Frequency _____
- f) Volume _____

8. If used, could you increase its use? _____

9. What do you require (need) to do so?

- a) Packing _____
- b) Quality _____
- c) Price _____
- d) Distribution channel _____
- e) Frequency _____
- f) Volume _____

10. Do you know other industrialists who are using _____?

Name: _____

Industry: _____

Address: _____

E. 1. Are you working independently or in a company? _____

a) If in a company, how is it organized? _____

2. What is the sales volume? _____

3. What is the capital? _____

E. 4. What is your opinion about the current situation of the industry based on this product?

Why?

Enterprise's name:

Informant's title:

Notes:

Schedule III - Interview with Consumers _____ of _____

Area: _____

Date: _____

1. Do you buy _____?
 - a) If yes, why? _____
 - b) (1) If no, why not? _____
(2) Is there a possibility that you might consume it?

2. a) Where do you buy _____?
 - b) (1) Are you satisfied with the place where you are buying it now? _____
(2) Why? _____
 - c) (1) Where would you prefer to buy it?

(2) Why? _____

3. a) What amount do you buy? (in physical units)

 - b) Are you satisfied with the quantity that you consume?

 - c) Would you like to consume more? _____
 - d) What is the amount that you would like to buy?
(in physical units) _____

4. a) How much did you pay last time (per unit)? \$ _____
 - b) (1) Do you consider that price reasonable? _____
(2) Why? _____
 - c) What is the price that you would prefer? (per unit)
\$ _____

5. a) (1) Are you satisfied with the quality of _____?

 (2) Why? _____
- b) (1) What quality would you prefer? _____
 (2) Why? _____
6. a) Do you have any problem in getting _____?

- b) If yes, what problems? _____
7. a) Do you think the current packing of _____ is adequate? _____
- b) (1) If no, why not? _____
 (2) What type of packing would you prefer?

8. a) Do you consider sufficient the quantity of _____ that you consume? _____
- b) What improvements would you like to have made in order for you to increase the amount you consume? _____

9. a) In general, how do you use the _____? _____

- b) If it is not used as food, do you think it can be used as food? _____
- c) What other uses do you think could be made of _____?

10. If prices of other products were to remain the same, while the price of _____ were reduced, how much more would you buy if it were reduced as follows:

10. a) By 10% (Give an estimation based on current price)

b) By 20% (Give an estimation based on current price)

c) By 30% (Give an estimation based on current price)

11. How many persons are in your family? _____

(How many customers, for restaurants?)

<u>Age</u>	<u>Number</u>	<u>Consumers</u>
Under 20	_____	_____
Over 20	_____	_____
Servants	_____	_____
Total	_____	_____

Notes:

Name:

Address:

Note: Questions above to ask interviewees who are not consumers but who could be: 1.b)(2); 2.c)(1); 2.c)(2); 3.d); 4.c); 5.b)(1); 5.b)(2); 6.a); 6.b); 7.b)(1); 7.b)(2); 8.b); 9.b); 9.c).