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MARKET PRICE INFORMATION AND POTATO
PRICE INSTABILITY IN THE SIERRA OF ECUADOR

BY

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PREFACE

My attention was first drawn to the problem of potato price instability in Ecuador in the summer of 1972 by Ing. Leopoldo Moncayo, the then Sub-Director of the Rural Development division of the Ministry of Agriculture and Livestock. Persistent severe fluctuations of potato prices throughout the country were considered, at that time, to be one of the more important agricultural marketing problems plaguing Ecuador.

Since I had previously undertaken agricultural marketing research of a geographic nature in Ecuador as a research assistant for a University of Windsor professor in the spring and summer of 1971, and since I wished to further pursue my interest and specialization in agricultural marketing in that country, I seriously considered undertaking research related to the above problem.

After discussing the specifics of the problem with Señor Moncayo, at which time it was learned that the Ministry of Agriculture was encouraging research in the area in an attempt to find a solution to the problem and, having discovered that very little original research had been done on the subject at that time, I decided that a detailed study of the inefficiencies of the agricultural marketing system (i.e. lack

of storage facilities, inadequate transportation infrastructure and unreliable market information for producers) as a cause of potato price instability in Ecuador could form the basis of a Master's thesis. Moreover, Señor Moncayo offered the full co-operation of the Ministry of Agriculture including the provision of transportation for the purpose of interviewing potato producers in various regions of the country.

Preliminary research on the problem was completed in the summer of 1972 and a research proposal was submitted to an advisory committee at the University of Ottawa in the Spring of 1973. At this point, it was suggested that the scope of the study be further reduced due to time constraints. Further revisions of the study proposal were made in the field at the commencement of the intensive research period after it was learned that other proposals had been submitted by individuals to study storage and transportation factors as they pertained to the problem. In the end, as a basis of the Master's thesis, I decided to concentrate my efforts on a study of market information and its reliability as it related to potato price instability in Ecuador. The prospect was further enhanced by the fact that no research on market information and its associated aspects had previously been undertaken.

CHAPTER I

INTRODUCTION

It is widely accepted that inadequate market information contributes to the instability of crop production and prices in many developing countries. Frequently, crop producers are forced to make production decisions based on insufficient and/or inadequate knowledge of existing market conditions. This contributes to the persistence of severe supply and price fluctuations.

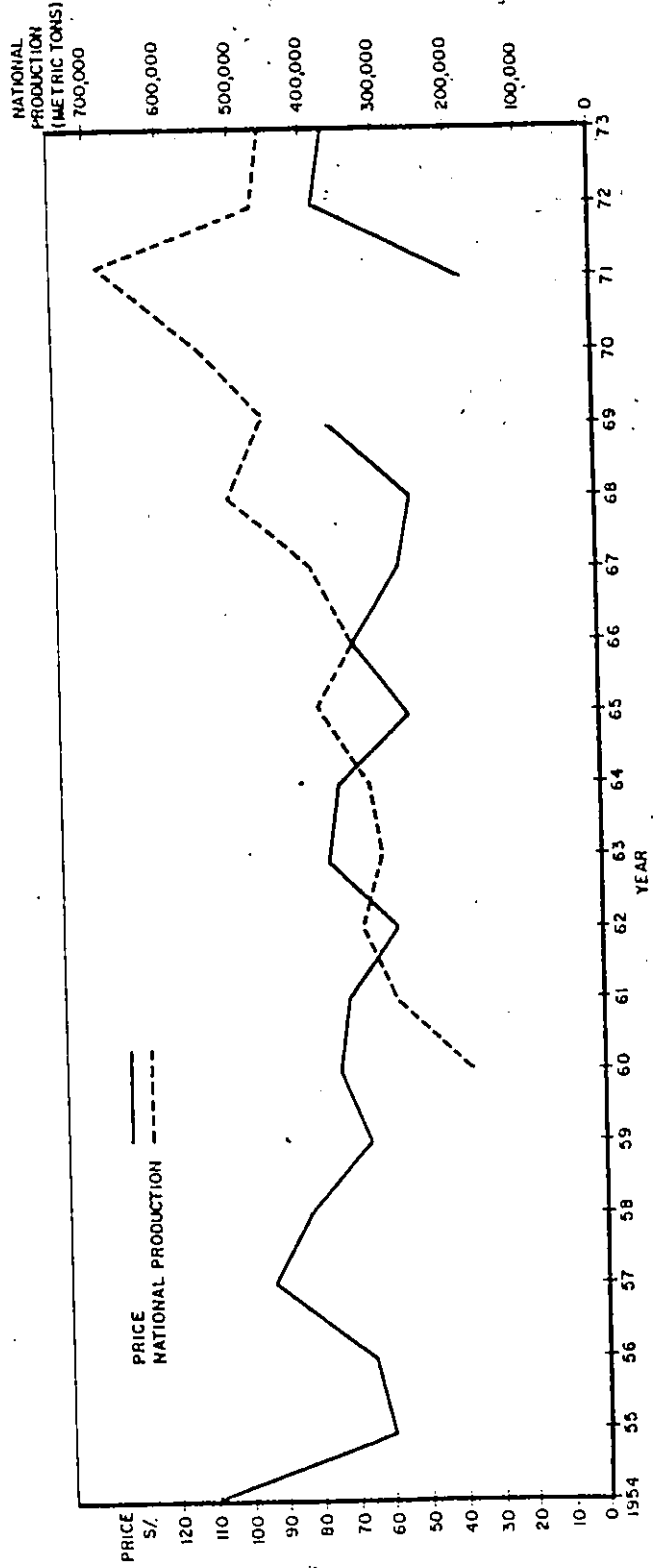
This study examines the role of the market information factor as it pertains to potato price instability in Ecuador. It focusses on such key elements as: sources of market information, variations in the quantity and quality of market information between large and small scale potato producers and spatial variations of market information quality and quantity.

The persistent instability of potato supply and, consequently, price has been a nagging problem in Ecuador for many years. The relationship between fluctuating national potato production and the average wholesale price of potatoes in the period 1954 to 1973 is illustrated in Graph I.

That potato price instability has persisted for almost two decades is shown in Table I. Average wholesale potato prices in Ecuador, in constant terms, fluctuated considerably

GRAPH I

Relationship Between National Potato Production and Average Price of Potatoes
in Ecuador, 1954-1973
(Prices Expressed in Constant Sucres of 1970)



SOURCE: Figures utilized appear in Arevalo's "Producción y Comercialización de la Papa en el Ecuador" P. 15 and 33

TABLE I
PERCENT CHANGE IN AVERAGE WHOLESALE
POTATO PRICES IN ECUADOR

(Prices in Constant Suces of 1970)

<u>YEAR</u>	<u>CONSTANT PRICES</u> <u>(S/. per qq)^{b/}</u>	<u>PERCENT CHANGE^{a/}</u>
1954	113.71	-47.43
1955	59.78	+14.08
1956	68.20	+34.75
1957	91.90	- 8.86
1958	83.76	-20.67
1959	66.44	+11.53
1960	74.10	- 3.70
1961	71.36	-18.90
1962	57.87	+31.21
1963	75.93	- 3.40
1964	73.35	-27.39
1965	53.26	+28.11
1966	68.23	-18.42
1967	55.66	- 8.79
1968	50.77	+44.55
1969	73.39	
1970 ^{c/}	-	-49.39
1971	37.14	
1972	76.56	+106.14

a/ Percentages calculated by the author.

b/ S/. =suces, U.S. \$1.00=S/. 24 (1971) and qq=quintals, 100 Pounds=1 qq.

c/ No price data available for this year.

Source: Francisco Arevalo, Producción y Comercialización de la Papa en el Ecuador, Quito: Tesis de Grado, Universidad Católica, 1973, pp. 15.

in the period 1954 to 1972 with a noticeable increase in the severity of these fluctuations in more recent years. However, the intensity of these fluctuations varies among major market centres (i.e. Quito, Guayaquil, Ambato, Latacunga, Riobamba and Ibarra) for which potato price data exist.

That price instability has increased in recent years, is illustrated by an examination of percentage changes, in current and constant terms², of average wholesale potato prices in the markets of: Quito, Guayaquil, Ambato, Ibarra, Riobamba and Latacunga (Table II). In Quito, for example, potato prices, in current terms, increased by 10% in 1971-72 and by 127% in the period 1971-73. In constant terms, the increases were 93% and 80% respectively. In Guayaquil, the increases in current terms were even greater, being 100% in 1971-72 and 155% in the period 1971-73. In constant terms, the increases were 89% and 115% respectively. Price fluctuations exhibited similar patterns, in current terms, in the four other cities listed in Table II.

As a result of the above and coupled with the fact that the potato, as a staple, is an important crop in Ecuador, the problem of potato price instability has emerged as a priority item in development plans for Ecuadorean agriculture.

The Potato in an Andean Historical Context

The potato, cultivated in South America for at least 2,000 years before the Spanish conquest, has long been an

TABLE II

AVERAGE WHOLESALE POTATO PRICES:
PERCENT CHANGE IN POTATO PRICES IN
MAJOR MARKETS OF ECUADOR IN CURRENT PRICES

MARKET	1971	1972	1973	PERCENT CHANGE 1971-72	PERCENT CHANGE 1971-73
Quito	41.61	86.13	94.44	+107	+127
Latacunga	38.92	84.68	95.27	+117	+144
Ambato	42.68	86.63	96.21	+102	+125
Ibarra	35.07	71.50	84.72	+103	+141
Riobamba	36.52	75.93	89.96	+107	+146
Guayaquil	44.28	88.56	113.17	+100	+155

Source: Ministerio de Agricultura y Ganaderia, SIMAE Anuario,
Quito: 1971 and 1972.

important crop of the Andean Sierra. "The evidence as to the antiquity of the potato as a cultivated plant in South America and the part it played in the life of the people, is largely based on archeological data, more especially on the pottery which has been excavated in such profusion during the last forty years."³

In earlier times, several species of wild tuber-bearing Solanums, among them the parent stock of the domestic potato, grew in the Andean highlands from Colombia in the north to Chile in the south. At a very early stage, Andean man, having emigrated from lowland regions east of the Andes, cultivated several varieties of potato and "it is suggested that it was the potato which enabled the early immigrants from the east to maintain their hold on the bleak highlands...."⁴ The importance of the potato "was further enhanced by the fact that, by a method of conservation, it became the safeguard against famine, following the destruction of crops by severe frost".⁵ Equally, Salaman contends that it was the potato which made residence on the bleak Andean plateaux possible.⁶

Thus, traditionally, the potato has been a significant crop in the Andean region although its relative importance has diminished somewhat in recent years.

The Potato in an Ecuadorean Context

The potato has remained a prominent crop of a large part of the Sierran population who continue to rely upon it as a staple and the basis of their diet. In Ecuador, "per

"capita consumption of tubers, of which potatoes are the most important item, is over twice the Latin American average ...".⁷

Because of the relative importance of the potato as a staple government officials, in particular those of the Ministry of Agriculture and Livestock, have become increasingly concerned with production and price instability as well as other marketing problems associated with this crop. As early as 1964, the Ministry of Agriculture (then the Ministry of Production) drew attention to the problem associated with this crop in its "Program of Agricultural Development":

"One of the aspects that has most affected the maintenance of high levels of production of this crop is the uncontrolled fluctuation of prices that occur from one agricultural period to another"^{8*}

Of major concern to the government, are the repercussions of the persistence of potato price instability and its alternating adverse effects on producers and consumers. It appears that when potato prices are high, consumers (in particular the urban lower income classes) are forced to pay more of their income⁹ for that product, substitute less expensive foodstuffs or abstain from buying the product until prices have decreased. Where a particular food crop, in this case the potato, is a staple in the diet, the problem becomes more

* In the text, all Spanish titles and quotations are translated into English.

serious, especially for the urban poor. At the same time, with a great price increase, one would expect producers to be reaping the benefits of higher prices. This is not the case; however. Since other elements in the agricultural marketing chain siphon off increased profits resulting from price increases.¹⁰

Alternatively, when potato prices decrease substantially, the producer has difficulty selling his crop. Moreover, the low wholesale prices paid by middlemen for farmers' harvests, in most cases, are less than the costs of production. In the past, low potato prices have resulted in the bankruptcy of numerous producers, increased indebtedness to others in the marketing chain or even in potatoes rotting in the ground due to the reluctance of some producers to sell their harvests at very low prices.

Measures to dampen or eliminate severe potato price fluctuations would do much to reduce the plight of those most affected by this problem.

The following section focusses on a review of the literature related to the problem of potato price instability in Ecuador.

REVIEW OF RELEVANT LITERATURE

In this section, literature related to the aforementioned problem, both governmental and non-governmental in nature, is examined in an effort to place the proposed research in the context of the existing literature.

Government Studies

In the Ministry of Agriculture and Livestock's "State of Agriculture in Ecuador"¹¹ dealing principally with the major problems and strategies for future development of the agricultural sector, the problems of supply instability and consequential price fluctuations of some agricultural products (notably potatoes) are mentioned as major issues plaguing the sector. Although the report also cites probable causes of the aforementioned problems, such as inefficiencies in the agricultural marketing system including excessive profit levels of middlemen and inadequacies in transportation infrastructure and storage facilities, these are not discussed in detail.

Another report which deals with improvements in the agricultural sector is the 1973 "Integral Plan of Transformation and Development, 1973-77".¹² This long-term government plan is generally concerned with the development and improvement of all sectors of the Ecuadorean economy. With specific reference to the agricultural sector, the plan outlines goals

and objectives for improvement of the agricultural marketing system. A main objective of this part of the plan was an improvement "in the general facilities for storage and conservation of products with an end to eliminating excessive profit margins of middlemen and reducing fluctuations in the prices of agricultural products".¹³ The plan also establishes various programs for specific agricultural products, one of which is potatoes.

Neither of these government studies provided a detailed analysis of the problems of supply and price instability in the agricultural sector.

(The Ecuadorean "Potato Program")

The "Potato Program"¹⁴ established by the "Integral Plan" in 1972 and administered by the Ministry of Agriculture represented Ecuador's first major attempt to deal with the problems of supply and price instability specifically associated with the potato.

The Program cited, as the major cause of supply imbalances and price instability, inefficiencies in the agricultural marketing system. It proposed to eliminate, or at least dampen these fluctuations by:

1. zonification or designation of preference zones for potato production;
2. reduction of potato production in areas considered marginal with substitution of other cereal crops;

3. encouragement of the use of certified seeds in preference zones; and
4. studying the possibilities of storage and improved marketing policy in order to eliminate strong fluctuations of prices in the market.¹⁵

The "Potato Program" is more detailed than the previous two government reports; however, it is still rather general in its approach to the problem of causes of potato price instability. However, the Ministry of Agriculture has acted, to some extent, on the fourth objective listed above by encouraging the undertaking of various studies¹⁶ related to potato production-marketing problems.

More Specific Literature Related to the Problem

Major studies found to be specifically concerned with aspects of the potato problem in Ecuador are those of: Arevalo, Bromley, Wiegand and Maldonado. Andrew and Fletschner have undertaken similar research but in other countries.

Perhaps the foremost study on potato production and marketing in the field of agricultural economics is that of Agricultural Research, (INIAP). Arevalo referred to the cultivation of the potato as "being characterized by the sharp fluctuations of prices which have been the cause of the bankruptcy or wealth of many farmers".¹⁷ The major purpose of Arevalo's study was to "identify the causes that have

"stimulated the fluctuation of prices in the production of potatoes".¹⁸

In his study, Arevalo discusses general aspects of potato production and marketing such as: location and areas of cultivation, physical characteristics and varieties of potatoes, economics of potato supply and demand, the role of potato production in the national economy and dynamics of production. However, he emphasizes various aspects of potato production rather than marketing. His major goal is to determine production functions and the importance of various factors (inputs such as: seeds, labour, fertilizer and technical assistance) affecting these functions for large, medium and small-scale producers.¹⁹

Aside from his concentration on production aspects, Arevalo cites other factors affecting supply and price instability based on the results of his interviews. Among those mentioned were "the lack of sources of information pertaining to the use of seed pesticides and fertilizer" and the "absence of entities which could supply reliable projections of future prices".²⁰

Arevalo also suggests that the lack of reliable market information is a contributing factor in the persistence of cyclical price fluctuations:

"When market information sources providing reliable projections of future prices do not exist, farmers utilize prices of past

"harvests as indicators of prices in the future."²¹

Although mentioning a possible relationship between the lack of reliable market information and potato price instability, Arevalo does not elaborate on it in his study.

In a 1972 preliminary study on the marketing of agricultural products in the Sierra and Costa regions of Ecuador, Bromley²² devotes one chapter to potato production and consumption in the Sierra. This chapter identifies the regions and forms of production and considers consumption and marketing patterns. Although the problem of potato price instability was not the principal focus of his work, Bromley pointed out that the potato did indeed "suffer variations in prices which are very large and very irregular ...".²³ He suggested as a solution to the problem, "a program of information to the producers in order to stabilize the price for the potato ...".²⁴ Bromley also recommended the provision of adequate storage facilities as a means of eliminating supply and price instability. It is interesting to note that Bromley, like Arevalo, mentions only briefly the link between reliable market information and price instability. Rather his study is designed to provide an overview of the present situation in potato marketing than to give in depth consideration to any problem associated with the potato.

Wiegand²⁵ began his study in late 1973, a few months after this researcher completed his intensive research in

Ecuador. Like this researcher, he worked from the premise that Ecuador was suffering from the persistence of supply imbalances and price instability; but, he cites as the crucial problem, and the basis of his research the "lack of sufficient marketing or storage facilities for potatoes causing losses of up to 20-50% of production due to spoilage, loss of produce in transit, poor handling and merchandising".²⁶ In his study, Wiegand proposed to describe the existing production-distribution system for potatoes in the Ecuadorean provinces of: Cotopaxi, Chimborazo, Pichincha, Tungurahua and Carchi to determine the technical and economic feasibility of potato storage with price/supply stabilization a primary concern and to determine the economic and technical feasibility of supply management as a potato price stabilizer in conjunction with or in place of potato storage.²⁷ Thus Wiegand concentrated his efforts on a study, from an agricultural economics standpoint, of storage in relation to potato supply and price instability.

Little is known about Maldonado's study. In a meeting between this researcher and Maldonado, the latter briefly explained that he would focus on transportation and the middle-man's role in the marketing of potatoes in Pichincha Province.

As previously mentioned, other relevant studies focusing on aspects of potato production and marketing have been undertaken by Fletschner²⁸ in Chile and Andrew in Colombia.²⁹

The major objective of Fletschner's study is to provide a deeper understanding of how the marketing system

for certain agricultural crops functions and how different variables affect agricultural producers. In addition, the study analyzes the behaviour of small and large producers and the different market environments in which they operate. The study also examines the structure of selected agricultural product markets, focussing on economic and geographic differences and attempting to explain the most important marketing problems of small and large producers in each study area. One chapter of Fletschner's work is devoted wholly to potatoes.

Potato price instability is not confined only to Ecuador for Fletschner comments on a similar problem in Chile:

"Wholesale prices for potatoes fluctuate constantly, principally because of changes in market supply concurrent with a fairly stable demand ... late potato seasonal price variations reach 95%, early potato variations 141%."³⁰

He states that the problem is primarily a result of the effects of such factors as climate, season of the year, speculation by growers or middlemen, market information or transportation infrastructure. Although he does not dwell on the market information factor as it effects price instability, Fletschner provides some worthwhile comments concerning its importance. He feels that "adequate market information and forecast systems may help guide producers as to prospective

"prices and the best marketing period". Furthermore, there is a good possibility that farmers would benefit from reliable market information:

"No potato grower can directly influence market prices, but a grower can obtain better prices with adequate information on market conditions."³²

Fletschner contends that more and better market information coupled with its rapid diffusion would greatly improve supply and reduce price variations of potatoes in Chile.

Finally, with reference to variations in availability of market information among regions and potato producers, Fletschner discovered, by way of case studies of large, medium and small scale producers in various parts of the country, that the availability of market information does indeed vary among regions and large and small scale producers. Fletschner bases these conclusions on general observations related to the characteristics of production and access to market of small and large scale producers and not on the basis of behaviour.

Andrew's³³ study of potatoes in Colombia attempted to identify areas in which marketing processes influence present and potential productivity increases and undertook to investigate problems related to modernizing the production process and to improving co-ordination in the distribution process.

As did Fletschner in Chile, Andrew commented on the existence of potato price fluctuations as being "common and significant" in Colombia. He also found evidence supporting those findings of Arevalo in Ecuador that fluctuation of potato prices in Colombia are cyclical although the pattern is not totally consistent.

With respect to the co-ordination of the potato distribution process, Andrew identifies communication and price information as one of the problem areas. His survey revealed that "information flows within the market system for potatoes are primarily by interpersonal communication and not by mass communication".³⁴

"A recent study oriented to production and marketing problems for producers of 14 agricultural commodities including potatoes revealed that 70% of communication about market prices was interpersonal. In none of the interviews at any level within the potato marketing system, did radio, newspapers or other forms of mass communication appear as important information sources."³⁵

Andrew admitted that market information (in particular, price information) was an important factor in the improvement of the performance of the potato distribution system in Colombia.

He recognized that, at least in the case of Colombia, marketing problems such as potato price instability could not

be eliminated simply by reducing the seasonality in production. Rather an adequate assessment of potato market supply and demand conditions "calls for dependable market information for both public institutions and private market participants Top priority must be given to a comprehensive market information system."³⁶ Finally, Andrew recommended that "continued emphasis would be given to developing a market information program with a timely dissemination system that will be useful to producers and distributors in their market decision-making processes".³⁷

Much of the literature reviewed above concentrates on the work undertaken on market information in relation to the production and marketing of potatoes in South American countries. An examination of works on market information pertaining to the production and marketing of other crops in developing countries revealed that for purposes of this study, they are only of marginal relevance. Exceptions are the works of Abbott³⁸ concerning market information and its role in the production and marketing of agricultural crops.

He pointed to:

"inadequate information in current and prospective market conditions (as a) characteristic weakness of marketing in less developed countries ...".³⁹

"Producers, traders and consumers all need accurate information in supply, prices and

"demand prospects if marketing mechanisms are to work effectively. Farmers require it if they are to plan their crop and livestock production program to the best advantage and market their output efficiently."⁴⁰

Abbott recommends as a solution to the problem, a "market news service for the dissemination of information (which) would have a great effect in helping to reduce the ranges of retail prices of fruits and vegetables in different city markets".⁴¹

PROPOSED RESEARCH IN THE CONTEXT OF THE RELEVANT LITERATURE

From the preceding survey of the relevant literature, it appears that there are no existing empirical or methodological studies specifically focussing on the geographic aspects of market price information. The literature reviewed, marginally relevant to the study proposed here, is concentrated in the discipline of agricultural economics (i.e. the works of Wiegand, Maldonado, Arevalo, Andrew and Fletschner), while studies involving spatial considerations related to market price information and price instability are conspicuous in their absence.

It is suggested that this study, rather than duplicating or over-lapping previous research on the problem, when combined with the empirical studies undertaken in Ecuador, under the

auspices of the fourth objective of the "Potato Program", on production (Arevalo), storage (Wiegand), transportation and middlemen (Maldonado), will provide the Ministry of Agriculture with a more accurate assessment of the problem of potato supply imbalances, price instability and those factors affecting them.

In view of the above, it is felt that the research proposed here will make a worthwhile contribution to the general body of literature on the subject and, more specifically, to the scant body of geographic literature.

REFERENCES

Chapter I

1. Market information may be defined as news about prices (both wholesale and retail), supply and demand, production and other information which may aid producers' decision-making processes and which is necessary for the co-ordination of production and marketing systems. Market information, in the context of this study, primarily refers to market price information.
2. Average wholesale potato prices in Quito and Guayaquil were deflated and expressed in constant Sucres of 1971 using cost of living indices developed for these cities covering the period 1971 through 1973. (See: Bank of London and South America Review, December 1974, Vol. 8, No. 12/74, (96), pp. 740). Cost of living indices were not given for the other four cities.
3. Radcliffe Salaman, The History and Social Influence of the Potato, Cambridge: Cambridge University Press, 1970, pp. 5.
4. Ibid, pp. 5.
5. Ibid, pp. 37.
6. Ibid, pp. 11.
7. U. S. Department of Agriculture, Agricultural Production and Trade of Ecuador, Washington, June 1968, pp. 17.

REFERENCES (Cont'd)

8. Ministerio de la Producción, Programa de Desarrollo Agropecuaria, Quito: Junta Nacional de Planificación y Co-ordinación, 1964, pp. 200.
9. Food consumption survey conducted in four Latin American cities (i.e. Cali, Bogota, La Paz and Recife) showed that between 40 to 50% of total consumer income was being spent for food. More important was the fact that the poorest one half of the households typically spent 60 to 80% of their income for food. (See: Riley, "Improving Internal Marketing Systems as Part of National Development Programs", M.S.U. Staff Paper #72-10, Department of Agricultural Economics, Michigan State University, 1972.)
10. It is generally conceded that profit margins of middlemen in the Ecuadorean agricultural marketing chain are excessive and have a detrimental effect on the producer's incentive to grow certain crops (e.g. potatoes). For example, potato producers in Chimborazo Province receive only 40% of the price that the consumers pay for potatoes in Quito markets. (See: Ministerio de Agricultura y Ganaderia, "Estado de la Agricultura en el Ecuador", Quito: 1971, pp. 53-54.
11. Ministerio de Agricultura y Ganaderia, Estado de la Agricultura en el Ecuador, Quito: 1971.

REFERENCES (Cont'd)

12. J.N.P.C., Ecuador, Plan Integral de Transformación y Desarrollo, 1973-77, Resumen General, Quito: 1972.
13. Ibid, pp. 104.
14. Ministerio de Agricultura y Ganaderia, Programa de Papa, Quito: 1973.
15. Ibid, pp. 1.
16. The fourth objective of the Ministry of Agriculture and Livestock's "Potato Program" provided the basis for Wiegand's study of storage, Maldonado's study of transportation and middlemen and this researcher's study of market information all in the context of the potato.
17. Francisco Arevalo, Producción y Comercialización de la Papa en el Ecuador, Quito: Tesis de Grado, La Universidad Catolica, 1973, pp. 1.
18. Ibid, pp. 9.
19. Arevalo's study was based on information gathered in interviews with eighty potato producers in various locations throughout the Sierra.
20. Francisco Arevalo, Producción y Comercialización de la Papa en el Ecuador, Quito: Tesis de Grado, La Universidad Catolica, 1973, pp. 91.
21. Ibid, pp. 97.
22. R. J. Bromley, Informe Preliminar a CESA Sobre Los Resultados de Las Investigaciones Realizadas Sobre el

REFERENCES (Cont'd)

- Comercio de Productos Agropecuarios Entre La Costa y La Sierra Ecuatoriana, Quito: Octubre, 1972.
23. Ibid, pp. 44.
 24. Ibid, pp. 44-47.
 25. Kenneth Wiegand, The Economic Feasibility of Stabilizing the Price and Supply of Potatoes in Ecuador, M. A. Thesis, Department of Agricultural Economics, University of Florida, 1975.
 26. Quote from Wiegand's original M. A. Thesis proposal.
 27. Ibid.
 28. Carlos Fletschner, Structural Patterns in the Marketing of Selected Agricultural Products in Chile: The Position of Small and Large Growers, Land Tenure Centre Research Paper, No. 42, February 1971.
 29. Chris Andrew, Improving the Performance of the Production - Distribution System For Potatoes in Colombia, Ph. D. Dissertation, Agricultural Economics, Michigan State University, 1969.
 30. Carlos Fletschner, Structural Patterns in the Marketing of Selected Agricultural Products in Chile: The Position of Small and Large Growers, Land Tenure Centre Research Paper, No. 42, February 1971, pp. 94.
 31. Ibid, pp. 104.
 32. Ibid, pp. 103.
 33. Chris Andrew, Improving the Performance of the Production - Distribution System For Potatoes in Colombia, Ph. D.

REFERENCES (Cont'd)

- Dissertation, Agricultural Economics, Michigan State University, 1969, pp. 60.
34. Ibid, pp. 165.
35. Ibid, pp. 167.
36. Ibid, pp. 216.
37. Ibid, pp. 217.
38. J. C. Abbott, Marketing - Its Role in Increasing Productivity, Rome: FAO Basis Study, No. 4, 1962.
39. Ibid, pp. 12.
40. Ibid, pp. 48.
41. Ibid, pp. 50.

CHAPTER II
SCOPE AND METHODOLOGY

Purpose of the Study

This research arises from a general need to know more about the relative importance of market information in the production and marketing of potatoes. More specifically, the study examines the quantity of market information received by producers as it pertains to the problem of potato price instability in Ecuador.

The investigation also focusses on the number and identification of major sources of market price information for producers. The availability, reliability and variation (in the three provinces comprising the study area) of this information provided by the above sources is also explored.

Still another integral part of the study is the analysis of the decision-making process of potato producers to determine the basis of this process and its consistency throughout the Sierra. The importance of the market price information factor in this process is also examined.

In addition, variations in the quantity and quality of market information (in particular, market price information) among small and large scale producers are analyzed in an attempt to determine their effect on the potato price instability problem.

Finally, an aggregate view (the study area as a whole) of the role of market information in price instability may conceal important spatial (regional) variations in factors related to the problem being studied. Consequently, emphasis has also been placed on analysis of these related factors at a provincial level as well as at the aggregate level.

It is anticipated that a study of this nature may elucidate the relative importance of market information (specifically market price information) as it related to potato supply/price instability in Ecuador.

Statement of Hypotheses

The researcher perceives the problem as being one of little or no receipt of market information by Ecuadorean potato producers. Specifically, what little market information (price information) is received by producers from their major information sources such as middlemen tends to be unreliable. Consequently, producers tend to rely upon past experience and prices in the making of production decisions and this fact has led to the perpetuation of supply/price instability.

As a test of the relative importance, to two groups of producers, of the market information factor in providing an explanation for price instability, the variation in the quality and the quantity of market information among large and small scale producers is examined. It is anticipated that, in the case of small scale producers, the lack of

reliable market information may partially explain their contribution to price instability while, in the case of large scale producers who receive greater amounts of reliable information, it provides little explanation for perpetual price instability.

From the explanation above the following hypotheses have emerged:

1. (a) The amount of market information received by producers, other than that related to the price of the product, is minimal.
(b) The middleman is the major source of market information in all producing regions, but the price information that he provides tends to be very unreliable.
2. The decision to increase total potato acreage is based on prices received by producers for the crop in the previous harvest. This process is consistent throughout the Sierra.
3. Large scale potato producers receive greater amounts of reliable information than do small scale producers.

Exploratory Nature of the Research

This research represents an initial attempt at clarifying the role of market information (specifically market price information) as it pertains to potato supply/price instability in Ecuador. As such, it must be considered as being of an exploratory nature; for, although the researcher has employed what he feels to be the best method of approach to the problem being studied given the constraints encountered, depending upon the results, better methods of approach might be suggested in retrospect. Attempts will be made to enumerate alternative approaches to the problem being studied here in the final chapters.

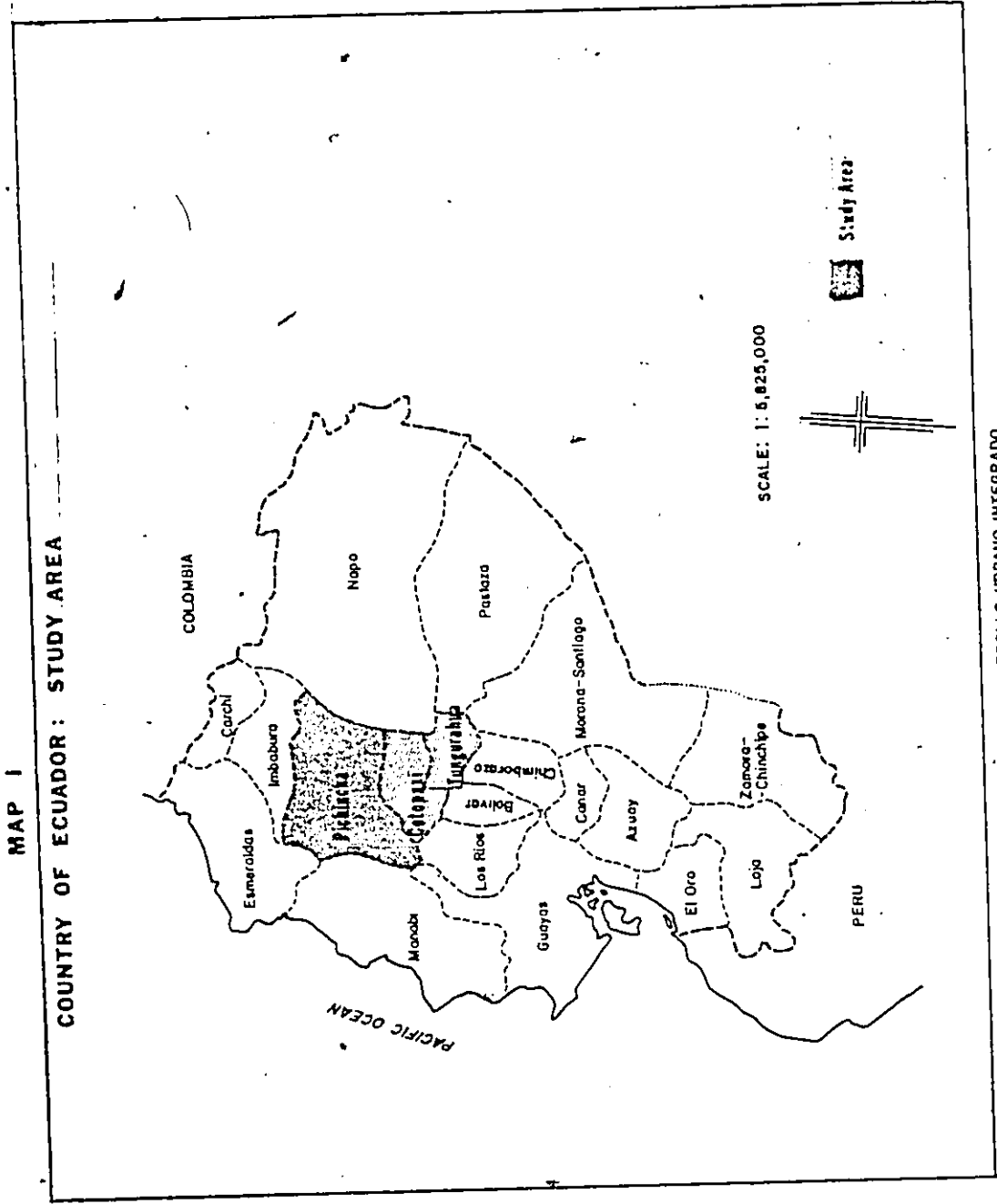
Delimitation of the Study Area

The area of potato cultivation in Ecuador is limited to the higher altitudes (2,500 metres and above) and extends some 640 kilometres in a north-south direction from Tulcan near the Colombian-Ecuadorean border to Ecuador's boundary with Peru. Extending east and west of the cities of Latacunga, Ambato and Riobamba from latitudes 1° S. to 1.7° S. (approximately), the zone of production reaches a width of 75 kilometres.

Due to the vast extent of the production area, and to time and transportation constraints imposed upon the researcher, the study was limited to the contiguous provinces of Pichincha, Cotopaxi and Tungurahua. These are among the most important in Ecuador with regard to potato production.

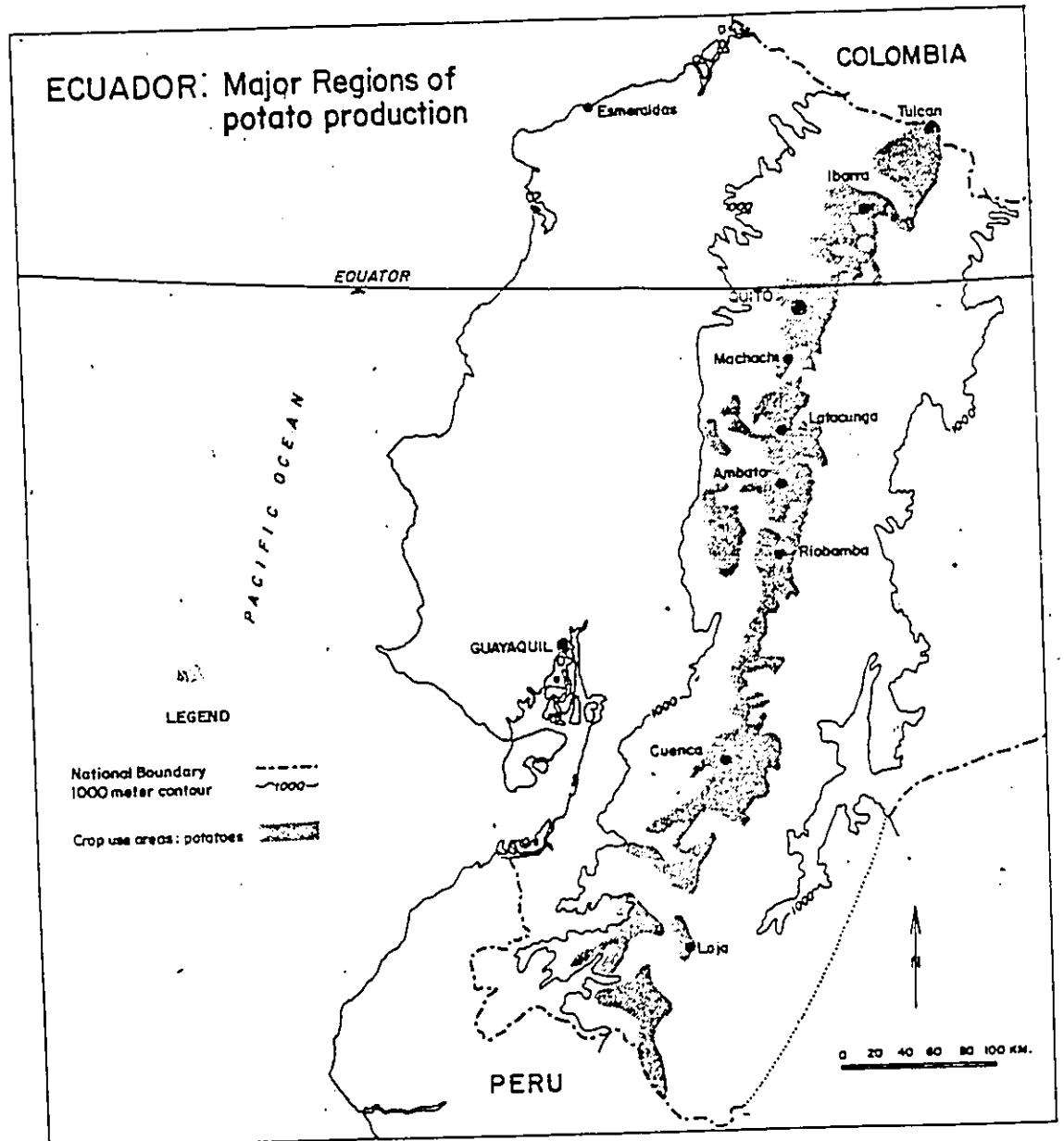
In 1972, these three provinces combined comprised almost 36% of the total area devoted to potatoes⁴² in Ecuador (13,152 of 37,729 hectares).⁴³ These same provinces accounted for almost 48% of Ecuador's production in 1972 (221,357 of 473,348 metric tons),⁴⁴ Tungurahua alone comprising 45%. In yield, Tungurahua led all other provinces with 22.8 metric tons per hectare in 1972.⁴⁵

The study area was further defined to include major producing regions within the three aforementioned provinces. In the end, interviews with potato producers were conducted in the Cayambe and Cangahua regions of Pichincha, the Pastocalle, Latacunga and Salcedo regions of Cotopaxi and the Pillaro, Ambato and Tiseleo-Quero regions of Tungurahua (See Appendix C, Maps 1, 2 and 3).



SOURCE: MUNICIPIO DE QUITO, PROGRAMA DE DESARROLLO URBANO INTEGRADO,
QUITO: SOLICITUD DEFINITIVA DE PRESTAMO AL B.I.D., 1971.

MAP 2

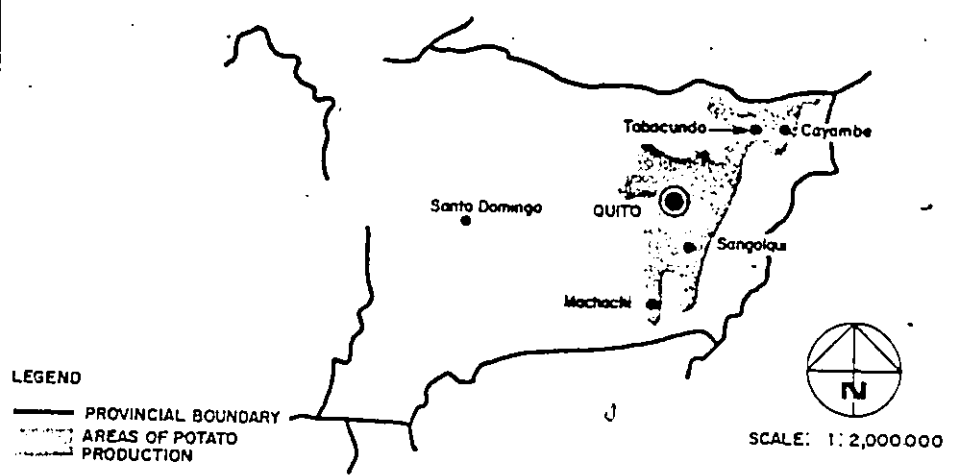


SOURCE: IBRD, The Current Economic Position and Prospects of Ecuador, October, 1973

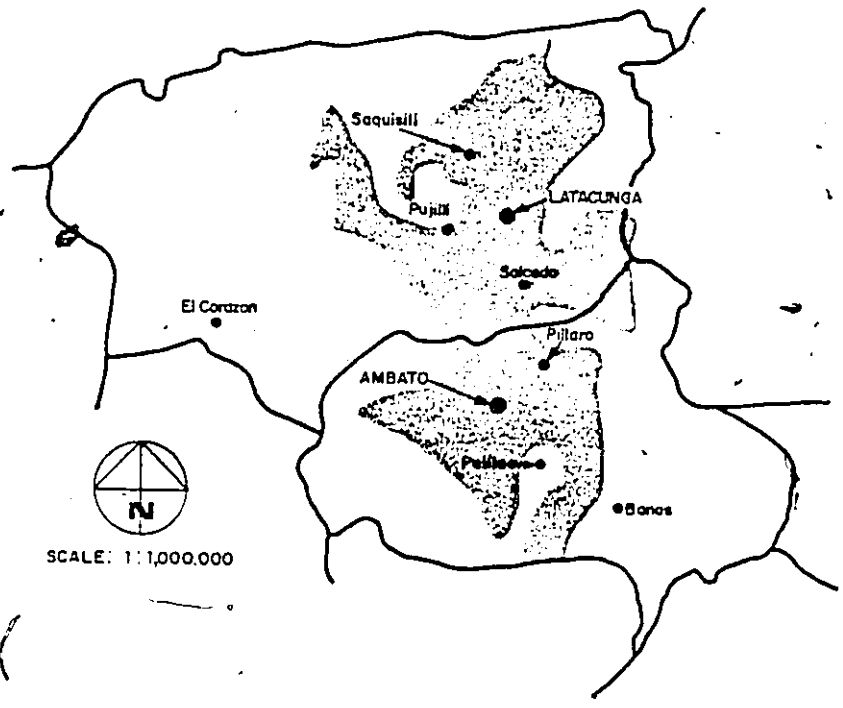
MAP 3

Principal Intra-Provincial Regions of Potato Production

Pichincha Province



Cotopaxi and Tungurahua Provinces



METHODOLOGY

The Use of Interviewing Techniques

Aside from those studies mentioned in the survey of literature (i.e. Arevalo, Bromley, Wiegand), few secondary sources of information existed, concerning the production and marketing of potatoes in Ecuador in general and the role of the information factor in particular. To supplement these sources, and to obtain other necessary data for the study, the researcher decided to interview potato producers using a structured questionnaire.

Sampling Technique

Originally, the use of a stratified random sample of large and small scale producers selling in regional and national markets in Pichincha, Cotopaxi and Tungurahua provinces had been contemplated. This plan was based on the knowledge that the Ministry of Agriculture and Livestock was about to conduct a census of all potato producers in these provinces in early 1973, and a list of these producers would be available to the researcher. However, upon the researcher's arrival in Ecuador in late 1973, it was discovered that the census had been abandoned by the Ministry and the list of potato producers, from which the random sample would have been drawn, had not been completed.

Further efforts to make use of a random sampling technique for the purposes of the study were voided due to the unavailability of any lists of potato producers combined with the great number of small scale producers growing potatoes only for family consumption, absentee landlordship in the case of large haciendas, the reluctance of some producers to give information, the lack of a good transport infrastructure inabling only limited penetration into potato producing regions, and difficulties in locating rural producers. Consequently, the sampling methodology had to be changed.

A systematic sample, was also considered. However, since accurate estimates of the number of potato farmers in the study areas were not available, this method of sampling was not feasible.

Instead, non-random or purposive sampling was chosen. This consisted, primarily, of the researcher relying upon the chief agricultural extention agent, as well as other extention agents who were familiar with the area, for estimates of the size of the potato producing population⁴⁶ in a particular region. Names of large producers in the region, which were almost always know by the agents, were provided and attempts were made to interview these individuals. Moreover, on the way to interviews with larger producers, small and medium size parcels of land planted in potatoes were frequently noticed; inquiries were made concerning the owners of the plots and they were interviewed if available and they consented. In

some cases, both large and small scale producers provided names of other producers and, if possible, they were interviewed as well.

Although the majority of the interviews with producers were done on farms; some producers were interviewed in local and regional markets.⁴⁷ Attempts were made to interview all producers who sold their own produce in the market; however, for reasons mentioned above, few consented to be interviewed.

The Questionnaire and Interviewing

A total of 140 potato producers were interviewed in the producing regions of Cotopaxi, Tungurahua and Pichincha provinces. Forty-nine percent (69) of the total number of interviews were done in Cotopaxi. Another 34% (48) were completed in Tungurahua and the remainder in Pichincha.

All possible attempts were made to restrict interviewing to those producers selling potatoes to middlemen on the farm or to middlemen, retailers or consumers in local, regional or national markets.⁴⁸ Efforts were also made to interview small, medium and large scale producers to obtain a valid cross-section of the Ecuadorean potato producing population. Interviews with producers were generally conducted on the farm or in local or regional markets.

The questionnaire,⁴⁹ on which minor revisions were made during the study, was specifically designed to obtain information from producers which would provide answers to

those questions which have been formalized in the hypotheses; namely, information related to: location, production, yield, scale of operation, knowledge of potato prices, sources of market information, farmers' decision-making processes, importance and varieties of potatoes grown, problems in production and opinions of producers concerning fixed prices for potatoes and price cycles among others. The importance of the information solicited from producers by way of the questionnaire cannot be overstated. Much of the analysis has been based on questionnaire responses.

Brief Description of the Analytical Method

The analysis undertaken in the study is both descriptive and statistical in nature. The researcher, however, was limited to the use of non-parametric statistical techniques, for the most part, due to the small sample size, the unknown nature of the population distribution from which the sample was drawn, and the predominant use of nominal and ordinal data.⁵⁰

To determine the validity of part (a) of the first hypothesis, the responses of potato producers will be relied upon.

Both the responses of producers to questions concerning their perception of market information received, and concerning whether they feel that a reliable source of market information exists in their area will test this hypothesis. Other responses

that may indicate the amount of market information received are as follows: the producer's knowledge of the Santa Catalina potato variety and the year of its adoption for production, the initiative of the producer in seeking out the most reliable sources of market information (i.e. travelling to the major markets rather than relying on a secondary source), his knowledge of the movement of potatoes from his farm to various markets, his knowledge of potato price and production cycles and the farmers' thoughts and views on a fixed price for potatoes.

With reference to the second part of the first hypothesis, the responses of potato producers to the question⁵¹ on sources of market price information, will simply be described. This will give a fairly reliable indication of the importance of the middleman as a source of market price information.

To evaluate the reliability of sources of market price information for producers, the farmers' responses to the question (Question 15) on market information sources will be compared with the accuracy of the farmers' responses to those questions (Questions 6 and 7) dealing with existing (1973) and past wholesale potato prices (1972) in major regional and national markets with the aid of contingency table analysis.⁵² To test reliability, an index of accuracy, based on the responses of farmers to those questions on potato prices in regional and national markets in 1972 and 1973, had to be first

prepared to evaluate the farmers' knowledge of these prices. Responses given by the producers were compared to actual prices in the markets at specified times, to determine the deviation from the actual price. Producers were then classified according to the accuracy of their responses regarding wholesale potato prices in the major markets in 1972 and 1973.

As a further test of hypothesis one, contingency table analysis or cross-tabulation was done to examine possible relationships between producers' market information sources and their perception of information quality and quantity (Questions 14 and 31), in an attempt to show an association between market information unreliability and the middleman as a source of market information.

The second hypothesis is concerned with the decision-making process of the Ecuadorean potato producer and the consistency of this process throughout the study region. Again, with the use of correlation and contingency table analysis, an attempt will be made to relate potato prices in major markets in 1972 and 1973 to producers' responses to questions on price and production, to discover whether potato production in a particular year is responsive to the previous year's prices. By examining farmers' responses about their decision-making processes, its importance relative to potato price instability and the variation or its consistency throughout the study area may be determined.

Other aspects to be examined in relation to the second hypothesis are the responses of producers concerning production and price cycles. Consideration of such responses may provide the basis for a more refined explanation of the existence and persistence of potato price fluctuations.

The third hypothesis reflects on variations in market information quality and quantity between and among large and small scale potato producers. Size and production factors for individual producers will be correlated with their perception of the market information received to determine whether or not there exists a trend towards larger scale producers receiving greater amounts of more reliable information.

As a further test, size and production factors will be correlated with producers' responses on perceived prices in the major markets in 1972 and 1973, in an attempt to corroborate the above findings related to the third hypothesis.

Finally, throughout the analysis, results of the research related to individual hypothesis will be viewed at a provincial level, as well as in the aggregate, to determine whether or not they are spatially consistent throughout the study area.

CRITICAL EVALUATION OF DATA QUALITY

In most studies undertaken in less developed countries, the quality of the data base must be carefully considered.

"The greatest problems arise, of course, on the micro-scale where primary data have to be gathered for lack of other resources."⁵³ In the case of this research, the data, being of a primary nature, must be critically examined to identify those areas where the quality is suspect.

To begin, the method of interviewing employed by the researcher may have given rise to the possibility that responses of potato producers on some questionnaires were not properly recorded, or were biased or misrepresented. This may have resulted from the fact that, although this researcher did the greatest part of the interviewing of producers (i.e. asking the questions and recording the responses), he was forced, due to time and transportation constraints, to utilize the services of three students to do some interviews. It may be that these students misinterpreted the intent of some of the questions appearing in the questionnaire. They may have also biased producers' responses by leading them on and anticipating their responses. Although the above practices may reflect upon the quality of some of the primary data, it must be pointed out that all three of the students who did interviews were highly recommended by reputable people. The two students, who

conducted a total of fifteen interviews in the province of Tungurahua, attended the Colegio de Agricultura in Ambato and were recommended by the Director of the School. The other university student who conducted interviews in Pichincha and Cotopaxi was a native of Quito and had been recommended by another researcher working there who was familiar with her work. In all cases, these students were given detailed instructions as to how interviews with producers were to be conducted.

The researcher's lack of fluency in the Spanish language also posed problems in the interviewing of potato producers. In some instances the researcher may have misinterpreted responses of farmers to questions during the initial interviews; however, as more interviews were done an expertise was gained, and the possibility of misinterpretation decreased.

Some of the producers' responses may have been deliberately falsified due to fear that the information might be used by the government for such a purpose as taxation. Therefore, "if one considers that such data are collected ... from an illiterate or semi-literate populace which frequently is antagonistic to representatives of the government, one must be apprehensive".⁵⁴ Despite the efforts of the researcher to dispel producers' fears, the fact that an extension agent of the government agricultural extension service always accompanied the researcher, may have led to deliberate under or over-estimates of: yield, size of farm, number of hectares in potatoes, prices paid for potatoes by middlemen, amount

of production sold by the farmer himself in the market and the number of sementeras (harvests) sold in a year.

With respect to all other questions, it appears that, because of their nature, there would be no need for producers to falsify their responses; for these questions did not touch on sensitive area. Thus it is assumed that this data is as accurate as can be expected.

Another data-quality problem concerned the actual location of the fincas or haciendas of the potato producers interviewed. To pinpoint the actual location of producers' fincas for mapping purposes they were asked to provide information on: the nearest city or town and the distance from that town to their finca, the finca's orientation relative to the town and the canton and parroquia in which the finca was located. The researcher had to rely, to a great degree, on the producer's knowledge of the location of his finca. However, where possible,⁵⁵ Ecuadorean topographic maps were used to verify the locations of the fincas or haciendas of those producers interviewed. Still, the location of the farms of some producers interviewed must be considered approximate.

Finally, weekly potato prices in the major markets of Ecuador in August and September, 1973 were to be used to calculate the index of accuracy of potato producers with regard to potato prices. Despite the researcher's efforts to obtain this data, it remained elusive and thus average monthly, rather than weekly, potato prices for August and September,

1973 were employed to determine producers' knowledge of potato prices.

To conclude, a few words must be said about the data quality relative to the analysis to be carried out in the study. Wesche states that:

"Data for less developed countries are usually limited in quantity, coverage and quality, and researchers from developed countries are frequently not sufficiently critical of their usefulness for advanced statistical analysis."⁵⁶

This researcher realizes the limitations of his data in the above context and, although he proposes to make use of correlation and contingency table analysis, they are not considered to be sophisticated statistical techniques requiring data comparable to that available in developed countries. Moreover, a great deal of descriptive analysis of various aspects of the problem will be employed.

One must also caution that, because of the sampling procedure utilized, the statistical results may not apply to all potato producers. The results apply only to producers in the study region. Although the researcher feels that, with some exceptions, the findings of this study could generally be applied throughout the Sierra region, further research to corroborate these findings would be necessary.

REFERENCES

Chapter II

42. 14.3% of the total cultivated area in Ecuador in 1972 was devoted to the production of potatoes. (See: Ministerio de Agricultura and Ganaderia, "Estimación de la Superficie Cosechada y de la Producción Agrícola del Ecuador", Quito: 1972.)
43. Ministerio de Agricultura y Ganaderia, "Estimación de la Superficie Cosechada y de la Producción Agrícola del Ecuador", Quito: 1972, pp. 3.
44. Ibid, pp. 3.
45. Ibid, pp. 3.
46. Based on estimates provided by extension agents, the researcher feels certain that a majority of the potato producers in the Cayambe region of Pichincha Province were interviewed. More uncertainty exists with respect to the percentage of producers interviewed relative to the producing population in the other regions studied; however, it is felt that this should not reflect, to any degree, on the representativity of the sample.
47. The distribution of interviews was as follows: of the sixty-nine completed in Cotopaxi, five were done in Latacunga market, six were done in the Saquisilí market and the rest were done on farms; of the forty-eight

REFERENCES (Cont'd)

- completed in Tungurahua, five were done in the Ambato market and ten were done in the Pillaro market while the rest took place on the farm; of the twenty-three completed in Pichincha, all were done on the farm.
48. Attempts were made to interview only those Ecuadorean potato producers who had a direct effect upon the supply of this particular crop in Ecuadorean markets.
 49. See Appendix A.
 50. For an elaboration of the distinctions in the use of parametric and non-parametric statistics see French, "Quantitative Methods and Non-Parametric Statistics" in Quantitative Geography: La Necessite d'un Dialogue, Ottawa: University of Ottawa Press, 1971, pp. 119-123.
 51. See Question 15 of the questionnaire.
 52. Contingency table analysis, or cross-tabulations as they are commonly referred to, show the frequency distribution of cases (i.e. potato producers) according to two or more classificatory variables (i.e. responses to Questions' 14 and 30 of the questionnaire). See: SPSS Manual, second addition, N. Nie et al. (ed.) McGraw-Hill, 1975.
 53. Rolf Wesche, "Rural Geography, Underdeveloped Areas and Quantitative Methods", in Quantitative and Qualitative Geography: La Necessité d'un Dialogue,

REFERENCES (Cont'd)

54. Ibid, pp. 117.
55. In the case of larger potato producing haciendas, some were actually located by name on the topographic maps used. Problems in the location of fincas arose in the case of the very small ones (i.e. less than two hectares).
56. Rolf Wesche, "Rural Geography, Underdeveloped Areas and Quantitative Methods", in Quantitative and Qualitative Geography: La Necessité d'un Dialogue, French and Racine (ed.), Ottawa: University of Ottawa Press, 1971, pp. 117.

CHAPTER III

MARKET INFORMATION RECEIVED BY POTATO PRODUCERS:
QUANTITY, SOURCES AND QUALITY

Focus of the Chapter

It is postulated that Ecuadorean potato producers receive little or no market information with which to make production decisions. Also, with specific reference to market price information, what information they do receive originates from the middleman in the marketing system who tends, it is theorized, to provide unreliable information. The above problem of the lack and unreliability of market information results in producers basing production decisions on past experience and prices and this has led to the perpetuation of potato supply/price instability.

The analysis described in this chapter attempts to find support for the above hypotheses by focussing on the questions of quantity, sources and quality of market information received by producers. Results are based, to a great degree, on survey data and its manipulation through the use of contingency table analysis. The quantity of market information received by producers is dealt with briefly as an initial focus. Emphasis is then shifted to market price information and its source and quality. These are examined in detail. The role of the middleman in the agricultural marketing

system, in general, and as a source of market price information are particularly stressed.

In addition, the relationship between the reliability of market price information and the major sources of this information is also explored in depth. First, an index of accuracy relating producers' perceived prices to actual prices in major markets for 1972 and 1973 is utilized to test the above relationship. Secondly, responses of producers to questions on reliability⁵⁷ and major sources of market information are cross-tabulated in an attempt to determine if a relationship does exist between the two. Again, survey data forms the basis of the analysis.

Finally, the above relationships, as well as being analyzed at an aggregate level, are studied at a provincial level to determine if any spatial variations in the relationships exist.

Quantity of Market Information Received by Potato Producers

When asked about the amount of market information received, 59.3% of those producers interviewed in Cotopaxi, 56.1% in Tungurahua and 47.7% in Pichincha indicated that they received little or no market information. Another 20.2% in Cotopaxi, 31.2% in Tungurahua and 39.1% in Pichincha claimed they received just enough information pertaining to the production and marketing of potatoes to aid in their decision-making process while only 18.8% in Cotopaxi, 10.4% in Tungurahua and 8.6% in Pichincha, of those interviewed, estimated that

they received more than enough market information to aid in making production decisions. Table III shows the responses of producers to the question:

TABLE III

Quantity of Market Information Received
(Number of Producers)

<u>PROVINCE</u>	<u>LITTLE OR NONE</u>	<u>ADEQUATE</u>	<u>MORE THAN ENOUGH</u>	<u>TOTAL</u>
Pichincha	11	9	3	23
Cotopaxi	41	14	14	69
Tungurahua	27	15	6	48
TOTAL:	79	38	23	140

Viewing the above results at an aggregate level, it appears that a majority (56%) of the total number of those producers interviewed felt that they received little or no market information.

At a provincial level, results were similar to the aggregate in both Cotopaxi and Tungurahua with the exception of Pichincha where only a strong minority of producers felt that they received little or no market information.

Major Sources of Market Information For Ecuadorean Potato Producers

The Middleman in the Potato Marketing System in Ecuador

In theory, a middleman may be defined as a "business concern (or individual) that specializes in performing functions

or rendering services immediately involved in the purchases and/or sale of goods (agricultural products) in the process of their flow from producer to consumer".⁵⁸

In Ecuador, the middleman is a key element in the agricultural marketing system. He performs such functions as consolidation, storage and transportation of agricultural products from their source of production, to local, regional and national markets where they may be sold to other intermediaries or directly to the consumer. On occasion, he may also perform the function of money-lender. In some cases, middlemen may even undertake the harvesting⁵⁹ of potatoes.

Smith has identified five major types of middlemen operating in the Ecuadorean Sierra: the Sierra central place, the Coastal central place, the travelling Quito, the stationary Quito and the trucker middleman.⁶⁰ In the provinces of Pichincha, Cotopaxi and Tungurahua, all of the aforementioned, with the exception of coastal central place middlemen, operate to some degree.

Opinions vary concerning the value of the functions performed by the middlemen in the agricultural marketing system of Ecuador. Indeed, relatively little is known about the group as a whole due to their reluctance to divulge information concerning their operations. This has resulted in adverse criticism from many sources to the extent that the word "middleman" has become synonymous with "excessively high profit margins", low prices to producers and monopolistic and

oligopolistic behaviour in the buying of agricultural products.

In its report on the state of the Ecuadorean agricultural sector, the U. S. Agency for International Development (A.I.D.) stated that:

"... many markets (in Ecuador) are dominated by powerful middlemen who are quick to absorb any price increases, thus hurting farmers' incentives to increase production".⁶¹

The report continues on to say that:

"Small farmers suffer considerably from the marketing system, as middlemen receive high margins and, for many commodities, absorb most of any increase in price ... In some marketing zones, there are only a few buyers for agricultural products, and their influence in the marketing process can be judged by the fact that they are sometimes referred to as a kind of 'Mafia'".⁶²

Of primary interest in this study is the role of middlemen as a major source of market price information for Ecuadorean potato producers. Smith has theorized that, in many cases, middlemen are the only individuals in the marketing chain which have adequate information about supply-demand relationships and the pricing of various agricultural products; for, as he points out, the consumer has no idea of the supply

situation in the country nor does the producer know the demand situation in the city.⁶³ Smith feels that, even without relying upon supply manipulation⁶⁴ (as they are quite capable of doing due to their oligopolistic position in the storage of agricultural products), middlemen can cause the fluctuation of prices of agricultural goods because market information flows stop with them.⁶⁵ Expressed in another way, the failure of the middleman, if he is a major source of market price information, to impart to producers his knowledge about market prices as well as supply and demand could result in the perpetuation of severe price fluctuations of an agricultural commodity such as potatoes.

The next section examines the problem of the middleman as a major source of market price information for Ecuadorean potato producers.

THE MIDDLEMAN AS A MAJOR SOURCE OF MARKET
PRICE INFORMATION

During the course of interviews, Ecuadorean potato producers were asked who their major sources of market information were. They were given a number of choices; namely: middlemen, neighbours, other producers, extension agents, the market at the moment of sale and other. Since they were not limited to one major source of market price information, many of those producers interviewed indicated more than one source. The results are displayed in Table IV below:

TABLE IV

Number of Market Information Sources for Producers
(Number of Producers)

		SOURCES						
		<u>NONE</u>	<u>ONE</u>	<u>TWO</u>	<u>THREE</u>	<u>FOUR</u>	<u>FIVE</u>	<u>TOTAL</u>
Producers:	Number:	9	57	49	19	4	2	140
	Percentage:	6.4%	40.7%	35%	13.6%	2.9%	1.4%	100%

Based on the interviews with Ecuadorean potato producers, the most frequently mentioned sources of market price information were the market at the moment of sale and middlemen. The tabulated results; both aggregated and provincially are reproduced in Table V below:

Other sources of market information such as newspapers, radios and extension agents appear to be of little

importance as major information sources for potato producers; they were mentioned only by 9% of producers interviewed.

TABLE V

Major Sources of Market Price Information
For Potato Producers.

INFORMATION SOURCE	TOTAL SAMPLE		PROVINCIAL SAMPLES		
	NUMBER OF PRODUCERS	PERCENTAGE ^{a/}	PICHINCHA	COTOPAXI PERCENTAGE	TUNGURAHUA
Market at Moment of Sale	104	74%	61%	75%	79%
Middlemen	51	36%	70%	25%	38%
Neighbours	47	34%	-	42%	38%
Other Producers	22	16%	-	-	25%
Other	14	10%			

^{a/} Percentages total more than 100% due to the fact that producers named more than one major source of market information in many cases.

Major Source of Market Information Where Only One Source Indicated

In those 26 cases in Cotopaxi Province where only one major source of market price information was indicated by potato producers interviewed, the market at the moment of sale was mentioned in 21 cases (80.8%) while middlemen, as a source, gained mention on only 2 cases.

TABLE VI
 MAJOR SOURCES OF MARKET INFORMATION
 FOR ECUADOREAN POTATO PRODUCERS
 (BY COMBINATION OF SOURCES)

Number of Sources:	Source					Total	
One:	MKTMIDDLMN 42 ^{a/}	MIDDLMN 11	OTHER 2	OTHERPROD 1	NEIGHBR 1	57	
Two:	OTHERPROD-NEIGHBR		MIDDLMN-OTHER		NEIGHBR-MKTMIDDLMN	19	
	1		1		17		
	MIDDLMN-NEIGHBR		NEIGHBR-OTHER		OTHERPROD-MKTMIDDLMN		8
Three:	MIDDLMN-OTHERPROD		MKTMIDDLMN-MIDDLMN			22	
	1		21				
	MKTMIDDLMN-MIDDLMN-NEIGHBR			MIDDLMN-OTHERPROD-NEIGHBR			10
	8			2			
OTHERPROD-NEIGHBR-MKTMIDDLMN			NEIGHBR-MKTMIDDLMN-OTHER		7		
6			1				
MIDDLMN-MKTMIDDLMN-OTHERPROD			OTHERPROD-NEIGHBR-OTHER			3	
2			1				
MKTMIDDLMN-OTHERPROD-OTHER							1
1							
Four:	MIDDLMN-MKTMIDDLMN-OTHERPROD-NEIGHBR					3	
3							
Five:	ALL SOURCES					2	
2							
TOTAL:						132 ^{b/}	

a/
 Figures represent number of producers with a particular source or combination of sources.

b/
 Eight producers did not respond to the question on sources of market information.

In Tungurahua, middlemen were mentioned in only 1 case of 17 while the market at the moment of sale figured in 15 cases (88%).

In Pichincha, however, producers indicated middlemen as a major source in 8 cases (57%) and the market at the moment of sale in the other 6 (43%).

Observations Concerning the Quantity and Major Sources of Market Information

Quantity of Market Information

The results of the survey indicate that a majority of the producers feel that they receive little or no market information in general. Although it was expected that more than just a majority of producers would have replied in a similar manner; nevertheless, the results are consistent with the original hypothesis that producers receive minimal amounts of market information.

Major Sources of Market Information

Again, with reference to the survey results, it would appear, in the majority of cases, potato producers rely on more than one major source for market information (specifically market price information). This and the fact that the most frequently mentioned source of market price information among producers was the market at the moment of sale suggests that potato farmers may not be totally satisfied with market price information they receive from those middlemen (operating in

their regions) neighbours, or other producers. Thus, in order to protect their own interests and insure themselves the greatest return on their crop, they appear to travel to local and regional markets themselves to obtain maximum prices for their crop. According to the responses of producers, many (57% in Pichincha, 81% in Cotopaxi and 94% in Tungurahua) travel to local and regional markets to sell at least some of their production. In some cases, smaller producers, who have a marketable surplus of potatoes, and who may have been overlooked by middlemen consolidating production in their regions, in all probability, are forced to travel to the nearest local or regional market to sell their product. Hence, this becomes the source of their market price information.

The above reasoning may also account for provincial variations in the major sources of market price information. The figures suggest that the plethora of small producers in Cotopaxi and Tungurahua, having little access to middlemen and market information they provide, rely, for the most part, on neighbours and the nearness of major wholesale potato markets of Latacunga and Ambato for the bulk of their market price information. In Pichincha, potato producers are fewer in number and produce more in comparison with individual producers in Cotopaxi and Tungurahua. The probabilities of a middleman serving potato producing areas in the Cayambe (Pichincha) region are thus greater than in the other two provinces due to fewer and larger producers. However, those producers in

Pichincha still make use of their proximity to the large wholesale markets of Quito and Ibarra for potato price information (See Table V, page 55).

Middlemen as Sources of Market Price Information in the Markets and on the Farm

The fact that the majority of the sample indicated as their major source of market price information, the market at the moment of sale, suggests that producers (small and medium scale for the most part) travel to local, regional and, on occasion, national markets to sell their production perhaps with only a vague idea, if any, as to what might be the wholesale price of potatoes. Thus, their presence in the market allows them to take advantage of the opportunity to obtain several price bids on their production from several market intermediaries. Once in a market, the producer's market price information source may be any number of: middlemen of all types, revendones, minoristas and other producers. However, the producer's major source of market price information in the markets is still likely to have been the middleman; for it is the middleman, in both local and regional markets, who continues to be the dominant force.

From personal conversations and observations in local and regional markets, it appears that middlemen frequent these markets primarily for purposes of buying potatoes for shipment to national markets (i.e. Quito and Guayaquil). Because of their knowledge of the supply and demand situation relative

to the crop, they continue to be major sources of market price information, for farmers travelling to these markets with their production. In many cases, the middleman is the "price-maker" and the producer a "price-taker". Although haggling over prices is common, producers are offered a price by the middleman which he accepts or rejects. The alternative to the acceptance of the middleman's price is selling to revendones, minoristas or directly to consumers.

Respondents interviewed for the purpose of this study were not asked to qualify their "market at the moment of sale"⁶⁶ response to the market information source question. Thus it is possible that, a producer who did not indicate the middleman as his major source, may have used bids from middlemen in markets to gain a knowledge of the range of the wholesale prices of potatoes at a particular time. Thus, the results of the survey appear to reveal the existence of two types of middlemen who act as major market price information sources for producers: one which is resident in local and regional markets (the market at the moment of sale) and the other who operates in the countryside (middleman) consolidating production.

Considering the above explanation and the fact that the middleman continues to be the predominant force (in terms of his possession of information on demand and prices of agricultural products) in most local, regional and national markets, he must be considered as the major source of market price information for Ecuadorean potato producers.

PERCEPTION OF RELIABILITY OF SOURCES
OF MARKET PRICE INFORMATION

In order to gain some idea of how producers interviewed perceived the reliability of the major sources of market price information, they were simply asked if they thought reliable market information sources existed in the Sierra.

When asked if there existed reliable market information sources in their respective zones, 49% of those producers interviewed replied that information sources were not reliable, 36% replied that they were and the remaining 15% had no opinion. Tabulated results for the individual provinces are contained in the table below:

TABLE VII

Responses of Producers to Question of the Existence
of Reliable Market Information Sources

<u>PROVINCE</u>	<u>RELIABLE</u>	<u>UNRELIABLE</u>	<u>NO OPINION</u>	<u>TOTAL</u>
PICHINCHA	4 (17.4%)	16 (69.5%)	3 (13%)	23 (100%)
COTOPAXI	17 (24.6%)	33 (47.8%)	19 (27.5%)	69 (100%)
TUNGURAHUA	29 (60.4%)	19 (39.1%)	--	48 (100%)
TOTAL:	50	68	22	140

Surprisingly, Table VI reveals one important fact which was not observed at the aggregate level; that is, unlike the two other provinces, whose results clearly parallel the aggregate, a large majority of producers in Tungurahua

expressed the opinion that market information sources in their zones were reliable rather than unreliable.

THE MIDDLEMAN AND RELIABILITY OF
MARKET PRICE INFORMATION

Further Statement of the Methodology

In order to determine whether or not a relationship between various sources of market information and their reliability exists, contingency table analysis was employed. Since the data used in the tests are predominantly nominal and ordinal scale for the most part, the use of this non-parametric technique seems appropriate. Contingency table analysis or cross-tabulations consist simply of "a joint frequency distribution of cases according to two or more classificatory variables. The display of the distribution of cases by their position on two or more variables is the chief component of contingency table analysis ...".⁶⁷

Testing the Significance and Strength
of the Relationships

The SPSS Program CROSSTABS makes use of chi square, phi, Cramer's V and the contingency coefficient to determine the significance, strength and direction of relationships between two or more variables depicted in the frequency tables.

Chi square (χ^2)⁶⁸ is used in the analysis of the relationship between major sources of market information and their reliability as a test of significance. It is non-parametric in nature and makes no assumptions about the

distribution of the population studied. Depending upon the critical value of χ^2 and the number of degrees of freedom, a high χ^2 implies that a systematic relationship exists between two variables being considered while, on the other hand, a small value of χ^2 signifies the absence of a relationship or the statistical independence of the two variables.⁶⁹

Phi (ϕ), for the purpose of this research, is employed as a measure of association and strength of the relationship between two variables. Phi makes a correction for the fact that the value of χ^2 is directly proportional to the number of cases by adjusting the χ^2 value. This statistic ranges from 0 indicating no relationship between variables to ± 1 signifying perfect association.⁷⁰

Cramer's V, another measure of association, is a modified version of phi suitable for contingency tables larger than 2×2 ; for when phi is calculated for a table larger than 2×2 , it has no upper limit. Cramer's V adjusts phi for the number of rows or columns in a table, depending upon which of the two is smaller. This measure ranges from 0 (no relationship) to ± 1 (perfect association) but does not indicate the direction of the relationship.⁷¹

The contingency coefficient (C) is another measure of association for ordinal data. Again, C ranges from 0 (no relationship) to an upper limit of less than 1.⁷² As in the case of Cramer's V, the contingency coefficient does not indicate the direction of the relationship.⁷³

Problem Encountered in the Use of Contingency Table Analysis
and Chi Square in the Thesis

One of the principal problems encountered in the use of contingency table analysis together with the chi square test of significance in the thesis concerned the problem associated with the number of observations (expected) in any given cell within the frequency tables generated by the analysis.⁷⁴ In some cases, depending on overall sample size, the appearance of less than five observations in a cell within the frequency table leads to a distortion (over estimation) of the chi square value and consequent problems in determining whether or not a systematic relationship does exist between the variables in question. This problem is, indeed, encountered in the proceeding analysis due to the small number of interviews completed with potato producers.

As a solution to this problem, the consolidation of two or more cells within the contingency table was recommended despite the fact that this tends to obscure information pertaining to the relationship between the variables. Although the researcher presents the results as originally generated, wherever required, consolidation of cells, and recalculation of the chi square value to verify the original results was undertaken.

ANALYSIS OF THE RELATIONSHIP BETWEEN RELIABILITY
AND MARKET PRICE INFORMATION SOURCES

Market Price Information Sources and the Producers
Knowledge of Potato Prices in Major Markets 1972-73

As a primary test of the relationship between major sources of market price information and the reliability of this information, producers' responses to questions concerning information sources were cross-tabulated with their responses to questions pertaining to wholesale potato prices in major regional and national markets in 1972 and 1973.

The choice of 1972 and 1973 for an analysis of producers' knowledge of potato price in major markets was related to the fact that, if a significant relationship could be found to exist between producers' knowledge of prices and sources of market price information and it was consistent for two years, then, this would increase the credibility of the results.

Since the research was undertaken in the summer of 1973, it seemed logical to query producers about prices prevailing at that time to gain some idea about their contemporary knowledge of prices. Also, more accurate perceptions of contemporary prices from producers were expected than for 1972; consequently, major emphasis has been placed on the analysis of 1973 data. Producers' perceptions of 1972 potato prices were inquired about primarily for comparative

purposes to corroborate any findings related to the 1973 analysis. Since the researcher asked for producers perceptions of prices only one year before, no major recall (of price) problems on the part of the producer were anticipated. However, the researcher did expect slightly less accurate (compared to those of 1973) responses of producers for 1972.

Price data gathered for 1972 can also be considered important to the analysis of the decision-making process of producers which follows in the next chapter.

Construction of an Index of Accuracy Based on Producers Perception's of Wholesale Potato Prices

To evaluate the producer's knowledge of wholesale potato prices, an index of accuracy was constructed. The responses of the producers on questions pertaining to wholesale potato prices were compared with the actual prices of potatoes at specified times to determine deviations from the actual price. Producers were then classified on the basis of the accuracy of their responses regarding the prices.

Because SIMAE published weekly ranges of wholesale potato prices (maximum and minimum values), responses of producers falling within the range of SIMAE prices were still considered as very accurate for the purpose of the index.

Source of Actual Price Data for Comparison

Weekly wholesale potato price data collected by SIMAE in 1972 and 1973 for the major Ecuadorean markets of:

Quito, Guayaquil, Ambato and Latacunga provided a point of reference which could be compared to producer's responses to form the index. However, weekly data on wholesale potato prices for August and September, 1973 were not available and thus average monthly, rather than weekly, wholesale potato prices were utilized.⁷⁵ (See Chapter II, page 30).

As a basis for the index, producers were asked what they perceived wholesale potato prices to be (per quintal for "Papa Chola") in the markets in Quito, Guayaquil, Ambato and Latacunga on the day they were being interviewed and one year before. Producers' responses concerning prices in 1972 and 1973 were then compared to the actual prices that existed in the major markets. The following index⁷⁶ was then constructed based on the accuracy of their responses:

Very Accurate: Producers' perceived prices (1972-73) within 0 to 5 Sucres of the actual price

Accurate: Producers' perceived prices within 6 to 11 Sucres of the actual price

Inaccurate: Producers' perceived prices within 12 to 17 Sucres of the actual price

Very Inaccurate: Producers' perceived prices not within 17 Sucres of the actual price

Doesn't Know: Producer did not know prices.

The range from "very accurate" to "very inaccurate" consisted of four intervals of five Sucres. In the aggregate, the difference of 20 Sucres between perceived and actual price could account for a 17% to 20% differential in the price of a quintal of Ecuadorean potatoes. This difference could influence his decision concerning the amount of acreage to plant in potatoes.

Since it is postulated that producers receive a minimum of reliable market information in general and market price information, in particular, one would expect producers' perceived prices relative to actual prices to range from inaccurate to very inaccurate. If producers are very poorly informed then they may not have any idea as to wholesale potato prices in major markets.⁷⁷

Relationship Between Middlemen as a Major Source
of Market Price Information and Producers'
Perception of Wholesale Potato Prices in 1972

Based on previous findings, two distinct types of middlemen are considered in the analysis; those who operate primarily in the countryside (hereinafter referred to as MIDDLMN) and those who frequent local and regional markets (hereinafter referred to as MKTMIDDLMN).⁷⁸

In the case of the former, the analysis of the relationship between MIDDLMN as a major source of market price information and the producer's accuracy in his perception of wholesale potato prices revealed some statistically

TABLE VIII

The Middleman as a Market Price Information Source
 Related to Producers' Perception of Wholesale
 Potato Prices in Major Markets, 1972^{a/}

(Aggregate^{b/} Cross-tabulation Results)

VARIABLES	SIGNIFICANCE		MEASURES OF ASSOCIATION BETWEEN VARIABLES	
	CHI SQUARE (x ²)	LEVEL OF SIGNIFI- CANCE(S)	CRAMER'S	CONTINGENCY COEFFICIENT(C)
MIDDLEMAN ^{c/} RELATED TO:				
INDEX OF ACCURACY FOR QUITO	8.0563	.08	.23	.23
INDEX OF ACCURACY FOR GUAYAQUIL ^c	12.1434*	.01	.29	.28
INDEX OF ACCURACY FOR AMBATO	12.0441*	.01	.29	.28
INDEX OF ACCURACY FOR OTHER	8.4025	.07	.25	.25
MKTSALE ^{d/} RELATED TO:				
INDEX OF ACCURACY FOR QUITO	3.0478	.54	.14	.14
INDEX OF ACCURACY FOR GUAYAQUIL	2.6214	.62	.13	.13
INDEX OF ACCURACY FOR AMBATO	.2301	.99	.04	.04
INDEX OF ACCURACY FOR OTHER	1.5459	.81	.11	.11

TABLE VIIIa

Results of Table VIII Corrected Via Consolidation
of Cells to Eliminate Problem of Less than
Five Observations Per Cell in Contingency Table

(Aggregate^{b/} Cross-tabulation Results)

VARIABLES	SIGNIFICANCE			MEASURE OF ASSOCIATION
	CHI SQUARE (x ²)	CRITICAL VALUE (.05 LEVEL)	DEGREES OF FREEDOM	CONTINGENCY COEFFICIENT
MIDDLMN ^{c/} RELATED TO:				
INDEX OF ACCURACY FOR QUITO	5.67	5.99	2	.20
INDEX OF ACCURACY FOR GUAYAQUIL	5.75	5.99	2	.20
INDEX OF ACCURACY FOR AMBATO	4.39	5.99	2	.17
INDEX OF ACCURACY FOR OTHER	3.76	5.99	2	.17
MKTSALE RELATED TO:				
INDEX OF ACCURACY FOR QUITO	2.40	5.99	2	.13
INDEX OF ACCURACY FOR GUAYAQUIL	.31	5.99	2	.05
INDEX OF ACCURACY FOR AMBATO	.00	5.99	2	.00
INDEX OF ACCURACY FOR OTHER	1.44	5.99	2	.11

* Significant at .05 level.

TABLES VII and VIIIa (Cont'd)

- a/ See Appendices E and G for detailed results.
- b/ Results are based on responses of all 140 producers.
- c/ This acronym for middleman was used for programming purposes.
- d/ This acronym for the market at the moment of sale was used for programming purposes.

significant, yet very weak, associations as are evidenced by the high chi square values in Table VIII. However, if one examines the results shown in Table VIIIa, which are the corrected values of the chi squares in Table VIII due to the appearance of less than five observations in a number of cells in the contingency table (see Appendices E and G), one sees no statistically significant chi square values. In the case of the latter, no statistically significant results were found in either Table VIII or VIIIa.

Since no significant associations were found between MKTMIDDLEMN and MIDDLEMN as sources of market price information and any of the indexes of accuracy in 1972, this would seem to indicate that he cannot be considered as an unreliable market price information source.

Relationship Between Other Market Price Information Sources and the Accuracy of Producers' Perceived Prices

No other statistically significant relationships were discovered between any other market price information source (i.e. neighbours, others, etc.) and accuracy indices for 1972.

Examination of Above Relationships at a Provincial Level

At a provincial level, in Cotopaxi no statistically significant relationships were found to exist between MIDDLEMN and the producer's perception of potato prices in Quito ($x^2 = 8.4$, $s = .07$), Guayaquil ($x^2 = 3.0$, $s = .54$), Ambato

($x^2 = 1.10$, $s = .89$) or Others ($x^2 = 5.39$, $s = .24$) nor could any significant associations be found between any other information sources and any of the indices of accuracy for 1972.

In the province of Pichincha an examination of the relationships between the MIDDLMN as an information source and the indices of accuracy yielded results similar to those found in Cotopaxi.

However, in Tungurahua province results indicated a significant association between MIDDLMN as a source of information and producers' perceived prices in Ambato (corrected $x^2 = 8.2$, $s = .05$, $C = .38$). A more detailed examination of the frequency tables indicate that the relationship is negative in that it appears that those producers who utilized information on prices provided by a MIDDLMN were also very inaccurate or did not know potato prices in the Ambato market.

Other producers, as sources of market price information, also seemed to be linked with the unreliability of market price information to producers according to results of the contingency table analysis (corrected $x^2 = 6.35$, $s = .05$, $C = .34$).

With reference to MKTMIDDLMN, again, no statistically significant relationships between him as market price information source and the producers accuracy in perception of potato prices was found at a provincial level.

From the provincial analysis, three observations may be made:

- (1) the MIDDLMN, in all but one case, and the MKTMIDDLMN, in all cases, as market price information sources are not significantly related to the indices of accuracy for all the major markets;
- (2) in the province of Tungurahua there appears to be a statistically significant association between MIDDLMN as a market price information source and the index of accuracy for that market nearest the producer;
- (3) in all provinces the significance of relationships between information sources and the indices of accuracy were obscured by the small number of observations used in the analysis and the continuous problem of the existence of less than five observations in a cell of the contingency table.

Due to the third observation mentioned above, of the results of the analysis can hardly be viewed as concrete proof that MIDDLMN and MKTMIDDLM are unreliable market price information sources.

Relationship Between Middlemen as a Major Source
of Market Price Information and Producers' Perception
of Wholesale Potato Prices in 1973

Upon examination of the cross-tabulation results

for 1973, two statistically significant (after correcting for the problem of less than five observations in the cell of a contingency table) relationships were found to exist at the aggregate level (140 producers) between the MIDDIMN as a source of market information and the producers' perception of prices in the Quito and Guayaquil markets (See Table IXa). No other statistically significant relationships were found to exist between other sources of market price information and the indices of accuracy for 1973.

Again, as was the case in the 1972 analysis, no significant relationship was observed between MKTMIDDIMN as a major source of information and the producers' perception of price.

In the case of the former relationships, a detailed analysis of the contingency tables suggests that having the MIDDIMN as a source of market price information is better than not having any source at all but the trends still appear to indicate that those producers who relied upon the MIDDIMN for Quito prices tended to be less accurate in their perception of prices in that market.

In contrast, the results of the contingency table analysis of the relationships between MIDDIMN and the producers' perception of prices in Guayaquil appears to indicate that having him as a market price information source lead to better overall perception of prices in that market than was expected. The above variations seem to be difficult to

explain; however, these results could be an indication that different types of middlemen are operating in different markets and thus the type of market price information provided by one type of MIDDLEMN for a particular market to the producer tends to be more reliable than that provided by the other type in a different market.

Examination of Above Relationships
at a Provincial Level in 1973

Again based on the contingency table analysis, only one statistically significant relationship was found to exist at a provincial level in 1973 between market information sources and producers' perception of prices. In Tungurahua, the results revealed a strong significant association between MIDDLEMN and producers' perception of wholesale prices in Quito ($\chi^2 = 16.95$, $s = .00$, Cramer's $V = .59$). This suggests that producer although better off having a MIDDLEMN as a price information source than no (he, at least, had some idea of prices rather than saying he didn't know), who relied upon MIDDLEMN as a source of price information for Quito markets, still tended to be somewhat inaccurate in his perception of prices, in that market.

In no other cases, at the provincial level, were any statistically significant relationships found to exist between sources of market price information and the producers' perception of prices.

It is also interesting to note that in no cases were any associations revealed between MIDDLEMN as a market price

TABLE IX

The Middleman as a Market Price Information Source
 Related to Producers' Perception of Wholesale
 Potato Prices in Major Markets, 1973^{a/}

(Aggregate^{b/} Cross-tabulation Results)

VARIABLES	SIGNIFICANCE		MEASURES OF ASSOCIATION BETWEEN VARIABLES	
	CHI SQUARE (x ²)	LEVEL OF SIGNIFI- CANCE(S)	CRAMER'S V	CONTINGENCY COEFFICIENT(S)
MIDDLEMAN RELATED TO:				
INDEX OF ACCURACY FOR QUITO	14.6651	.005	.32	.30
INDEX OF ACCURACY FOR GUAYAQUIL	12.4902	.01	.29	.28
INDEX OF ACCURACY FOR AMBATO	1.8904	.75	.11	.11
INDEX OF ACCURACY FOR OTHER	8.7985	.06	.26	.25
MKTSALE ^{d/} RELATED TO:				
INDEX OF ACCURACY FOR QUITO	3.5212	.47	.15	.15
INDEX OF ACCURACY FOR GUAYAQUIL	2.5992	.46	.16	.15
INDEX OF ACCURACY FOR AMBATO	.9859	.91	.08	.08
INDEX OF ACCURACY FOR OTHER	.5392	.96	.06	.06

TABLE IX (Cont'd)

- a/ See Appendices F and H for detailed results.
 - b/ Results are based on responses of all 140 producers.
 - c/ This acronym for middleman was used for programming purposes..
 - d/ This acronym for the market at the moment of sale was used for programming purposes.
- * statistically significant at a .05 or less level.

TABLE IXb

Results of Table IX Corrected Via Consolidation
of Cells to Eliminate Problem of Less than
Five Observations Per Cell in Contingency Table
(Aggregate ^{b/} Cross-tabulation Results)

VARIABLES	SIGNIFICANCE			MEASURE OF ASSOCIATION
	CHI SQUARE (x ²)	CRITICAL VALUE* (.05 LEVEL)	DEGREES OF FREEDOM	CONTINGENCY COEFFICIENT
MIDDLMN RELATED TO:				
INDEX OF ACCURACY FOR QUITO	11.39*	5.99	2	.27
INDEX OF ACCURACY FOR GUAYAQUIL	10.43*	5.99	2	.26
INDEX OF ACCURACY FOR AMBATO	1.07	5.99	2	.09
INDEX OF ACCURACY FOR OTHER	2.86	5.99	2	.15
MKTSALE RELATED TO:				
INDEX OF ACCURACY FOR QUITO	1.36	5.99	2	.10
INDEX OF ACCURACY FOR GUAYAQUIL	.81	5.99	2	.08
INDEX OF ACCURACY FOR AMBATO	.22	5.99	2	.04
INDEX OF ACCURACY FOR OTHER	.39	5.99	2	.06

* Significant at .05 level.

information source and producers' perception of wholesale potato prices in the market nearest him.

Also, as was the case in the 1972 analysis at a provincial level, no relationships were found to exist between MKTMIDDLMN and the producers perception of prices in any of the major markets.

Conclusions to be Drawn from the Above Analysis

Based on the analysis of 1972, there appears to be little evidence to support the fact that middlemen operating in the countryside do tend to be somewhat unreliable in terms of the market information the producer receives from him. This conclusion was arrived at after corrections were made to the values of chi square by grouping observations in cells to eliminate the problem of less than five observations in any given cell in the frequency tables used in the analysis.

In contrast, the analysis of 1973, considering again, the corrected chi square values, revealed the existence of statistically significant relationships between MIDDLMN as a source of price information and the producers perception of prices in Quito and Guayaquil markets. However, these results still do not allow one to generalize about the reliability of the MIDDLMN's market price information to producers as an interpretation of the direction of the relationship between the two variables has been somewhat

observed by the grouping of observations to facilitate the use of the contingency table analysis. Thus, the evidence found at both an aggregate and provincial level in 1973 to support the theory of the middleman as an unreliable source of market price information to producers, is not sufficient to allow one to draw that conclusion. However, there is some evidence that, in terms of certain major markets, the reliability of the MIDDEMN's market price information may indeed be questioned.

Also, no evidence could be found linking middlemen who operate in local and regional markets to the unreliability of market price information received by producers.

Finally, based primarily on the 1973 analysis, there appears to be no indication that producers do not receive reliable market price information relevant to the market nearest them.

Relationship Between Middlemen as a Major Source of Market Information and the Reliability of Information

As a second, and more subjective, test of the relationship between the middleman as a market information source and the reliability of market information received by producers, the responses of those producers interviewed concerning their sources of market information were simply cross-tabulated with their responses relating to the reliability of market information.

The results of the contingency table analysis reveal the existence of only one statistically significant relationship (at a .05 level or less) among the variables (See Table X) in the total sample. Two other relationships were statistically significant at a .1 to .15 level, but were very weak in relation to their strength as is evidenced by their phi and contingency coefficients. Based on the latter measure, it would appear that it would be very difficult to relate MIDDLMN as a source of market information to the reliability of market information they provide to producers.

Cross-tabulation results also indicated no relationship between MKTMIDDLMN as an information source and the reliability of their information.

Of the three weak relationships revealed in the analysis, the association of other producers as a market information source with reliability was the most significant and strongest. A detailed examination of the frequency tables indicate the relationship to be a negative one as 18 out of the 22 producers indicating neighbours as major sources also considered the market information that they received to be unreliable.

In the case of OTHRPROD⁷⁹ (other producers), the existing systematic relationship of this variable with price information reliability suggest that it is not a reliable market price information source. In many cases, he may be passing on unreliable information obtained from

TABLE X

Relationship Between Reliability of Market Information and Market Information Sources^{a/}

(Cross-tabulation Results)

SOURCE OF MARKET INFORMATION	AGGREGATE SAMPLE (140)					
	TIMES MEN-TIONED AS SOURCE (1) ^{b/}	TIMES MEN-TIONED NOT RE-LIABLE (2)				
Market at Moment of Sale (MKTIMIDLMN)	104	57	1.79	.18	.12	.12
Middlemen	51	25	2.42	.11	.14	.14
Neighbours	47	32	2.08	.14	.13	.13
Other Producers	22	18	4.73	.02	.20	.19
Other	14	11	1.73	.18	.13	.13

PROVINCIAL SAMPLES

PICHINCHA (23)						COTOPAXI (69)						TUNGURAHUA (48)					
(1) ^{b/}	(2)	x^2	S	O	C	(1) ^{b/}	(2)	x^2	S	O	C	(1) ^{b/}	(2)	x^2	S	O	C
14	9	1.04	.30	.30	.28	52	29	1.51	.21	.18	.17	38	19	3.69 ^{c/}	.05	.32	.31
16	7	.59	.44	.25	.24	17	8	1.11	.29	.16	.15	18	10	.000	1.00	.04	.04
-	-	-	-	-	-	29	18	.00	.93	.02	.02	18	14	3.29	.06	.30	.29
-	-	-	-	-	-	10	9	2.85	.09	.24	.23	12	9	1.02	.31	.19	.19
						5	4	.18	.66	.10	.10	9	7	.87	.34	.18	.18

a/ All results appearing above have been checked employing Yate's Correction and no variations in the above results have been found.

b/ Since producers indicated more than one source of market information, the responses reflect disproportionate weights with reference to individual market information sources.

c/ When Yate's Correction was applied to this chi square x^2 was found not to be significant at a .05 level (3.79 with critical value = 3.84)

NOTE: x^2 = chi square S = level of significance
 O = phi coefficient C = contingency coefficient

other sources in the marketing chain or merely speculating about market prices of potatoes himself. It may also be that, other producers, having received reliable market information, are reluctant to pass this information on to other producers of the same product in an effort to maintain a competitive edge over their less informed colleagues.

No other significant relationships were discovered at an aggregate level between other major market information sources and reliability.

Examination of the Market Information Source/Reliability Relationship at a Provincial Level

When those potato producers interviewed in each province were considered as sub-samples and analyzed individually, the cross-tabulation results revealed no significant association between the variables being compared.

As was the case at the aggregate level, no significant relationships appeared to exist between MIDDLEMN and MKTMIDDLEMN as market information sources and the reliability of market information. (See Table X).

As the chi square values in Table IX indicate, no associations were found to exist between any other market price information sources and reliability of their information to producers.

SUMMARY AND CRITIQUE OF FINDINGS IN THIS CHAPTER

It appears from the above analysis, that the amount of market information received by producers is minimal. Indeed,

a majority of those producers interviewed indicated that they felt they received little or no market information with which to make decisions concerning production.

When attempting to determine the major sources for producers market information (specifically price information) a complicating factor was introduced when it was discovered that two distinct middlemen types were involved in disseminating information to producers: those operating in the countryside and those who were resident in the local and regional markets. Nevertheless, the results of the analysis indicated that both types of middlemen could be considered as major market information sources.

Tests of the reliability of the market price information provided by middlemen proved to be inconsistent in terms of findings. Relating the accuracy of the producers' perception of wholesale potato prices to information sources suggested that middlemen operating in the countryside tended to be less reliable as price information sources in terms of that information as it pertained to certain major markets (i.e. Quito) although this relationship was very weak. This leads one to ponder the possibility of the existence of different types of MIDDLEMEN operating in the Sierra whose market price information to producers varies in its reliability depending upon the market.

At the same time, no evidence could be found for the existence of a similar association between market price information and middlemen operating in local and regional markets.

The lack of a relationship here appears supportable on the basis that, whereas it may be easier for MIDDLMN to quote lower prices to producers on the farm than those prevailing, it is much more difficult in the markets where MKTMIDDLMN must provide accurate price information due to the immediate availability of alternative market price information sources for producers. The second test, which related the responses of producers on reliability of market information to market information sources provided no evidence that middleman provided producers with unreliable information.

The emergence of the two types of middlemen, one of which, it is suggested (very weakly), provides less reliable market price information for certain markets presents a methodological problem which was not originally foreseen. Since producers were allowed to indicate more than one major source of market information and since many mentioned the two types of middlemen together, this fact makes it difficult to distinguish which type actually provided market price information. This also obscures the results of the cross-tabulations.

Also obscuring the contingency table analysis results, was the fact that a number of cells within many of the contingency tables had to be combined in order to calculate a more accurate chi square value due to the "less than five observations in a cell problem". This made the interpretation of the corrected results much more difficult, and less significant, in many cases.

As an alternative methodological approach to what has been done, producers, when originally interviewed, should have been asked to specify one major source of market price information or distinguish between those sources providing market price information as opposed to other market information. If this were done, the researcher feels that the results of the analysis would have been enhanced (strengthened) and relationships between variables clarified.

REFERENCES

Chapter III

57. This test, because it tends to be more subjective in nature than the "Index of Accuracy" test, is considered of lesser relevance.
58. M. S. Heidingsfield and A. B. Blankenship, Marketing, New York: Barnes and Noble Inc., 1969, pp. 288-289.
59. When he harvests potatoes, the middleman may be referred to as the cavador or digger. This situation arises when the potato producer is unable to procure adequate labour to aid in the harvest of the crop. The producer then sells his sementera or plot to the middleman who does the harvesting using his own workers.
60. Vernon Smith, "Marketing Agricultural Products in Pichincha Province, Ecuador", Geographical Review, Vol. 65, #3, July 1975, pp. 361-362.
61. U. S. Agency for International Development, Economic Analysis of Ecuador's Agricultural Sector, mimeo, 1971, pp. 28-29.
62. Ibid, pp. 30.
63. Vernon Smith, op. cit., pp. 360-361.
64. The Middleman is capable of manipulating the supply of an agricultural crop (e.g. potatoes) that he controls

REFERENCES (Cont'd)

directly (in terms of production stored or contracted to buy), to some extent, during times of high prices due to the relative scarcity of the crop; however, production eventually catches up to price (excessively high prices lead to increased production and lower prices) and the middleman, unless he controls a great deal of production, is powerless to prevent or avoid the trough of the price cycle. His approach to low prices is simply not to contract to buy the crop while its price is low.

65. Vernon Smith, op. cit., pp. 361.

66. It is also possible that some of the producers interviewed may have been confused by the question on major market information sources and indicated "market at the moment of sale" as a major source, when they really meant this as a major location for the source, and middlemen as the major source.

In eight cases in Pichincha province where two major sources of market information were indicated by an individual producer, the sources indicated were "middlemen" and the "market at the moment of sale." This also happened in 12 of 23 cases in Cotopaxi and 15 of 18 in Tungurahua. If it is assumed that some producers were indeed confused, then the importance

REFERENCES (Cont'd)

of the "market at the moment of sale" as a major source of market price information for the Ecuadorean potato producer has been considerably overstated.

67. Norman H. Nie, et al., Statistical Package for the Social Sciences, 2nd ed., New York: McGraw-Hill, 1975, pp. 218.
68. For a further explanation of chi square, see N. M. Downie and R. W. Heath, Basic Statistical Methods, New York: Harper and Row Publishers, 3rd ed., 1970, pp. 196-214.
69. Ibid, pp. 224.
70. Ibid, pp. 224.
71. Ibid, pp. 224.
72. C does not have 1 as an upper limit. For a further explanation see N. M. Downie and R. W. Heath, Basic Statistical Methods, New York: Harper and Row Publishers, 3rd edition, 1970.
73. Norman H. Wic, et al., op. cit., pp. 225.
74. This problem, as well as solutions to it, are well documented in N. M. Downie and R. W. Heath, Basic Statistical Methods, New York: Harper and Row Publishers, 3rd ed., 1970, pp. 202-204 and pp. 207-208.
75. Monthly figures on actual wholesale prices for 1973 were utilized in 17 cases (12%).

REFERENCES (Cont'd)

76. For purposes of the statistical analysis which made use of the CROSSTABS computer program, the index of accuracy for 1972 and 1973 was coded as follows: very accurate = 5, accurate = 4, inaccurate = 3, very inaccurate = 2 and doesn't know = 1.
77. The index of accuracy developed for "other" markets refers to, for the most part, the market nearest the producer, this was usually the Latacunga market; but, in some cases, the markets of Pillaro and Salcedo were mentioned.
78. MKTMDDL MN were previously referred to, in Chapter II, as the "market at the moment of sale".
79. Computer name used for other potato producers as a market price information source.

CHAPTER IV

MARKET INFORMATION AND THE DECISION-MAKING
PROCESS OF ECUADOREAN POTATO PRODUCERS

The results of the analysis in the previous Chapter suggested that the majority of producers were receiving little or no market information pertaining to the production and marketing of potatoes. Moreover, that information which they were receiving, concerning potato prices in some markets, from certain major sources (middlemen operating in the countryside) tended to be unreliable. Despite the existence of these problems pertaining to market information, the producer is still forced to make decisions concerning increasing or decreasing production. Since it is assumed that market information is a valuable input into the decision-making process of producers, this chapter examines its effect on decision-making of Ecuadorean producers in an attempt to determine the link between it and the problem of price instability.

Importance of Market Information to the Producers' Decision-Making Process: Further Elaboration

As was stated above, reliable market information pertaining to prices, supply of and demand for agricultural crops is assumed to be a crucial input into the producers' decision-making process. Without it, he may be forced to make decisions concerning production based on past production and prices and this usually leads to over or underproduction

of a particular crop with resulting large increases or decreases in the price of the commodity. If the process of relying upon market information relevant to preceding production periods is continuous, then resulting price increases and decreases could become persistent and severe price fluctuations having adverse effects upon both consumers and producers may result.

In the case of the Ecuadorean potato producer, it would appear that his decision to increase or decrease total acreage in potatoes is based on prices received by him for the crop in the previous harvest (or year in some cases). It is also suggested that this process is consistent throughout the study area (provinces of Cotopaxi, Tungurahua and Pichincha). This also leads one to consider the possibility of the existence of a price-supply cobweb as a partial explanation for the persistence of potato price fluctuations in Ecuador.

The Theory of the Cobweb

The theory of the cobweb was first proposed by Tinbergen, Schultz and Ricci,⁸⁰ writing around the same time but working completely independently.

According to Akerman, "The Cobweb Theorem" presumes an original state of equilibrium at a given price between demand and supply of some commodity. The theory assumes that in this situation some sort of disturbance occurs giving rise

to a discrepancy between actual demand and supply.⁸¹ The cobweb is simply a way of describing the resulting movements of price and production.

Ezekial contends that the theory of the Cobweb can apply only to those commodities which fulfill three conditions:

- "(1) where production is completely determined by the producer's response to price, under conditions of pure competition (where the producer bases plans for future production on the assumption present prices will continue, and that his own production plans will not affect the market);
- (2) where the time needed for production requires at least one full period before production and this cannot be changed once the plans are made; and
- (3) where the price is set by the supply available."⁸²

Ezekial continues on to qualify the above conditions. He claims, in the case of (2), that, although the farmer cannot increase production after his decision on production has been made; nevertheless, he still maintains some "elasticity of response" on the downward side; for, producers can always plow crops under or let the harvest rot in the fields if prices don't meet their expectations.⁸³

With reference to point (3), Ezekial maintains that:

"In the case of many farm commodities, changes in acreage are partly influenced by prices of the preceding year, and partly by those of two years before."⁸⁴

Finally he states that:

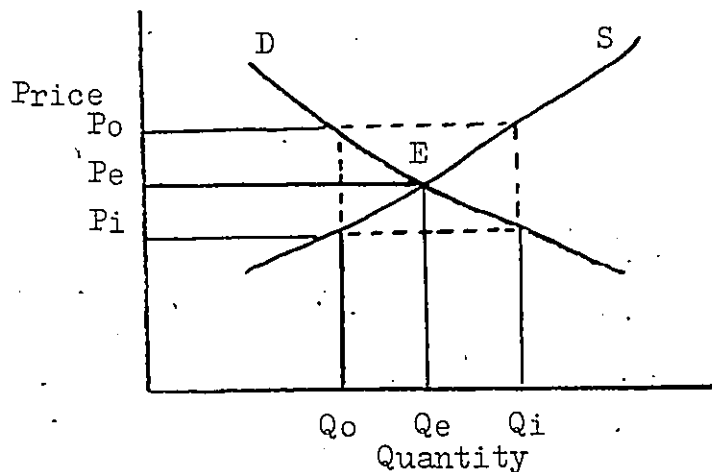
"The combination of 'cobweb' reactions with occasional crop disasters or gluts may be sufficient to produce recurring cyclical changes in production and prices, rather than stability, as the normal situation over a considerable number of commodities."⁸⁵

The Ecuadorean Case

Graphs II and III illustrate the cobweb as it may apply to the production of potatoes in Ecuador.

GRAPH II

THE COBWEB: A CASE OF PERPETUAL OSCILLATION

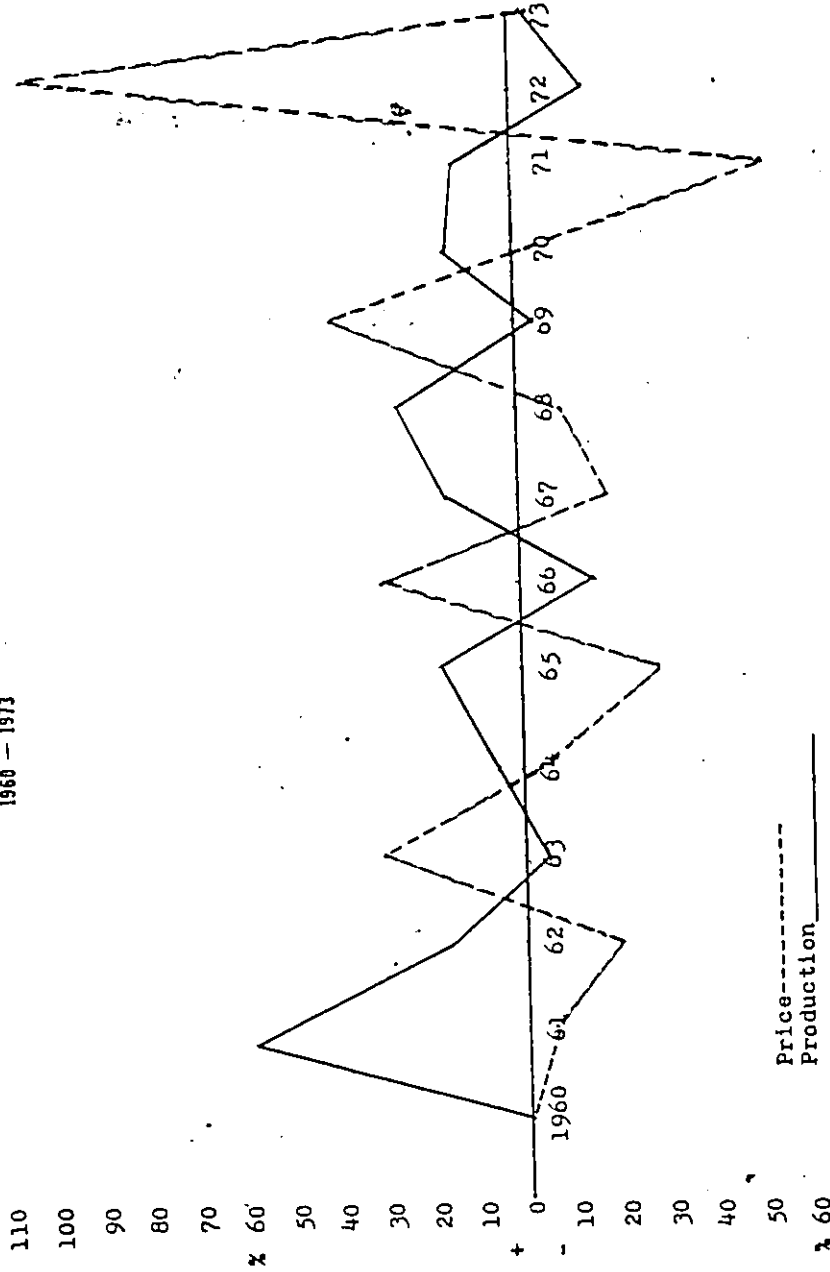


Stated simply, the essential feature of the "cobweb" is the fact that production in year two is a response to price in year one. Thus production lags one year behind price. As illustrated in Graph II above, initially a glut or shortage in the market resulting from, for example, favourable or unfavourable climatic conditions will cause the quantity producers are willing to supply (Q_e on Graph II) as opposed to the quantity consumers are willing to buy to be driven away from equilibrium (E).

In the case where adverse weather conditions reduce yields and the size of the harvest, production decreases from Q_e to Q_o . In one assumes demand remains stable, the reduction in quantity supplied, given a constant demand for the production bids the price up to P_o . Potato producers interpret this high price for potatoes as reason enough to increase their production to Q_i corresponding to P_o . The fact that all producers have made similar commitments to increase their production of potatoes, combined with the six to nine month lag in production (gestation period for the Santa Catalina and Chola varieties of potato respectively), leads to reduction in the price to P_i where the supply-price cycle begins anew.

Whereas Graph II provides a more theoretical illustration of the situation, Graph III and Table XI illustrate the actual relationship between potato production and prices in the time period 1960 to 1973. The lagging of percentage change in production of potatoes in Ecuador behind percentage

GRAPH III
Relationship Between Percentage Change in Potato Production And Percentage Change in Average Wholesale Potato Prices in Ecuador
1960 - 1973



Price-----
 Production_____

Source: SIMAE ANUARIOS, various and Arevalo

TABLE XI

National Production of Potatoes in Ecuador
1960-1973
(In Metric Tons)

<u>YEAR</u>	<u>PRODUCTION</u> ^{a/}	<u>PERCENT CHANGE</u>
1960	180,000	-
1961	288,000	+60%
1962	339,840	+10
1963	322,848	-5
1964	345,447	+7
1965	411,082	+19
1966	345,309	-16
1967	407,465	+18
1968	513,406	+26
1969	492,870	-4
1970	576,658	+17
1971	645,857	+12
1972	548,978	-15
1973	455,000	-17

a/ Production figures have been calculated using Graph's I and III.

changes in average wholesale potato prices from 1961 to 1972 can be readily seen. In nine of twelve years considered, the lag of the percentage change in production one year behind the percentage change in price is consistent. For example, a 13% increase in the production of potatoes in 1964 appears to be a response to a 48% increase of wholesale potato prices in 1963 and a 35% decrease in production in 1966 is a response to a 35% decrease in prices in 1966. Inconsistencies in the pattern could possibly be linked to unnaturally good or poor harvests due to very favourable or unfavourable weather.

With the exception of 1960-61, when national production increased by some 59%, increases and decreases varied between -15 and 30% while the percentage change in wholesale potato prices varied between -50 and 50%, with the exception of 1971-72 when prices increased by some 106%. It appears that, from 1960 to 1971, the existing potato "cobweb" in Ecuador could be described as one of "perpetual oscillation" (depicted in Graph II). However, after 1971, it appears that the "cobweb" becomes more explosive in nature due to a possible change in the slope of the potato supply curve.⁸⁶

Link Between Market Information and Potato "Cobweb"

Whether the "cobweb" can be considered as the sole, or even a partial, explanation of the existence of severe potato supply and price instability is dependent upon how producers make their decision concerning the increasing or decreasing of potato production, and, this in turn, may be a

function of the quantity and quality of market information (especially price information) received by the producer.

It is felt that, in most cases, Ecuadorean potato producers, working with a minimum of market information of questionable reliability, simply base production decisions on the price they received in their last harvest or the year before. If this price was quite high, then production is increased and if the price quoted to them was very low, then they reduce production accordingly.

To test this premise, those potato producers interviewed were simply asked how an increase in the price of potatoes affected their production decisions. A strong minority (44%) indicated that, when potato prices increased, they did not alter their acreage devoted to potatoes. In contrast 37% of those producers interviewed indicated that, when prices increased, they followed suit by increasing their total acreage in potatoes.

When potato prices decreased, this same minority (45%) indicated no alternation of acreage planted to potatoes. Thirty-five percent of those interviewed indicated they reduced acreage in potatoes when prices decreased.

Producers' Behaviour at a Provincial Level

The above pattern of response varied somewhat when considered in a provincial context.

In Tungurahua, 60.4% of those producers sampled (48), indicated that their acreage planted to potatoes remained

constant regardless of a price increase while 37.5% indicated they increased potato acreage if prices increased.

In Pichincha, on the other hand, 52.1% of the producers maintained that they increased acreage devoted to potatoes if prices increased, while 47.8% made no change in acreage despite increased prices.

In Cotopaxi province, responses were evenly distributed in the three categories; 34.7% indicated they increased acreage, 33.3% maintained they made no change in acreage and 30.4% maintained they decreased acreage devoted to potatoes if potato prices increased.

Provincial variations suggest that in Tungurahua, a majority of the producers are reluctant to gamble on the instability of price, while in Pichincha, increasing prices are still a bellweather for production decisions. Patterns of responses are blurred in Cotopaxi due to the even distribution of the responses.

The above responses to the question on production practices are surprising in that they suggest, although a "cobweb" may exist with reference to the production of potatoes in Ecuador, the normal practice of using existing prices or prices received for a crop in a preceding time period as the basis for decisions on production is not followed by the largest number of Ecuadorean potato producers interviewed.

However, a distinction must be made between the producer's perception of reliable prices and his production behaviour. The above findings indicate that the greatest

number of producers interviewed tend towards "stabilization" of acreage when potato prices increase. This behaviour might be explained by some producers' aversions to risk. Indeed, the fact that many producers non stagger the planting of potatoes as a means of assuring the even distribution of production throughout the year, coupled with the short growing season of the Santa Catalina variety of potato (6 months compared to 9 or 10 months for the Chola variety) and the certainty associated with keeping a good portion of cultivable land in pasture reduced the considerable risk associated with the production of potatoes in Ecuador and, to some extent, the need to rely upon the quality and quantity of market information.⁸⁷

This "stabilization" behaviour might also be explained by the fact that a majority of producers appear to be aware of the existence of a potato price cycle. Arevalo has identified the cycle as being one of three years with one year of expansion and two years of contraction of prices.

Producers interviewed were asked when they thought prices would decrease and their responses indicated that they were not totally ignorant of the peaks and troughs of the potato price cycle; for 69.5% of those interviewed in Pichincha, 62.5% in Tungurahua and 43.4% in Cotopaxi indicated that they thought wholesale potato prices would decrease in a year. Since the interviews were done in 1973, they predicted the decrease in 1974. If the past pattern of the cycle is any

indication of what potato prices will be in the future, then prices should have decreased in 1974.

Thus, the postulate that these producers receive very little reliable market price information in the present and must rely upon past prices does not appear to be true in a number of cases.⁸⁸

However, some producers do react positively to increases in prices. The fact that they do increase acreage planted to potatoes in accordance with price increases would give rise to a "cobweb" regardless of whether or not they received reliable market price information simply because of the natural lag in time between planting and harvesting. But, it may be that the reliability of market price information influences the duration of the "cobweb" cycle and the size of price fluctuations rather than directly causing the perpetuation of the cycle.

For example, if a producer feels his market price information to be reliable in year t (present year), he makes use of this information as an input into his production decision whose affect on output will be felt in year t^{+1} (due to the gestation period of the potato). This, in itself, leads to the existence of a simple "cobweb" based on the lag in production. However, if he finds market price information to be unreliable in year t , he may be forced to rely upon potato prices in year t^{-1} (past year), which he knows to be reliable, when making his decision on the amount to produce in year t will be a

function of prices of two years (in t^{-1}) rather than one (t) and this may result in a "cobweb" with two lags rather than one. In addition, the two-lagged "cobweb" could conceivably lead to much larger potato price fluctuations.

Summary

From the preceding analysis it appears that a number of producers do not consistently rely on past information pertaining to the general change and direction of prices in the making of production decisions. The fact that these same producers receive market price information of questionable reliability in some cases in the present and must, therefore, rely upon past experience and prices does not always appear to be the case. Thus, unreliable market price information to producers does not appear to be directly related to the persistence of potato price instability in Ecuador as was originally hypothesized; however, since it is still felt that the "cobweb" appears to provide a valid explanation for the perpetuation of supply/price instability, it may be that unreliable market price information to producers influences the duration and severity (i.e. price fluctuations) of such a cycle. Nevertheless, the analysis leads one to consider other factors such as: adequate storage facilities for potatoes⁸⁹ changes in the supply of competing products, changes in the prosperity or income of consumers and the change in climatic conditions and national hazards as being more significant with respect to providing an explanation

for the persistence of the potato "cobweb" than the quality of market price information received by the producer.

REFERENCES

Chapter IV

80. Gustav Akerman, "The Cobweb Theorem: A Reconsideration" in Quarterly Journal of Economics, February 1957, pp. 151.
81. Ibid, pp. 150.
82. M. Ezekial, "The Cobweb Theorem" in Quarterly Journal of Economics, 1937-38, Vol. 52, pp. 272..
83. Ibid, pp. 272.
84. Ibid, pp. 272.
85. Ibid, pp. 272.
86. For a cobweb to be considered as one of "perpetual oscillation", the slopes of both the supply and demand curves must be equal. When the slope of the supply curve exceeds the slope of the demand curve, the cobweb is considered to be one of "dampened oscillation". An explosive "cobweb" results when the slope of the supply curve is less than the slope of the demand curve.
87. Although reliable market price information may not be a major determining factor related to

REFERENCES (Cont'd)

the perpetuation of price instability; it could be important with respect to a "redistribution of income" from the production of potatoes from the middleman to the producer. At present, middlemen enjoy extremely high profit margins, due to the fact that, in many cases, they quote prices to producers for their crop lower than those prices actually prevailing. Through the receipt of more reliable market price information, middlemen would be forced to quote more realistic prices paid to producers and this would increase the latter's income.

88. It could be argued that, middlemen, because they deliberately, in some cases, quote prices to producers lower than actual prevailing prices, have a stabilizing effect on potato markets. If producers were provided with actual prices, it might be that they would produce more or less than present behaviour dictates based upon market information received and this would result in increased supply/price instability.

REFERENCES (Cont'd)

89. In the case of Ecuador, it is anticipated that the inadequacy of storage facilities for potatoes and non-governmental participation are determining factors in the persistence of price instability. Since potatoes can be stored for extended periods of time, the existence of adequate storage facilities coupled with governmental participation in buying up excess production at reasonable prices during times of glut and selling it at reasonable prices during times of shortage could possibly dampen price fluctuations and reduce instability considerably. For a description and analysis of the Chilean approach to potato price instability see Fletschner's Study on "The Marketing of Agricultural Crops in Chile."

CHAPTER V

MARKET INFORMATION VARIATIONS AMONG LARGE AND
SMALL SCALE POTATO PRODUCERS

Preceding conclusions concerning the decision-making process of Ecuadorean potato producers appear to suggest that market information (specifically price information) may not be as important as a causal factor in the perpetuation of potato price instability as was originally thought. This observation is further investigated in this chapter by focusing on the variations in the quantity and quality of market information received by both large and small scale producers. If results of this investigation reveal that large scale producers do receive greater amounts of reliable information than do small scale producers; then, this would lead one to seriously question the importance of market information relative to other factors as causes of the perpetuation of potato price and supply instability.

Basis of the Hypothesis

It was originally postulated that large scale producers receive greater amounts of reliable market information than their small scale counterparts. The reasoning appears as follows: because of the greater risk involved (greater number of hectares planted to potatoes), it would be in the best interests of the large scale producer to be well-informed.

about all aspects of potato marketing and production as possible; for, it is he who is in the position of gaining or losing the most. In comparison with other agricultural crops in Ecuador, the production of potatoes appear to offer the most risk. Thus it would appear that great amounts of reliable information are essential to those producers who hope to be successful in the market.

In the case of Ecuador, there appears to exist a relationship of necessity between certain middlemen and large producers. The producer, on the one hand, aids the middleman by providing him with a stable and large supply of potatoes while the middleman keeps the producer well informed as to current supply, demand and prices of that same crop in the major markets of the country. In addition, middlemen do not wish to risk losing a large client so they are more apt to provide more reliable market price information to large scale producers. But, in the case of small scale producers, the same relationship does not appear to exist. Small scale producers are simply growing potatoes as a subsistence crop. On occasion they may produce a marketable surplus, over and above their subsistence needs and the logical outlet for the excess production is the local or regional market. Since their original intent was not to produce for the national market, they have no real need for as accurate market information pertaining to potatoes. Moreover, many small producers live in areas which are somewhat inaccessible and, therefore, are seldom visited by middlemen on a regular basis.

TABLE XII

Relationship Between Number of Hectares Devoted to Potatoes in 1973 and Market Information Reliability

RELIABLE MARKET INFORMATION TO PRODUCERS	LESS THAN 5	NUMBER OF HECTARES IN POTATOES					TOTAL
		5-19.9	20-99.9	100-499.9	500		
No: Pichincha	4	3	4	0	0	11	
Cotopaxi	25	12	3	0	0	40	
Tungurahua	21	3	3	2	0	29	
Aggregate:	50	18	10	2	0	80	
Yes: Pichincha	4	4	3	0	0	11	
Cotopaxi	9	13	3	2	0	27	
Tungurahua	8	5	5	1	0	19	
Aggregate:	21	22	11	3	0	57	

NOTE:

CORRECTED CHI SQUARE ^{a/} (x ²)	LEVEL OF SIGNIFICANCE CV ^{b/} =5.99 VC ^{c/} =2	CONTINGENCY COEFFICIENT
8.65	.05	.24

a/ Chi Square has been corrected through the grouping of cells with less than 5 observations.

b/ CV = Critical Value of x².

c/ V = Degrees of Freedom.

It is felt that the above explanations provide a basis for theorizing that market information received by producers varies according to their size. In order to test this statement empirically, relationships between market information reliability and quantity and total potato acreage and production in 1973 were examined for the sample of 140 Ecuadorean potato producers interviewed.

Relationship Between Total Potato Acreage, Total Potato Production and Reliability of Market Information

Considering the total sample of potato producers interviewed, the analysis suggests the existence of an association between potato acreage in 1973 and the reliability of market information. Of the 71 producers reporting potato acreage of less than 5 hectares, 50 (70.4%) indicated their market information to be unreliable. On the other hand, in the case those producers with between 5 and 19.9 hectares in potatoes, 55% (22 of 40) felt their market information to be reliable. Percentages in the 20 to 99.9 and the 100 to 499.9 hectares group of producers were 52.3% and 60% respectively. The corrected chi square value of 8.65 significant at a .05 level seems to suggest that a relationship exists between the two variables. A more detailed perusal of the contingency table suggests a trend towards the receipt of more reliable information as potato acreage increases. A weak, but statistically significant position relationship similar to the one mentioned above appears to exist in the case of total potato production

in 1973 and market information reliability (See Table XII). For example, of those farmers producing less than 500 quintals of potatoes, 84.8% expressed the opinion that their market information was unreliable. Fifty-four percent of those producing between 500 to 4999 quintals also felt that their market information was unreliable. However, the trend towards more reliable information showed itself in that group of producers producing over 5000 quintals of potatoes.

Provincial Variations

In Pichincha province, there appeared to be no distinct association or trend concerning the relationships between the aforementioned variables (See Tables XII and XIII).

The trend in Tungurahua exhibited a market similarity to that of the aggregate of the three provinces. In the case of the association between potato production and market information reliability, 76.4% of those interviewed who produced less than 500 quintals expressed the opinion that market information was unreliable. Sixty-six percent in the 500 to 4999 quintal group expressed a similar opinion about market information reliability. Those producers occupying a position in the other three production categories thought their market information to be reliable. The situation in Tungurahua was the same concerning the relationship of those producers with less than 5 hectares in potatoes; 72.4% indicated market information to be unreliable. Producers in all other acreage

TABLE XIII

Relationship Between Potato Production in 1973
and Market Information Reliability

RELIABLE MARKET INFORMATION TO PRODUCERS	1973 POTATO PRODUCTION (QUINTALS)					TOTAL
	LESS THAN 5	500- 4999	5000- 9999	10,000- 19,999	20,000+	
No: Pichincha	3	5	0	1	2	11
Cotopaxi	12	23	3	1	2	41
Tungurahua	13	12	0	2	1	28
Aggregate:	28	40	3	4	5	80
Yes: Pichincha	1	6	2	0	2	11
Cotopaxi	0	22	3	0	2	27
Tungurahua	4	6	4	3	2	19
Aggregate:	5	34	9	3	6	57

CORRECTED CHI SQUARE χ^2 a/	LEVEL OF SIGNIFICANCE $CV_b / = 5.99$ $VC / = 2$	CONTINGENCY COEFFICIENT
15.55	.05	.32

a/ Chi Square has been corrected through the grouping of cells with less than 5 observations.

b/ CV = Critical Value of Chi Square.

c/ V = Degrees of Freedom.

categories indicated their market information to be reliable.

In Cotopaxi province, 100% of those producers producing less than 500 quintals indicated market information to be unreliable; however, in all other production categories, producers were evenly split between those who thought market information to be reliable and those who thought it unreliable.

In the case of acreage in potatoes, 25 out of 34 producers with less than 5 hectares in potatoes indicated market information to be unreliable. Again, in the other acreage categories equal numbers of producers indicated market information to be both reliable and unreliable.

Despite some provincial differences, in the aggregate, it is suggested by the analysis that a general trend towards large scale producers receiving more reliable market information than small scale producers exists.

Total Production of and Acreage in Potatoes, 1973 and Quantity of Market Information

Tables XIV and XV show the relationship between the quantity of information received by producers, total potato production and acreage in 1973.

In the case of total potato production and the quantity of market information received, 77% of those producers with less than 500 quintals of production and 58.3% in the group of between 500 to 4999 quintals claimed that they received little or no market information. However, those producers in the 5000 to 9999 hectares group (76.9%) stated that they

TABLE XIV

RELATIONSHIP BETWEEN POTATO PRODUCTION IN 1975 AND QUANTITY OF MARKET INFORMATION RECEIVED

Quantity of Market Information Received by Producers	LESS THAN					TOTAL
	500	500-4999	5000-9999	10,000-19,999	20,000+	
None:						
Pichincha	1	2	0	0	1	4
Cotopaxi	3	15	2	1	1	27
Tungurahua	3	4	0	0	1	8
Aggregate:	12	21	2	1	3	39
Very Little:						
Pichincha	2	3	0	1	1	7
Cotopaxi	3	10	1	0	1	15
Tungurahua	10	3	0	1	0	19
Aggregate:	15	21	1	2	2	41
Adequate:						
Pichincha	1	4	2	0	2	9
Cotopaxi	1	10	3	0	0	14
Tungurahua	4	3	2	3	2	14
Aggregate:	6	17	7	3	4	37
More Than Adequate:						
Pichincha	0	1	1	0	0	2
Cotopaxi	0	11	0	0	2	13
Tungurahua	2	1	2	0	0	5
Aggregate:	2	13	3	0	2	20

NOTE:

CORRECTED CHI SQUARE (x ² a/)	LEVEL OF SIGNIFICANCE CV ^{b/} =5.99 VC ^{c/} =2	CONTINGENCY COEFFICIENT
12.52	.05	.29

a/ Chi Square has been corrected through the grouping of cells with less than 5 observations.

b/ CV = Critical Value of Chi Square

c/ V = Degrees of Freedom

TABLE XV

Relationship Between Number of Hectares in Potatoes
1973 and Quantity of Market Information Received

QUANTITY OF MARKET INFORMATION RECEIVED BY PRODUCERS	NUMBER OF HECTARES DEVOTED TO POTATOES, 1973					TOTAL
	LESS THAN 5	5-19.9	20-99.9	100-499.9	500+	
None: Pichincha	3	0	2	0	0	5
Cotopaxi	15	8	2	1	0	26
Tungurahua	6	1	1	0	0	8
Aggregate:	24	9	5	1	0	39
Very Little: Pichincha	2	3	2	0	0	7
Cotopaxi	9	4	2	0	0	15
Tungurahua	15	3	1	0	0	19
Aggregate:	26	10	5	0	0	41
Adequate: Pichincha	4	2	3	0	0	9
Cotopaxi	4	7	2	1	0	14
Tungurahua	6	3	4	1	0	14
Aggregate:	14	12	9	2	0	37
More Than Adequate: Pichincha		2	0	0	0	2
Cotopaxi		6	0	2	0	14
Tungurahua		2	1	0	0	5
Aggregate:		10	1	2	0	21

NOTE:

CORRECTED CHI SQUARE $\chi^2 a/$	LEVEL OF SIGNIFICANCE $CVb/ = 5.99 \quad VC/ = 2$	CONTINGENCY COEFFICIENT
14.30	.05	.31

- a/ Chi Square has been corrected through the grouping of cells with less than 5 observations.
- b/ CV = Critical Value of Chi Square.
- c/ V = Degrees of Freedom.

received adequate to more than adequate information. The responses of the other two groups were evenly distributed. The results of the analysis indicate a weak, but significant positive relationship between the two variables (corrected $x^2 = 12.52$, See Table XIV).

In the case of potato acreage versus the quantity of information received, 69.4% of those with less than 5 hectares indicated they received little or no market information. In contrast, of those producers in the 5 to 19.9 hectare group, 53.6% maintained that they received adequate market information or better. Responses of those producers in the 20 to 99.9 hectare group were evenly distributed. But 80% of those producers in the 100 to 499.9 hectare group indicated that they received adequate to more than adequate market information.

Aggregate results in both Tables XIV and XV suggest that there is, indeed, a trend towards large scale producers receiving a greater amount of information than small scale producers.

Provincial Variations

No discernible patterns, trends or associations among the variables could be identified in the province of Pichincha.

In Tungurahua, the association and trends perceived among the variables were similar to those at the aggregate level but less pronounced.

In the case of Cotopaxi province, results of the analysis also indicated patterns similar to those found at the aggregate level, but less pronounced.

Concluding Observations

The above analysis reveals the existence of a very weak association between the quantity and quality of market information and small and large scale producers. Trends, based on producers' responses, appear to suggest that large scale producers receive greater amounts of more reliable market information than do small scale producers. However, these results are inclined to be viewed as somewhat tenuous due to the fact that the sample of producers interviewed appears to be somewhat biased in terms of the number of small and medium scale producers included.

With reference to the bias in the cross-section at producers interviewed a remedy to this problem might have been the consideration of a larger sample of producers or increased emphasis on large scale producers in the cross-section of producers considered.

Nevertheless, accepting the results, as tenuous as they are, seems to indicate that the role of market information as a causal factor in the perpetuation of potato price instability has been overstated particularly in the case of large scale producers. If one assumes that the behaviour of large scale producers has more of an effect upon the supply of potatoes and consequential problems related to supply (i.e.)

price instability) then small scale producers, then, the fact that large scale producers tend to be better informed with respect to market information they receive, and the problem of price instability still persists, this would lead one to conclude that there are more important determining factors related to this problem than market information and its reliability.

CHAPTER VI

CRITIQUE OF METHODOLOGICAL APPROACH
AND SUMMARY OF FINDINGS

Exploratory Nature of the Study

Again, it must be stressed that the above study is basically exploratory in nature. As such, certain methodological problems, which called for alternative approaches to those used, did arise during the course of the study; problems the solutions for which could not be readily incorporated at the time of realization. However, these alternative methodological approaches were noted and the major ones are discussed in retrospect below.

Methodological Problems Encountered and Perceived Approaches

One of the major problems encountered was that of the sampling technique employed. Although it was impossible at the time, a more scientific sampling methodology coupled with a much larger number of respondents may have lead to better and more accurate statistical results in comparison to those results which were general with the use of a purposive sample.

One of the most obvious operational problems plaguing the thesis was that encountered in the use of contingency table analysis. One primarily too small sample sizes at both

an aggregate and provincial level. Because of the overall small sample size, measures of the significance (chi square etc.) of the relationships between variables had to be continually corrected by way of the grouping of observations or by means of Yate's correction due to the persistent problem of cells within contingency tables with less than five observations. Also, because of the grouping of observations for correction purposes, valuable trends and information on relationships between variables was lost or obscured. Of course, in retrospect, it appears that the obvious solution to this problem would have been to increase the sample size thus eliminating this rather bothersome problem.

Another facet of the problem was that related to the samples taken in each province. Had a greater number of producers been interviewed in each province, the study could have concentrated more on spatial (provincial) variations in those factors related to the price instability problem. This concentrated view of the problem at a micro level could have served to elucidate the complexities of price instability and those factors affecting it in individual provinces.

Still another methodological problem related to the fact that producers (respondents) interviewed were allowed to indicate more than one major market information source when they should have been limited to only one major source. The latter should have been considered as a solution to the problem in light of the fact that, when respondents indicated

both middlemen and the market at the moment of sale as information sources, it was impossible to determine, for example, who had supplied him with market price information. There is no doubt that this situation reduced the accuracy of the statistical results pertaining to the relationship between reliability of market price information and major information sources.

The overlapping of producers' responses concerning middlemen and the market at the moment of sale represented still another methodological problem. Because the researcher did not require producers to further qualify their market at the moment of sale response, he was forced to assume that producers received their market information, while in a local or regional market, from the middlemen who frequented the markets. This assumption resulted in the need to distinguish between those middlemen who operated in the countryside and those in the local and regional markets. This problem may have been remedied by requiring those respondents to clearly state what information source they relied upon when they traveled to markets.

Finally, findings related to the final hypothesis lead one to the realization that large and small scale potato producers should have been considered as separate entities, throughout the study, rather than as one. It could be that the two groups might have revealed distinct variations in terms of their responses to questions related to market

information, the problem of potato price instability and those factors affecting the latter two. However, analysis, throughout the study, were normally carried out on the two groups combined.

Also, by means of the separation of the two groups during the performance of the analysis, it may have been discovered that small scale producers are not affected by market information considerations related to price instability and, therefore, should not have been studied.

In retrospect, if the study design were to be altered for any further research related to the problem, the incorporation of those changes mentioned above pertaining to the observed methodological problems would be seriously considered.

SUMMARY OF FINDINGS

Original Perception of the Problem and the Role of Market Information

Market information (specifically market price information) was originally perceived as being a causal factor in the perpetuation of potato price instability in Ecuador. Because producers received little or no reliable market information from their major information sources (who, it was theorized, were predominantly middlemen), they were forced to rely upon past prices and experience with reference to their production decisions and this behaviour is linked to the existence of a "cobweb", which it is postulated, provides an explanation for the problem of persistent potato price instability.

As a further test of the importance of reliable market information the variation in its quantity and quality was explored to determine if results were consistent with the above postulate.

Findings Related to the Role of Market Information

As a result of the analysis performed, the findings related to the problem investigated are as follows:

(1) The Quantity of Market Information Received by Producers

The original postulate concerning the

quantity of market information received by producers was found to be a valid one; the majority of producers interviewed indicated they received little or no market information.

(2) Sources and Reliability of Market and Market Price Information

The analysis revealed that (not one but two distinct types of middlemen were major sources of market and price information for potato producers; middlemen who operated in the countryside and those who primarily frequented local and regional markets. While no evidence could be found linking middlemen operating in local and regional market to producers' receipt of unreliable market and market price information results linking middlemen operating in the countryside to the producer's receipt of the similar types of information seem to be somewhat less clear cut. At best, about all that can be concluded pertaining to the reliability of market price information provided by middlemen operating in the country is that it is suspect for certain major

markets in the country (i.e. Quito).

(3) Making Process of Ecuadorean Potato Producers

Attempts were made to link unreliable market price information provided by middlemen to the farmer's need to rely on past prices and experience in his production decision-making process.

The results of the analysis indicate that the decision-making process of the producer related to production was not entirely dependent upon past prices and experience and, therefore, the fact that producers received unreliable market information in the present from their sources, did not necessarily imply that he was reliant upon previous price information to determine future production. The analysis revealed that most producers, rather than increasing and decreasing potato production in line with price increases or decreases, do not alter their acreage.

This conclusion raises serious questions about the importance of market information as a causal factor in the persistence of price instability. However,

despite the results, the opinion is still held that the "cobweb" provides a valid explanation of the problem of potato price instability. The above finding points to the consideration of other factors as being more important from the standpoint of causation related to price instability. The inadequacy in storage facilities for the potato in Ecuador could certainly be given serious consideration as a major causal factor. In all probability, this provides a good part of the explanation for potato price instability in Ecuador.

However, producers' receipt of reliable market information (and price information) should not be dismissed as being unimportant; for, in terms of its "redistribution of income" effect, it could have great importance. In some cases, middlemen (with the excessively high profit margins) would be forced to offer higher prices to producers thus reducing their profits and increasing the individual producer's income from the sale of his production.

(4) Variation in Market Information Quantity and Quality Among Large and Small Scale Producers

A final test of the relative importance of market information as a causal factor in persistent potato price instability concerned its variation among producers. If evidence of variations could be found and one producer group received greater amounts of more reliable information than the other coupled with the fact that potato price instability still persisted; then, one would be inclined to conclude that, as a causal factor, reliable market information could not be considered a significant factor in providing an explanation of potato price instability in Ecuador.

The analysis revealed a trend towards large scale producers receiving adequate to more than adequate amounts of reliable market information thus giving credibility to the above reasoning.

Spatial Variation of Market Information Among Provinces

As a final but important point, it must be mentioned that the researcher looked past the results of the aggregate

analysis related to the importance of little or no reliable market information to producers as an explanation of potato price instability for verification of these relationships at a provincial level. However, for the most part, no relationships were present or those that were present tended to vary tremendously among the provinces included in the sample. This suggests, aside from the fact that the number of producers interviewed in each province may have been too small, that the problem of potato price instability and those factors affecting it may be more complex than originally envisioned and that regional differences in the importance of many factors may, in itself, be a relevant factor related to the problem. It is thought that certain factors (i.e. reliable market information) may be more important in terms of the overall problem, in some provinces than in others and there is no doubt that other factors, not discussed here, may also vary in importance from province to province. This spatial variation could in itself, provide a partial explanation for the existence and persistence of potato price instability in Ecuador.

SELECTED BIBLIOGRAPHY

1. Abbott, J.C., "Marketing Issues in Agricultural Development Planning" in Markets and Marketing in Developing Economies, Moyer and Hollander ed., 1968, pp. 87-117.
2. Abbott, J.C., "Situación Presente y Perspectivas de Los Mercados Mayoristas en America Latina", FAO Study, August 1971, 15 pp.
3. Abbott, J.C., "Un Programa de Acción Para Mejoramiento Mercadeo en El Ecuador", Misión de FAO de las Naciones Unidas, Quito: Diciembre 1956, 8 pp.
4. Abbott, J.C., "Marketing - Its Role in Increasing Productivity", FAO Basic Study #4, Rome: 1962.
5. Adams, Dale W., "Leadership, Education and Agricultural Development Programs in Colombia", in Inter-American Economic Affairs, Vol. 22, #1, 1968, pp. 87-96.
6. Adeokun, L.A., "Some Problems of Data Collection in Developing Countries", in Journal of the Durham University Geographical Society, Vol. 14, 1972, pp. 5.
7. Agency for International Development, Economic Data Book - Latin America, Springfield, M.R.: National

SELECTED BIBLIOGRAPHY (Cont'd)

- Technical Information Service, July 1971.
8. Akerman, G., "The Cobweb Theorem: A Reconsideration" in Quarterly Journal of Economics, February 1957, pp. 151-161.
 9. Andrew, Christopher, Improving the Performance of the Production-Distribution System for Potatoes in Colombia, Ph. D. Thesis, Agricultural Economics, Michigan State University, 1969.
 10. Arevalo, F., Producción y Comercialización de la Papa en el Ecuador, Tesis de Grado, Economía, Universidad Católica, Quito, Ecuador, 1973.
 11. Arias, Manuel B., Estructura Agraria del Ecuador, Quito: Junta Nacional de Planificación y Coordinación, Diciembre, 1972.
 12. Baker, Earl J. and Yuk Lee, "Alternative Analysis of Geographical Contingency Tables", in Professional Geographer, Vol. 27, #2, May 1975, pp. 179-188.
 13. Bank of London and South America Review, Vol. 8, No. 12174, (96), December 1974 and various others.
 14. Barraclough, Solon, Agrarian Structure in Latin America, Toronto: D. C. Heath & Co. 1973, pp. 193-228.

SELECTED BIBLIOGRAPHY (Cont'd)

15. Bauer, P.T. and B. Yamey, "The Economics of Marketing Reform" in Journal of Political Economy, Vol. 62, June 1954, pp. 210-225.
16. Berenson, Conrad, "Marketing Information Systems" in Current Marketing Views, George P. Morris and Robert W. Frye ed., San Francisco: Canfield Press, 1973, pp. 343-355.
17. Blankstein, Charles and Clarence Zuvekas, Land Reform in Ecuador, Spring Review Country Paper, USAID, Washington, D.C.: June 1970.
18. Benalcazar-Ruales, René, Toward a Program of Agricultural Development in Ecuador, M.A. Thesis, Agricultural Economics, University of Wisconsin, 1961.
19. Bennett, Peter D., The Role of the Government in the Promotion of Efficiency in the Retail Marketing of Food Products in Greater Santiago, Chile, Ph. D. Dissertation, Business Administration, University of Texas, 1965.
20. Blaut, J.M., "Micro-Geographic Sampling: A Quantitative Approach to Regional Agricultural Geography" in Economic Geography in Economic Geography, Vol. 35, 1959, pp. 79-88.

SELECTED BIBLIOGRAPHY (Cont'd)

21. Bromley, R.J., "Markets in the Developing Countries: A Review" in Geography, Vol. 56, Part 2 April 1971, pp. 124-132.
22. Bromley, R.J., "Informe Preliminar a CESA Sobre Los Resultados de Las Investigaciones Realizadas Sobre el Comercio de Productos Agropecuarios Entre La Costa y La Sierra Ecuatoriana", October 1972, pp. 41-48.
23. Bromley, R.J., "El Intercambio de Productos Agrícolas Entre La Costa y La Sierra Ecuatoriana" in Revista Geográfica, #78, June 1973, pp. 15-33.
24. Brown, Marion R., "Agricultural 'Extension' in Chile: A Study of Institutional Transplantation" in The Journal of Developing Areas, #4, January 1970, pp. 197-210.
25. Brown, Marion R., "Communication and Agricultural Development: A Field Experiment" in Journalism Quarterly, Vol. 47, #4, Winter 1970, pp. 725-734.
26. Buchanan, Norman S., "A Reconsideration of the Cobweb Theorem" in Journal of Political Economy, February 1939, pp. 67-81.

SELECTED BIBLIOGRAPHY (Cont'd)

27. Buchanan, Norman S., Realidades del Campo Ecuatoriano,
Quito: July 1972, Folleto #5, 19 pp.
28. Cassirer, Henry R., "Información y Desarrollo Rural"
in Desarrollo Rural en Los Americas,
Vol. III, No. 1, January-April 1971,
pp. 59-65.
29. Coolson, Frank G., "Marketing and Economic Development"
in Emerging Concepts in Marketing; Pro-
ceedings of the Winter Conference, American
Marketing Association, December 1963,
pp. 26-37.
30. Coppock, J.T., "The Geography of Agriculture", in
American Journal of Agricultural Economics,
1970, pp. 153-169.
31. Currie, L., "Marketing Organization for Under-developed
Countries" in Markets and Marketing in
Developing Economies, Moyer and Hollander
ed., 1968, pp. 117-129.
32. Dorner, Peter, "Needed Redirections in Economic Analysis
for Agricultural Development Policy" in
American Journal of Agricultural Economics,
Vol. 53, 1971, pp. 8-16.
33. Drucker, Peter F., "Marketing and Economic Development
in Journal of Marketing, Vol. 22, 1968,
pp. 252-259.

SELECTED BIBLIOGRAPHY (Cont'd)

34. Ezekial, M., "The Cobweb Theorem" in Quarterly Journal of Economics, Vol. 52, 1937-38, pp. 255-279.
35. Felstenhausen, Herman, "Economic Knowledge, Participation and Farm Decision - Making in a Developed and an Underdeveloped Country" in International Journal of Agrarian Affairs, Vol. V, No. 4, July 1968, pp. 263-281.
36. Fletschner, Carlos, "Structural Patterns in the Marketing of Selected Agricultural Products in Chile: The Position of Small and Large Growers", Land Tenure Center Research Paper, February 1971, #42, pp. 64-104.
37. Fletschner, Carlos, Extensión Para el Mercadeo Agropecuario, FAO, 5 pp.
38. Foneseca, Luiz, "Information Patterns and Practice Adoption Among Brazilian Farmers", Land Tenure Center Research Paper, #20, August 1966.
39. French, H. and J. Racine, Quantitative and Qualitative Geography: La Necessité d'un Dialogue, Ottawa: University of Ottawa Press, 1971.
40. Grajales, Guillermo, "La Comercialización de Productos Agrícolas en América Latina" in Desarrollo Rural en Los Américas, Vol. III, #2, May-August 1971, pp. 77-84.

SELECTED BIBLIOGRAPHY (Cont'd)

41. Grunig, James E., "Communication and the Economic Decision-Making Process of Colombian Peasants" in Economic Development and Cultural Change, Vol. 19, #4, July 1971, pp. 580-597.
42. Grunig, James E., "Economic Decision-Making and Entrepreneurship Among Colombian Latifundistas" in Inter-American Economic Affairs, Vol. 23, #1, pp. 21-46.
43. Harrison, Kelly, "Agricultural Market Co-ordination in the Economic Development of Puerto Rico", Ph. D. Dissertation, Agricultural Economics, Michigan State University, 1967. ✓
44. Harrison, Kelly, "Development, Unemployment and Marketing in Latin America" paper given at conference in Palo Alto, 1972, 15 pp.
45. Harrison, Kelly, "Approaches to Integration of Rural-Urban Food Marketing Systems in Latin America" paper prepared for the Agricultural Development Council Workshop on Agricultural Marketing in Developing Countries, Lexington, 1971.
46. Henley, Donald S., "Marketing and Economic Integration in Developing Economies" in Markets and

SELECTED BIBLIOGRAPHY (Cont'd)

- Marketing in Developing Economies in Moyer and Hollander, ed., 1968, pp. 70-87.
47. Holmes, John, "Problems in Location Sampling" in AAAG, Vol. 57, 1967, oo. 757-780.
48. Holton, Richard, "Marketing Structure and Economic Development", Quarterly Journal of Economics, Vol. 67, August 1953, pp. 344-361.
49. Hurtado, Oswaldo, Dos Mundos Superpuestos, Quito: 1971.
50. I.B.R.D., The Current Economic Position and Prospects of Ecuador, Washington, D.C., October 1973.
51. J.N.P.C., Ecuador, Plan Integral de Transformacion y Desarrollo, 1973-77, Resumen General, Quito, 1972.
52. J.N.P.C., Division Territorial de la Republica del Ecuador, Quito: June 1971.
53. J.N.P.C., Programa de Desarrollo Agropecuario, Quito: J.N.P.C., 1964.
54. Johnston, Bruce F., and John W. Mellor, "The Role of Agriculture in Economic Development" in American Economic Review, September 1961, pp. 566-593.
55. Kanel, Don, "Size of Farm and Economic Development" in Land Tenure Center Reprint #31, University of Wisconsin, pp. 26-44.

SELECTED BIBLIOGRAPHY (Cont'd)

56. Kohls, R. L. and W. D. Downey, Marketing of Agricultural Products, New York: MacMillan and Co., 1972, 4th ed., pp. 247-263.
57. Kriesberg, Martin, "The Marketing Challenge: Distributing Production in Developing Nations", Foreign Economic Development Report, No. 7, USDA, Washington, D. C., 1970.
58. Lansing, John B. and James N. Morgan, Economic Survey Methods, Ann Arbor: ASR, University of Michigan, 1971.
59. Larsen, A. B., "The Quiddity of the Cobweb Theorem" in Food Research Institute Studies, Vol. VII, 1967, pp. 165-175.
60. MacLean, Malcolm S., "Some Multivariate Designs for Communications Research", Journalism Quarterly, 42, Autumn 1965.
61. Miller, Filif V., "Agricultural Ecuador" in Geographic Review, XLIX, April 1959, pp. 183-207.
62. Ministerio de Agricultura y Ganaderia, SIMAE Anuario, 1971 and 1972, and various Bulletins for 1973.
63. Ministerio de Agricultura y Ganaderia, Programa de Papa, pp. 15.
64. Ministerio de Agricultura y Ganaderia, Estado de la Agricultura en el Ecuador, Quito: 1971.

SELECTED BIBLIOGRAPHY (Cont'd)

65. Ministerio de Agricultura y Ganaderia, Estimación de la Superficie Cosechada y de la Producción Agrícola del Ecuador, Quito: 1972.
66. Mintz, Sidney, "Peasant Market Places and Economic Development in Latin America" in Markets and Marketing in Developing Economies, Moyer and Hollander (ed.) 1968, pp. 170-190.
67. Miracle, Marvin, "Comparative Market Structures in Developing Countries" in Nebraska Journal of Economics and Business, Vol. 9, #4, 1970, pp. 33-46.
68. Moyer, Reed, "Marketing in Economic Development", International Business Occasional Paper #1, 1965, pp. 58.
69. Mueller, Willard F., "Some Marketing Structure Considerations in Economic Development" in Journal of Farm Economics, XLI, 2, 1959.
70. Nie, Norman H., et al., Statistical Package for the Social Sciences, 2nd ed., New York: McGraw-Hill, 1975.
71. Olivieri-Rodriguez, Jose, Market Organization Patterns and Related Problems in Latin America, Ph. D. Dissertation, University of Wisconsin, 1961.

SELECTED BIBLIOGRAPHY (Cont'd)

72. Parsons, Kenneth, "Institutional Aspects of Agricultural Development Policy" in Journal of Farm Economics, Vol. 48, #5, December, 1966, pp. 1185-1194.
73. Parten, Mildred, Surveys, Poles and Samples, New York: Cooper Square Publishers Inc., 1966.
74. President's Science Advisory Committee, The World Food Problem, Vol's II and III, Washington, D. C., September, 1967.
75. Preston, Lee, "The Commercial Sector and Economic Development" in Markets and Marketing in Developing Economies, Moyer and Hollander (ed.), pp. 160-170, 1968.
76. Riley, Harold, "Improving Internal Marketing Systems as Part of National Development Programs" M.S.U. Staff Paper #72-10, Department of Agricultural Economics, pp. 28.
77. Rothschild, Michael, "Models of Market Organization and Imperfect Information: A Survey" in Journal of Political Economy, Vol. 81, #6, November-December 1973, pp. 1283-1308.
78. Salaman, Rüdcliffe, The History and Social Influence of the Potato, Cambridge: University Press, 1970.

SELECTED BIBLIOGRAPHY (Cont'd)

79. Shaffer, James T., "Designing Agricultural Marketing Systems in Developing Countries" M.S.U. Staff Paper #72-3, pp. 31.
80. Smith, Gordon W., Agricultural Marketing and Economic Development: A Brazilian Case Study, Ph. D. Dissertation, Harvard University, 1965.
81. Smith, Vernon, "Marketing Agricultural Products in Pichincha Province, Ecuador" in Geographical Review, Vol. 65, #3, July 1975, pp. 353-363.
83. Thiesenhusen, William and Marion Brown, "Survey of the Alliance for Progress: Problems of Agriculture" in Land Tenure Center Reprint #35, University of Wisconsin, pp. 1-28.
84. U.S.A.I.D., "Economic Analysis of Ecuador's Agricultural Sector", 1972.
85. U.S. Department of Agriculture, Agricultural Production and Trade of Ecuador, Washington, D. C., June 1968.
86. Warwick, Kenneth M., "Computer Programs for Statistical Analysis" in Handbook of Marketing Research, Robert Ferber ed., 1973.
87. Watson, Donald, Price Theory and its Uses, Boston: Houghton-Mifflin, 1968.

SELECTED BIBLIOGRAPHY (Cont'd)

88. Watson, Dunn, "Problems of Cross-Cultural Research, in Handbook of Marketing Research, Robert Ferber ed., 1973, pp. 4-360 and pp. 4-371.
89. Weil, Thomas E. et al., Area Handbook of Ecuador, Washington, D. C., 1973.
90. Weintraub, Sidney, Price Theory, New York: Greenwood Press, 1968.
91. Wells, William D. and Jagdish N. Sheth, "Factor Analysis" in Handbook of Marketing Research, Robert Ferber ed., 1973, pp. 2-458 and pp. 2-471.
92. Wesche, Rolf, "Rural Geography, Underdeveloped Areas and Quantitative Methods" in Quantitative and Qualitative Geography: Le Necessite d'un Dialogue, Ottawa: University of Ottawa Press, 1971.
93. Wiegand, Kenneth, The Economic Feasibility of Stabilizing the Price and Supply of Potatoes in Ecuador, M. A. Thesis, Department of Agricultural Economics, University of Florida, 1975.
94. Willingham, Howell W., Marketing of Staple Foods, Port-au-Prince, Haiti, M.A. Thesis, University of Florida, 1967.

SELECTED BIBLIOGRAPHY (Cont'd)

95. Winch, Robert F. and Donald T. Campbell, "Proof? No. Evidence? Yes. The Significance of Tests of Significance" in American Sociologist, May 1969, pp. 140-143.

UNIVERSIDAD DE OTTAWA
DEPARTAMENTO DE GEOGRAFIA

La Comercialización de las Papas: La Difusión de Información

Fecha Altura de la finca Titulo

Esta encuesta es para el uso del Sr. Danny Napier de la Universidad de Ottawa-Canada y es completamente confidencial.

1. Ubicación de la Finca: Provincia

Canton

Parroquia

2. Que ciudad es la mas cercana

A cuantos Kms. de su finca:

3. Que orientación de esta ciudad: norte sur

este oeste:

4. Numero de hectareas de la finca:

5. Numero de hectareas dedicadas al cultivo de papas en este año: Año pasado

6. Sabe Ud. cual es el precio de las papas en los siguientes mercados:

	MERCADO	Precio (por mayor, en sucres, por quintal)
Quito:	si no (gruesa)
Guayaquil:	si no (gruesa)
Otros:	si no (gruesa)

APPENDIX A

7. Cual fue el precio de las papas en junio pasado

	MERCADO	Precio (por mayor, en sucres, por quintal)
Quito:	si no(gruesa)
Guayaquil:	si no(gruesa)
Otros:	si no(gruesa)

8. Cuando el precio de las papas sube:

Aumenta la superficie cultivada de papas:

Se reduce la superficie cultivada de papas:

Mantiene la misma superficie:

9. Porqué?

10. Cuando el precio de las papas baja:

Aumenta la superficie cultivada de papas:

Se reduce la superficie cultivada de papas:

Mantiene la misma superficie:

11. Porqué?

12. Ha observado Ud. si cambio el precio de las papas durante su ultima cosecha: si no

13. Si es asi, en cuanto cambio el precio:
(S/. por quintal).

14. Cree Ud. Que hay un origen seguro de informacion sobre los precios de las papas en esta zona: si no

15. Cual el el (los) origen (es) de su informacion sobre los precios de las papas:

Vecinos:

APPENDIX A

comerciante, comprador, cavador en el
mercado de vender la produccion:
otro:

16. Sus vecinos cercanos que son productores de pas, tienen
el mismo origen de informacion sobre los precios de las
papas: si no nosabe:

17. Conoce Ud. cuantos quintales de papas por hectarea
producen sus vecinos:

18. A donde va su produccion de papas?

----- % -----
----- % -----
----- % -----

19. Cuantos quintales de la cosecha anterior dedico al
consumo interno?

(por familia, peones, etc.)
a las semillas

20. Que variedades de papas siembra Ud.?

Sta. Catalina
Chola
otra

21. Que variedades son la mas importante para Ud.?

22. Porqué?

23. Que variedad siembra Ud. mas.% del sembrado total

.....

APPENDIX A

24. Cuando comenzo Ud. a sembrar Catalina, en que ano?
-
25. Quien le informo sobre la papa Catalina?
-
26. Cuantas veces le visito el extensionista durante este
ano ano pasado
27. Se informo por el extensionista sobre:
- los precios de la papas sino
- los precios de la abonos sino
- metodos modernos de cultivos sino
28. Cuanto pago el intermediario (comprador, cavador) por
sus sementeras de papas el ano pasado:
- por cavar (S/. por qq)
- en el mercado
- este ano
- en que mes
29. Vende Ud. a un solo comprador: sino?
- Cuantos:
30. Vende Ud. al (los) mismo(s) comprador(es) todo el
tiempo? sino
31. Recibe Ud. suficiente informacion sobre los precios de
las papas?
- si adecuada poca
- bastante no ninguna
32. Vende Ud. parte de su produccion de papas en los
mercados y ferias?

si no

APPENDIX A

33. Si es asi, donde las vende Ud.?
34. Que cantidad vende Ud. por feria?
35. Antes de la venta de las papas, trata de averiguar precios en diferentes mercados, buscando la mejor alternativa?
si no
36. Va Ud. a Quito, Guayaquil u otras ciudades buscando informacion sobre los precios de las papas?
si no
37. Cual es su rendimiento de papas, en quintales, por hectarea o cuadra?
38. Tiene Ud. problemas en la produccion de papas con:
suelo pobre -----
plagas: gusano blanco --- arroya --- tison --- -----
heladas -----
mano de obra escacez ----- caro -----
abonos escacez ----- precios -----
fluctuaciones de los precios de papas si ---
no --- -----
39. De todos estos, cual es el problema mas grave para Ud.?
.....
40. Que otros productos agricolas, ademas de papas, cultiva Ud. ahora?
1. ----- 3. -----
2. ----- 4. -----
41. Que producto, en su opinion, es el mejor en esta zona?
.....

APPENDIX A

- 42. Cree Ud. que deberia ser un precio fijo para papas en todos los mercados y ferias? si no
- 43. Si es asi, que precio fijo (S/. por qq.)
- 44. Porqué?
- 45. Si el precio de las papas es muy alto ahora, cuando cree que estara bajo? (cuantos meses o anos)
- 46. Quanto cuesta para sembrar 1 qq. de papas?
- 47. Usa Ud. rotacion de productos agricolas?
si no
- 48. Proxima sementera: mes
Proxima sementera: mes
- 49. Cuantas sementeras vendio (cosecho) Ud. en el ano pasado?

APPENDIX B.

PROGRAMA DE PAPA*

El cultivo de papa ha sido una de las principales actividades agrícolas tradicionales de la sierra y hoy continúa siendo uno de los alimentos básicos de la población. Si bien este cultivo se caracteriza como inherente del campesino, sin embargo en el País existen zonas definidas que reúnen las mejores condiciones ecológicas para producir papa, las mismas que han garantizado hasta el momento el abastecimiento nacional con fluctuaciones de precios, resultantes de una comercialización defectuosa.

La producción nacional de papa no ha sido deficitaria, sin embargo tanto el aumento demográfico como la necesidad de reducir las áreas marginales de este cultivo, en el futuro obligan a elaborar programas de acción para aumentar los rendimientos por unidad de superficie a fin de cubrir las necesidades internas, propiciando al mismo tiempo una política de precios populares que aumente el consumo "per capita".

*Source: Ministry of Agriculture and Livestock, Quito, Ecuador, 1973.

APPENDIX B

OBJECTIVOS

Aumento de la producción mediante asesoramiento-técnico dirigido al sector de propietarios, del area de atención preferencial.

Determinar ecologicamente las zonas paperas preferenciales y marginales para el cultivo de papa.

Reducción de la superficie destinada al cultivo de papa, en las areas que se consideren marginales, las mismas que deben incorporarse a otros cultivos: Trigo, cebada, pastos y otros que convengan técnicamente.

Suministro de semilla certificada para el sector de asistencia técnica preferencial.

Estudiar las posibilidades de almacenamiento y mejorar la política de comercialization, para evitar las fuertes fluctuaciones de precios en el mercado.

Mejorar la dieta alimenticia de la población, en base al aumento del nivel de ingreso.

APPENDIX B

METAS

De acuerdo con los datos disponibles en la actualidad se localizaban las áreas paperas que reúnan las mejores condiciones de suelo, clima y medio ambiente sanitario, acordes con las exigencias bioclimáticas de la papa. En este sector se distribuirán las variedades mejoradas y certificadas y se intensificará la asistencia técnica para conseguir de los medianos y grandes agricultores su interés por mejorar el manejo de sus cultivos y aumentar los promedios de producción. Este progreso deberá conseguirse en forma paulatina.

Las áreas en donde se siembre papa por iniciativa privada y que no reúnan las condiciones requeridas por la planta, anotadas en el párrafo anterior y que además el Ministerio de la Producción las vaya señalando como marginales, no recibirán asistencia técnica e irán eliminándose del cultivo de papa en forma progresiva.

Con el aumento de la producción, como resultado del suministro de semillas certificadas, asistencia técnica, crédito y facilidades para adquirir los insumos de la producción; será necesario de reducción de las superficies de siembra de las áreas marginales de 63.958 hectáreas en 1.973 a 61.959 en 1.977, márgenes que serán destinados para pastos y otros cultivos que requirieran aumentar la frontera agrícola.

APPENDIX B

Para cumplir con las recomendaciones del Instituto Nacional de Nutrición, se podrá aumentar el consumo de papa pro habitante de 48.93 Kg. en 1.973 a 53.00 en 1.977.

CUADRO N° 1

	<u>METAS</u>		
Superficie Sembrada	Ha.	63.958	61.959
Superficie Cosechada	Ha.	57.572	55.992
Rendimiento	Kg/Ha.	8.037	9.716
Producción	Ton.M.	462.640	544.000
Semillas	Kg/Ha.	1.138	1.230
	Ton.	72.679	71.424
Desperdicios	%	6	6
	Ton.	27.760	32.640
Consumo Animal	%	6	6
	Ton.	27.760	32.640
Exportación	Ton.	.-	.-
Importación	Ton.	.-	.-
Disponibilidad	Ton.	334.577	413.600
Materia prima	Ton.	.-	.-
Consumo Total	Ton.	334.577	413.600
Consumo "Per Capita"	Kg/Hbit.	48,93	53,0

APPENDIX B

LOCALIZACION

El sector de asistencia Técnica preferencial se ubicara en principio en tres zonas productoras, a lo largo de la sierra Ecuatoriana, entre 3.000 y 3.400 m.s.n.m., pero sera necesario efectuar reajustes á medida que se conduzcan los estudios fenológicos de la papa en la determinacion del area preferencial.

ZONA MORTE.- En el Carchi; Huaca y Julio Andrade, en donde se asesorara sobre el cultivo de la variedades Santa Catalina, Copiro y Violeta.

ZONA CENTRAL.- En Pichincha, Cayambe, Nono Pintac, Chillogallo y Machachi; en Cotopaxi y Tungurahua, Salcedo y Pillaro y las tierras altas de las estribaciones internas de la Cordillera occidental hasta Chimborazo, se dara asistencia técnica en los cultivos de la variedades: Santa Catalina, Chola y Bolona.

ZONA SUR.- En la provincia del Cafiar, zonas de Biblian y Cafiar con las variedades Santa Catalina, Maria y Bolona.

APPENDIX B

En estas zonas se distribuirán las variedades certificadas Santa Catalina, Copiro, Maria y otras que obtuvieran la calidad de mejoradas. Las demás variedades no constituirán semilla certificada sino la categoría de tradicionales o comunes.

Se aspira a que en las áreas de atención preferencial los rendimientos fluctuarán alrededor de las 18.000 Kg. mientras que en las áreas de atención secundaria se obtendrán rendimientos promedios de 8.000 Kg/Ha.

A medida que se vayan cumpliendo las metas de Programa se irán incorporando nuevas regiones consideradas como de atención preferencial a fin de reducir paulatinamente la superficie de este cultivo.

APPENDIX B

COSTOS DE PRODUCCIÓN

Para establecer a costo total del programa se formularon los costos por Hectarea, tanto para un cultivo tecnificado como para un tradicional sin mecanización y que alcanzaron a las sumas de 11.000 y 5.650, en su orden, que luego multiplicado por la superficie sembrada y cosechada del area de atención preferencial y del area secundaria de obtuvo que para el periodo 1.973-1.977, el monto total suma 1.892,4 millones de sucres (ver anexo 4).

CUADRO N° 2

COSTO TOTAL

En Millones de Sucres

<u>ANOS</u>	<u>COSTO TOTAL</u>	<u>AREA ATENCION</u>	
		<u>PREFERENCIAL</u>	<u>AREA SECUNDARIA</u>
1.973	361,9	1,1	360,8
1.974	379,6	2,6	377,0
1.975	387,7	11,4	376,3
1.976	388,7	25,3	363,3
1.977	374,5	50,2	363,4

FINANCIAMIENTO

A fin de conseguir el financiamiento de 90.6 millones de sucres que corresponden al costo total del area de atencion preferencial, el Banco Nacional de Fomento debera aportar con el 80% y 20% de dicha area estara a cargo del sector privado segun se indican a continuacion.

CUADRO N° 3

<u>ANOS</u>	<u>FINANCIAMIENTO</u>		
	<u>AREA ATENCION</u> <u>PREFERENCIAL</u>	<u>80%</u> <u>BANCO DE</u> <u>FOMENTO</u>	<u>20%</u> <u>SECTOR</u> <u>PRIVADO</u>
	Millones de Sucres		
1.973	1,1	0,88	0,22
1.974	2,6	2,08	0,52
1.975	11,4	9,12	2,22
1.976	25,3	20,24	5,06
1.977	50,2	40,16	10,04

El costo total del area secundaria para el periodo 1.973-1.977 que alcanzo a 1.801,9 millones de sucres sera financiada por el sector privado.

APPENDIX B

OCUPACION

Considerando el area de atención preferencial y secundaria para el periodo del quinquenio se llega a determinar que se producira una reducción en la ocupación de mano de obra debido a la necesaria tecnificación del cultivo que contempla el Programa, (ver anexo N° 5).

POLITICA DE ACCIÓN

Para encarar el Programa y cumplir con los objetivos y metas propuestas la política de acción será la siguiente:

Suministro de Variedades Mejoradas y Semilla Certificada.-

El INIAP producirá la semilla básica y registrará de las variedades que se hayan seleccionado para las distintas zonas productoras.

La semilla registrada será entregada por intermedio del Departamento de Certificación de Semillas del Ministerio de la Producción, a las entidades públicas, privadas o de constitución mixta, que deseen producir semilla certificada de papa. Este Departamento fiscalizará las sementeras de semillas básicas, registradas y certificadas de cualquier entidad que las produzca, de acuerdo con el contenido de la Ley y los Lineamientos del Plan de Desarrollo. Para un mejor cumplimiento de sus funciones ese Departamento reglamentará la producción, el procesamiento y la comercialización de semilla certificada de papa. Cooperará con la Dirección de Fomento Agrícola en la difusión y empleo de esta semilla en las zonas preferenciales de producción.

Los Organismos involucrados actuarán coordinadamente para la fijación de las superficies de siembra de las distintas clases de semillas según sea la demanda de la clase certificada.

APPENDIX B

FOMENTO

El Departamento de Fomento Agrícola del Ministerio de la Producción, se encargara de popularizar las nuevas técnicas de cultivo que recomienda el INIAP, así como las semillas que haya certificado el Departamento respectivo.

También ayudara a los agricultores a emplear correctamente los insumos de la producción y los orientara en la consecución de créditos según se haya previsto para el sector de asistencia técnica preferencial. Las metas del quinquenio no se podran cumplir sin un fomento adecuado del uso de semilla certificada.

DETERMINACION DE SECTORES PREFERENCIALES
Y SECUNDARIOS DEL CULTIVO DE PAPA

Esta labor la deberan cumplir, en el lapso de cinco años en forma cooperativa las siguientes Instituciones del Estado:

- a) El Ministerio de la Producción con sus Departamentos de Sanidad Vegetal, de Suelos, de Extension Agrícola y Certificación de Semillas.
- b) El Instituto Nacional de Meteorología e Hidrología, y,
- c) El Instituto Nacional de Investigaciones Agropecuarias.

La finalidad sera la delimitacion de los sectores preferenciales y secundarios para el cultivo de papa de acuerdo con los requerimientos fenológicos de la misma.

A partir de 1.973 los tecnicos encargados del Programa de Papa del Ministerio de la Producción, en coordinacion con las entidades estatales y privadas que tengan relacion directa con esta solanacia, seran los responsables de efectuar los estudios necesarios para la zonification del cultivo.

A medida que se vayan delimitando estas zonas, se iran ajustando los sectores de asistencia tecnica.

APPENDIX B

COMERCIALIZACION

Los sistemas de comercialización de la papa en el Ecuador son de lo mas defectuosos, y repercuten desfavorablemente en los intereses economicos de los productores y los consumidores. El precio de compra de un quintal para cavar en la sementera en ocasioned de ve mas que duplicado cuando llega el consumidor. La Dirección General de Empresas y el SIMAE buscaran los medios mas adecuadon para subsonar este problema, encontrando la manera de reducir en cuanto sea posible les grandes fluctuaciones de precios que sufre la papa en el mercado nacional.

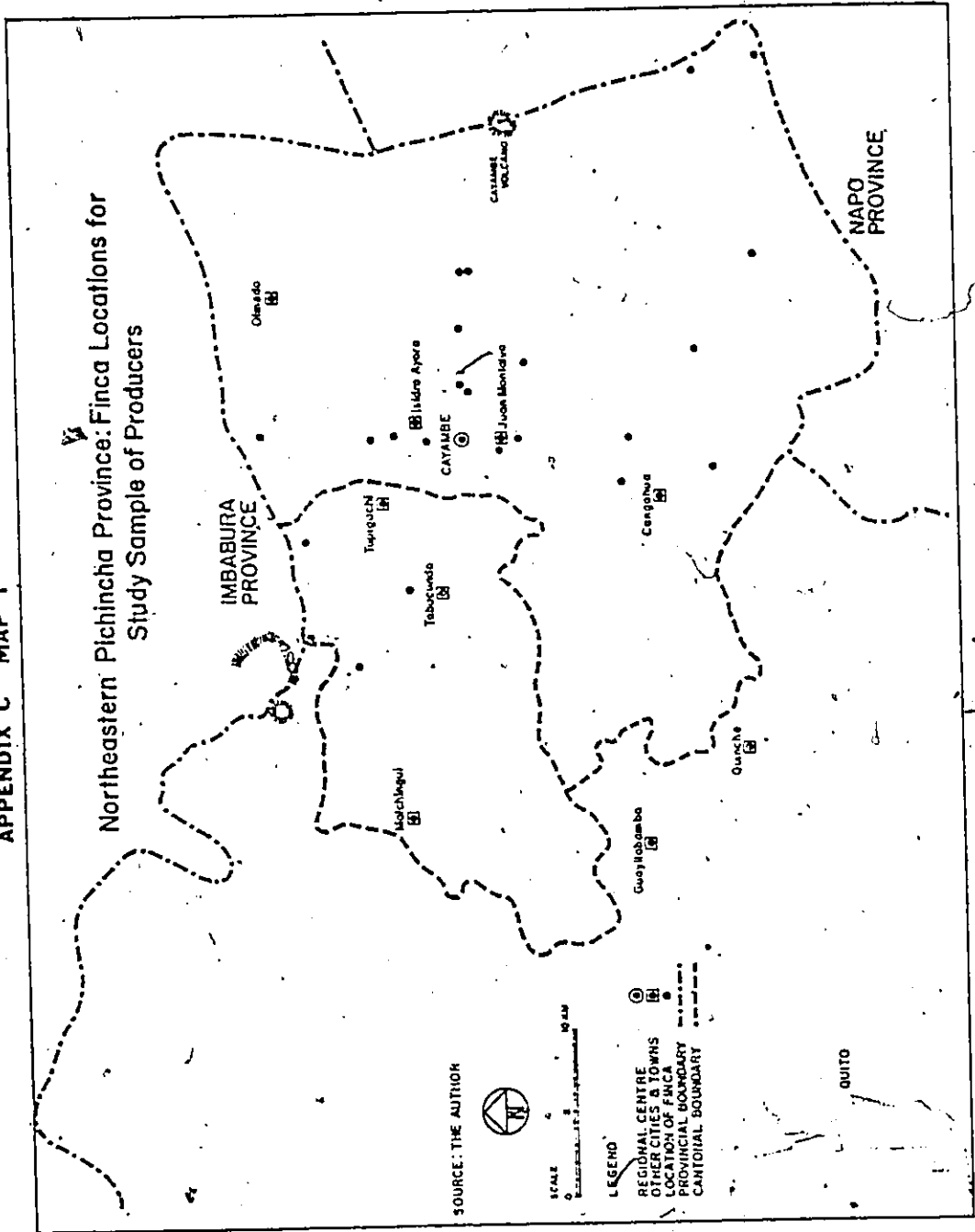
A N E X O N° 1

PROGRAMA DE PAPA

	<u>UNIDAD</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
SUPERFICIE SEMBRADA	Has.	63.958	66.961	66.643	66.625	61.959	
SUPERFICIE COSECHADA	Has.	57.572	60.931	60.931	60.078	55.992	
RENDIMIENTOS	Kg/Ha.	8.837	8.357	8.357	8.805	9.716	
PRODUCCION	Ton.	462.640	487.100	509.170	529.000	544.000	
SEMILLAS	Kg/Ha.	1.138	1.138	1.154	1.178	1.230	
	Ton.	72.679	76.118	77.078	76.209	71.424	
DESPERDICIOS	%	6	6	6	6	6	
	Ton.	27.760	29.230	30.550	31.700	32.640	
CONSUMO ANIMAL	%	6	6	6	6	6	
	Ton.	27.760	29.230	30.550	31.700	32.640	
EXPORTACION	Ton.	---	---	---	---	---	
IMPORTACION	Ton.	---	---	---	---	---	
DISPONIBILIDADES	Ton.	334.577	352.840	372.400	392.527	413.600	
MATERIA PRIMA	Ton.	---	---	---	---	---	
CONSUMO TOTAL	Ton.	334.577	352.840	372.400	392.527	413.600	
CONSUMO PER CAPITA	Kg/Hbt.	48.93	49.92	50.98	52.00	53.00	
POBLACION 31-XII	Habts.	6'838.400	7'067.700	7'304.500	7'549.300	7'802.300	

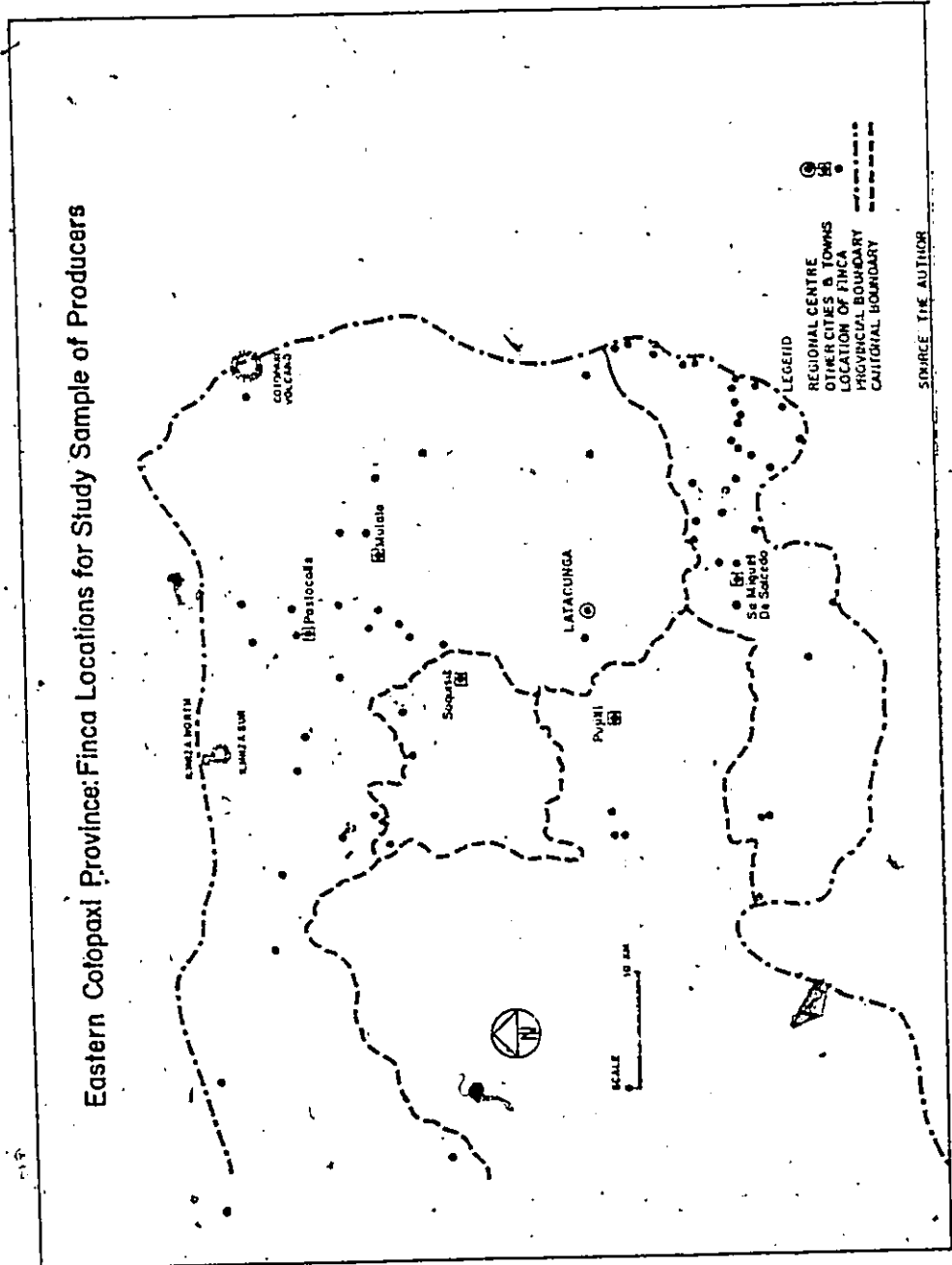
APPENDIX C MAP I

Northeastern Pichincha Province: Finca Locations for
Study Sample of Producers



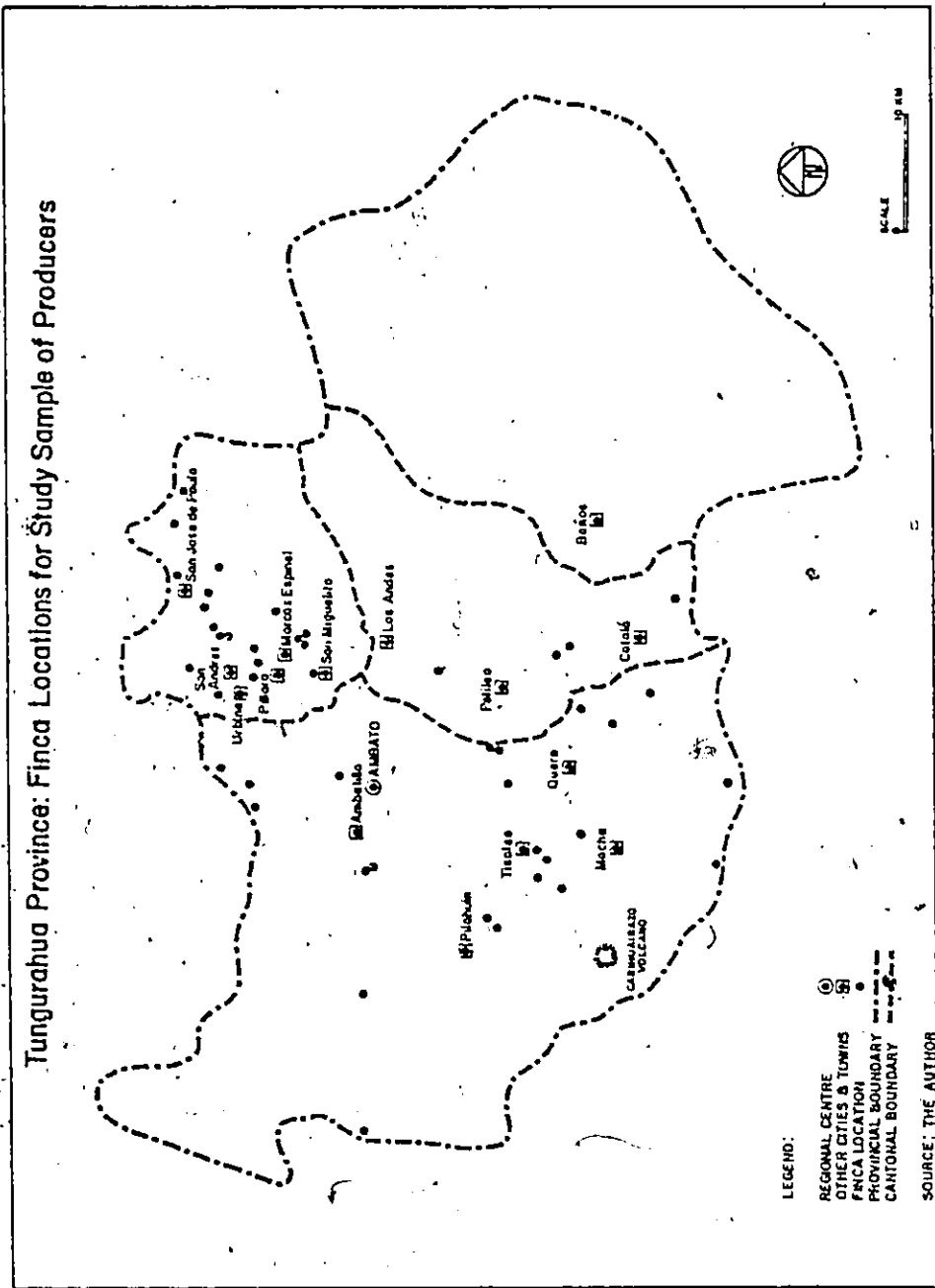
APPENDIX C MAP II

Eastern Cotopaxi Province: Finca Locations for Study Sample of Producers



APPENDIX C, MAP III

Tungurahua Province: Finca Locations for Study Sample of Producers



APPENDIX D

GLOSSARY OF TERMS

- Sierra - One of the three major regions of Ecuador comprised of, for the most part, the Andes mountain range. This region covers approximately the central two-fifths of the country.
- Costa - Another major region of Ecuador, covering approximately the western 30% of the country. This region is composed partly of swampy lowlands and partly of low hills. The coastal area in the north is covered by dense rainforest and in the south by dry scrub woodland and savanna.
- Sementera - Spanish word for harvest (of an agricultural crop).
- Solanum - Any of a genus of herbs, shrubs or trees of the nightshade family. Only tuber bearing solanums are considered in the context of this thesis.
- Finca - Small farm.
- Hacienda - Very large farm or estate.
- Canton - Ecuadorean provinces are divided into a number of "cantones" which are comparable to counties.

APPENDIX D (Cont'd)

- Parroquia - Each "canton" is divided into a number of parroquias or districts.
- Cavador - Usually a middleman who contracts with the producer to harvest his crop. In the case of potatoes, they must be dug out of the ground by those who harvest them; hence the name "digger".
- Revendones - Individuals who buy produce in local, regional, or national markets and then resell it to other individuals in the marketing chain such as middlemen or minoristas.
- Minoristas - An individual who sells agricultural produce as well as other products on a small scale usually in the local, regional or national markets of the country.

APPENDIX E

CROSS-TABULATION RESULTS: THE RELATIONSHIP BETWEEN MIDDLEMAN AND INDICES OF ACCURACY FOR 1972
(AGGREGATE SAMPLE)

04/19/76 PAGE 6

CONTINGENCY ANALYSIS I
FILE MARKET (CREATION DATE = 04/19/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR

***** CHOS TADULAT UN OF *****
MIDDLEMAN ***** HY IDXA072 ***** PAGE 1 OF 1

INDEX	1	2	3	4	5	ROW TOTAL
AC	54	18	1	12	4	89
	60.7	20.2	1.1	13.5	4.5	63.6
YES	69.2	47.4	33.3	75.0	80.0	
	30.0	12.0	0.7	8.6	2.9	
TOTAL	24	20	2	4	1	51
	47.1	39.2	3.9	7.8	2.0	36.4
	30.0	52.6	60.7	25.0	20.0	
	17.1	14.3	1.4	2.9	0.7	
COLUMN TOTAL	76	31	3	16	5	140
	55.7	27.1	2.1	11.4	3.6	100.0

CHI SQUARE = 4.9530 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0095
 CRAMER'S V = 0.23919
 CONTINGENCY COEFFICIENT = 0.23327
 LAMBEA (ASYMMETRIC) = 0.05802 WITH MIDDLEMAN DEPENDENT.
 LAMBEA (SYMMETRIC) = 0.02653
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.04332 WITH MIDDLEMAN DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.03183

APPENDIX E

U

FILE MARKET (CREATION DATE = 04/19/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR
 MIDULM CROSSTABULATION OF BY IDXAG72
 MIDULM PAGE 1 OF 1

COUNT	IDXAG72				TOTAL
	18 TO 23	12 TO 17	6 TO 11	UNDLRS	
FGA PCT	SUCRES	SUCRES	SUCRES	SUCRES	ROW
COL PCT	1	2	3	4	TOTAL
0	71	12	1	2	89
	79.0	13.5	1.1	2.2	95.8
	69.6	52.2	12.5	66.7	140.0
	50.7	18.5	0.7	1.4	61.3
1	31	11	7	1	50
	60.8	21.6	13.7	2.0	97.1
	30.4	47.8	87.5	33.3	169.0
	22.1	7.9	5.0	0.7	35.7
COLUMN	102	23	8	3	140
TOTAL	72.9	16.4	5.7	2.1	100.0

MAX CHI SQUARE = 12.14344 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0163
 CRAMER'S V = 0.20451
 CONTINGENCY COEFFICIENT = 0.20252
 LAMBDA (ASYMMETRIC) = 0.11705 WITH MIDULM DEPENDENT. = 0.0 WITH IDXAG72 DEPENDENT.
 LAMBDA (SYMMETRIC) = 0.06742
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.00623 WITH MIDULM DEPENDENT. = 0.004965 WITH IDXAG72 DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.05675

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APPENDIX E

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CENTINGENCY ANALYSIS I

FILE MARKET (CREATION DATE = 04/19/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR

MIDDLEMN ***** CRUS T A R U L A T I O N U F ***** PAGE 1 OF 1

IDXA072

COUNT	ROW PCT	CUL PCT	TOT PCT	1	2	3	4	5	6 TO 11	UNDER 5	HOW TOTAL
				SUCRES	SUCRES	SUCRES	SUCRES	SUCRES	SUCRES	SUCRES	
0				41	21	2	7	13			84
				48.8	25.0	2.4	8.3	15.5			66.7
				61.2	65.6	40.0	87.5	92.9			
				32.5	14.7	1.6	5.6	10.3			
1				26	11	3	1	1			42
				61.6	26.2	7.1	2.4	2.4			33.3
				30.0	34.4	40.0	12.5	7.1			
				20.6	8.7	2.4	0.8	0.8			
				57	32	5	8	14			126
				53.2	25.4	4.0	6.3	11.1			100.0

HAN CHI SQUARE = 3.40254 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0779

CRAMER'S V = 0.25024

CENTINGENCY COEFFICIENT = 0.25004

LAMBDA (ASYMMETRIC) = 0.02381 WITH MIDDLEMN DEPENDENT.

LAMBDA (SYMMETRIC) = 0.00000

UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.06085 WITH MIDDLEMN DEPENDENT.

UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.09147

NUMBER OF MISSING OBSERVATIONS = 14

WITH IDXA072 DEPENDENT.

= 0.03146 WITH IDXA072 DEPENDENT.

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APPENDIX F
 THE RELATIONSHIP BETWEEN MIDDLEMAN AND INDICES OF ACCURACY FOR 1973.
 (AGGREGATE SAMPLE)

CROSS-TABULATION RESULTS: THE RELATIONSHIP BETWEEN MIDDLEMAN AND INDICES OF ACCURACY FOR 1973.
 (AGGREGATE SAMPLE)

04/19/76

PAGE 3

CONTINGENCY ANALYSIS I (CALYON DATE = 04/19/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR

MARKET CROSS TABULATION BY MIDDLEMAN PAGE 1 OF 1

MARKET	COUNT		MIDDLEMAN	YES	NO	ROW TOTAL
	ROW PCT	TOT PCT				
IDXA073	56	17	0	1	73	52.1
DCNT KNOW	76.7	23.3	40.0	12.1	43	30.7
18 TO 2J SUCHES	44.2	55.8	21.3	47.1	68.4	50.0
12 TO 17 SUCHES	13.6	17.1	2	2.1	15.7	11.5
6 TO 11 SUCHES	72.7	27.3	9.0	5.0	14.0	10.0
UNDER 5 SUCHES	50.0	50.0	4.0	2.0	14.0	10.0
COLUMN TOTAL	140	51	63.4	36.4	100.0	

RAW CHI SQUARE = 14.05514 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0055
 CRAMER'S V = 0.22354
 CONTINGENCY COEFFICIENT = 0.30703
 LAMBDA (ASYMPTOTIC) = 0.10448 WITH IDXA073 DEPENDENT.
 LAMBDA (SYMPLECTIC) = 0.11017
 UNCERTAINTY COEFFICIENT (ASYMPTOTIC) = 0.04420 WITH IDXA073 DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMPLECTIC) = 0.03689.
 = 0.11765 WITH MIDDLEMAN DEPENDENT.
 = 0.07902 WITH MIDDLEMAN DEPENDENT.

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APPENDIX F

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CONTINGENCY ANALYSIS I

FILE MARKET (CREATION DATE = 04/19/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR
 ***** C H O S T A B U L A T I O N O F *****
 ***** BY MIDDLEM ***** PAGE 1 OF 1

	COUNT	MIDDLEM	YES	ROW TOTAL
10XAG73	1	0	1	100
		74	32	106
CGNT KNEW	2	64.8	30.2	75.7
		63.1	62.7	
		52.5	22.9	
10 TO 23 SUCRES	2	6	6	15
		60.0	40.0	10.7
		10.1	11.8	
		6.4	4.3	
12 TO 17 SUCRES	3	0	4	4
		0.0	100.0	2.9
		0.0	7.0	
		0.0	2.0	
6 TO 11 SUCRES	4	37.5	62.5	8
		3.4	4.0	5.7
		2.1	3.6	
UNCER 5 SUCRES	5	3	4	7
		42.0	57.1	5.0
		1.4	7.8	
		2.1	2.6	
COLUMN TOTAL	39	63.0	36.0	140
				100.0

MAX CHI SQUARE = 12.93027 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0141
 GRAFF'S V = 0.20909
 CONTINGENCY COEFFICIENT = 0.20070
 LAMBDA (ASYMMETRIC) = 0.0 WITH 10XAG73 DEPENDENT.
 LAMBDA (SYMMETRIC) = 0.02230
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.05554 WITH 10XAG73 DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.06322
 = 0.07330 WITH MIDDLEM DEPENDENT.

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APPENDIX F

1

CONTINGENCY ANALYSIS I INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR

FILE MARKET (CREATION DATE = 04/19/76) CHUS T A H U L A T I U N O F * * * * *
 IDXAA73 * * * * * BY MIDLMLN * * * * * PAGE 1 UF 1

COUNT FOR PCT COL PCT	MIDLMLN	YES	ROW TOTAL
1	52	32	84
2	61.9	38.1	100.0
3	50.4	22.9	73.3
4	37.1	14	51.1
5	73.7	26.3	100.0
6	15.7	9.8	25.5
7	10.0	3.6	13.6
8	75.0	25.0	100.0
9	6.7	3.9	10.6
10	4.3	1.4	5.7
11	10	0	10
12	55.6	44.4	100.0
13	11.2	15.7	26.9
14	7.1	5.7	12.8
15	7	4	11
16	63.6	36.4	100.0
17	7.9	7.9	15.8
18	7.9	7.9	15.8
19	5.6	2.9	8.5
20	5.6	2.9	8.5
21	39	51	90
22	63.6	36.4	100.0

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RAA CHI SQUARE = 1.89045 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = 0.7559
 CHI-SQUARE'S V = 0.11620
 CONTINGENCY COEFFICIENT = 0.11543 WITH IDXAA73 DEPENDENT.
 LAMBDA (ASYMMETRIC) = 0.0 WITH IDXAA73 DEPENDENT.
 LAMBDA (SYMMETRIC) = 0.0
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.00577 WITH IDXAA73 DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.00747

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APPENDIX F

04/19/76 PAGE 24

CONTINGENCY ANALYSIS I
 FILE MARKET (CREATION DATE = 04/19/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR

***** C R O S S T A B U L A T I O N O F *****
 ***** BY M I D D L M N ***** PAGE 1 O F 1

	M I D D L M N		
COUNT	NO	YES	ROW TOTAL
FOR PCT			
TOT PCT	0	1	
10XA073	37	25	62
DENT KNC#	59.7	40.3	40.8
	49.0	61.0	
	29.0	20.0	
12 TO 23 SUCRES	10	6	22
	72.7	27.3	17.6
	19.0	14.0	
	12.0	4.8	
12 TO 17 SUCRES	3	4	7
	42.9	57.1	5.0
	3.6	9.0	
	2.0	3.2	
6 TO 11 SUCRES	0	0	0
	100.0	0.0	6.4
	9.5	0.0	
	0.0	0.0	
UNDER 5 SUCRES	20	6	26
	76.9	23.1	20.8
	23.6	14.0	
	16.0	4.8	
COLUMN TOTAL	67.2	32.8	125
			100.0

MAX CHI SQUARE = 9.74084 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0463
 CRAMER'S V = 0.20531
 CONTINGENCY COEFFICIENT = 0.2504 WITH 10XA073 DEPENDENT.
 LAMBDA (ASYMMETRIC) = 0.0 WITH 10XA073 DEPENDENT.
 LAMBDA (SYMMETRIC) = 0.00542
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.03383 WITH 10XA073 DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.04571
 NUMBER OF MISSING OBSERVATIONS = 15

APPENDIX G

CROSS-TABULATION RESULTS: THE RELATIONSHIP BETWEEN MKTSALE (AGGREGATE SAMPLE) AND INDICES OF ACCURACY FOR 1972

04/19/76 PAGE 18

CONTINGENCY ANALYSIS I
 FILE MARKET (CREATION DATE = 04/19/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR

 MKTSALE ***** C R O S S T A B U L A T I O N G F *****
 ***** BY IDXA072 ***** PAGE 1 OF 1 *****

MKTSALE	COUNT	IDXA072					ROW TOTAL
		13 TO 23 SUCRES	12 TO 17 SUCRES	6 TO 11 SUCRES	UNDLR 5 SUCRES		
NO	0	11	0	2	1	36	
		30.0	0.0	5.6	2.8	25.7	
		28.9	0.0	12.5	20.0		
		7.9	0.0	1.4	0.7		
YES	1	27	3	14	0	104	
		53.8	7.9	13.5	3.8	74.3	
		71.8	100.0	87.5	80.0		
		40.0	2.1	10.0	2.9		
COLUMN TOTAL		38	3	16	5	140	
		55.7	2.1	11.4	3.6	100.0	

CHI SQUARE = 3.04702 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = 0.5499
 GRAMER'S V = 0.14755
 CONTINGENCY COEFFICIENT = 0.14597
 LAMBDA (ASYMPTIC) = 0.0 WITH MKTSALE DEPENDENT.
 LAMBDA (ASYMPTIC) = 0.0 WITH MKTSALE DEPENDENT.
 UNCERTAINTY COEFFICIENT (ASYMPTIC) = 0.02521 WITH MKTSALE DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.01691
 WITH IDXA072 DEPENDENT.
 = 0.01273 WITH IDXA072 DEPENDENT.

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APPENDIX G

CONTINGENCY ANALYSIS I
 FILE MARKET (CREATION DATE = 04/19/76) INFORMATION AND PCTATC PRICE INSTABILITY IN ECUADOR

***** C R O S T A U J L A T I O N O F *****
 ***** BY IDXAG72 ***** PAGE 1 OF 1

MKTSALL	CJUNT	FOM PCT	IDCNT	KND	12 TO 23					17 6 TO 11				UNDGR 5	SUCRES	TOTAL
					18	19	20	21	22	23	17	16	15			
NO	0				25	7										36
					69.4	19.4										25.7
					29.5	30.4										
					17.9	5.0										
YES	1				77	10										104
					74.0	15.4										74.3
					75.5	69.0										
					55.0	11.4										
					102	23										140
					72.9	16.4										100.0

RAW CHI SQUARE = 2.62141 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = 0.6230
 CHAMBERS V = 0.13684
 CONTINGENCY COEFFICIENT = 0.13557 WITH MKTSALL DEPENDENT.
 LAMBDA (ASYMMETRIC) = 0.0 WITH IDXAG72 DEPENDENT.
 LAMBDA (SYMMETRIC) = 0.0
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.02004 WITH MKTSALL DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.01581 = 0.01306 WITH IDXAG72 DEPENDENT.

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APPENDIX G

04/19/76 PAGE 21

CONTINGENCY ANALYSIS 1

FILL MARKET (CREATION DATE = 04/19/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR

***** C R O S S T A B U L A T I O N O F *****
***** U Y I D X A 0 7 2 ***** PAGE 1 OF 1

MKTSALE	COUNT	IDXA072					ROW TOTAL
		18 TO 23	12 TO 17	6 TO 11	UNDER 5	SUCRES	
NO	0	16	10	1	1	3	31
		51.6	32.0	3.2	3.2	9.7	24.6
		23.9	31.3	20.0	12.5	21.4	
		12.7	7.9	0.0	0.8	2.4	
YES	1	51	22	4	7	11	95
		53.7	23.2	4.2	7.4	11.6	75.4
		76.1	68.8	80.0	47.5	78.6	
		40.5	17.5	3.2	5.6	8.7	
COLUMN TOTAL		67	32	5	8	14	126
		53.2	25.4	4.0	6.3	11.1	100.0

MAX CHI SQUARE = 1.54592 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = 0.8185
 CRAMER'S V = 0.11077
 CONTINGENCY COEFFICIENT = 0.11008
 LAMBDA (ASYMMETRIC) = 0.0 WITH MKTSALE DEPENDENT. = 0.0 WITH IDXA072 DEPENDENT.
 LAMBDA (SYMMETRIC) = 0.0
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.01145 WITH MKTSALE DEPENDENT. = 0.00519 WITH IDXA072 DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.00714
 NUMBER OF MISSING OBSERVATIONS = 14

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APPENDIX II

CROSS-TABULATION RESULTS: THE RELATIONSHIP BETWEEN MKTSALE (MKT MIDDMN) AND INDICES OF ACCURACY FOR 1976 (AGGREGATE SAMPLE)

CONTINGENCY ANALYSIS I

FILE MARKET (OPERATION DATE = 04/19/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR

***** CROSS TABULATION OF ***** PAGE 1 OF 1

COUNT HOW PCT COL PCT TOT PCT	MKTSALE		RCW TOTAL
	NO	YES	
10XA073	22	51	73
CENT KNOW	30.1	69.9	52.1
	61.1	49.0	
	15.7	30.4	
10 TO 23 SUCRES	5	4	9
	20.0	79.1	30.7
	25.0	32.7	
	6.4	24.3	
12 TO 17 SUCRES	1	4	5
	20.0	80.0	3.6
	2.0	3.8	
	0.7	2.9	
6 TO 11 SUCRES	1	10	11
	9.1	90.9	7.9
	2.8	9.0	
	0.7	7.1	
LADLE 5 SUCRES	3	5	8
	37.5	62.5	5.7
	6.3	4.8	
	2.1	3.6	
COLUMN TOTAL	36	104	140
	25.7	74.3	100.0

4 DEGREES OF FREEDOM. SIGNIFICANCE = 0.4747

RAW CHI SQUARE = 3.52121 WITH 3 DEGREES OF FREEDOM. SIGNIFICANCE = 0.4747
 GRAFFER'S Y = 0.15055
 CONTINGENCY COEFFICIENT = 0.15663
 LAMUELA (ASYMMETRIC) = 0.0 WITH 10XA073 DEPENDENT.
 LAMUELA (SYMMETRIC) = 0.0
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.01160 WITH 10XA073 DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.01566
 WITH MKTSALE DEPENDENT. = 0.0
 = 0.02410 WITH MKTSALE DEPENDENT.

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APPENDIX H

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CONTINGENCY ANALYSIS I
 FILE MARKET (CREATION DATE = 04/19/76) INFORMATION AND PGATO PRICE INSTABILITY IN ECUADOR

***** C R U S T A B U L A T I O N D E *****
 ***** BY MKTSALE ***** PAGE 1 OF 1

COUNT HOW PCT TOT PCT	MKTSALE		RCM TOTAL
	NC	YES	
10XAG72	0	1	100
CONT KNCA	29 27.4 80.6 20.7	77 72.6 74.0 55.0	75.7
18 TO 23 SUCRES	2	12	15
	20.0 6.3 2.1	80.0 11.5 8.6	10.7
12 TO 17 SUCRES	0	4	4
	0.0 0.0 0.0	100.0 3.8 2.9	2.9
6 TO 11 SUCRES	1	7	8
	12.5 2.8 0.7	87.5 6.7 5.0	5.7
UNDER 5 SUCRES	3	4	7
	42.9 11.3 2.1	57.1 3.8 2.9	5.0
COLUMN TOTAL	36 29.7	104 74.3	140 100.0

RAM CHI SQUARE = 3.59927 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = 0.4629
 CRAMER'S V = 0.100J4
 CONTINGENCY COEFFICIENT = 0.150J2 WITH MKTSALE DEPENDENT.
 LAMUCA (ASYMMETRIC) = 0.0 WITH IDXAG73 DEPENDENT.
 LARUCA (SYMMETRIC) = 0.0
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.01905 WITH IDXAG73 DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.02246 = 0.02890 WITH MKTSALE DEPENDENT.

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APPENDIX H

COUNTING ANALYSIS I

FILE MARKET (CREATION DATE = 04/19/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR
 ***** CRUS TABUL AT ION OF *****
 ***** BY MKTSALL ***** PAGE 1 OF 1

INDEX	COUNT	HOW PCT	INDO	YES	PO* TOTAL
1DXAA73	TOT PCT	TOT PCT	0	1	
1	23	61			84
2	27.4	72.6			60.0
3	63.9	58.7			
4	16.4	43.6			
5	5	14			19
6	20.3	73.7			13.6
7	13.9	13.5			
8	3.0	10.0			
9	1	7			8
10	12.5	07.5			5.7
11	2.0	6.7			
12	0.7	5.0			
13	4	14			18
14	22.2	77.8			12.9
15	11.1	13.5			
16	2.5	10.0			
17	3	11			7.9
18	27.3	72.7			
19	8.3	7.7			
20	2.1	5.7			
COLUMN TOTAL	36	104			140
	25.7	74.3			100.0

RAW CHI SQUARE = 0.90595 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = 0.9119
 Cramer's V = 0.08392
 CONTINGENCY COEFFICIENT = 0.08303 WITH 1DXAA73 DEPENDENT.
 LAMBDA (ASYMMETRIC) = 0.0 WITH 1DXAA73 DEPENDENT.
 LAMBDA (SYMMETRIC) = 0.0 WITH 1DXAA73 DEPENDENT.
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.00128 WITH 1DXAA73 DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.00445

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APPENDIX H

(4)

03/19/76

CENTINGENCY ANALYSIS 1

FILE MARKET (CREATION DATE = 04/19/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR

***** C H O S T A B U L A T I O N D F *****
 ***** BY MKTSALE ***** PAGE 1 OF 1

	COUNT	YES	NO	RCH
	FUM PCT	TOT PCT	TOT PCT	TOTAL
10XAO73	0	1		62
DEAT KNCH	15	47		49.6
	24.2	75.8		
	50.6	49.5		
	12.0	37.8		
10 TO 23 SUCRES	9	16		22
	27.3	22.7		17.6
	20.0	14.8		
	4.7	12.8		
12 TO 17 SUCRES	2	5		7
	20.6	71.4		5.6
	0.7	5.3		
	1.6	4.0		
6 TO 11 SUCRES	2	0		8
	25.0	75.0		6.4
	0.7	0.3		
	1.6	4.8		
UNCL 5 SUCRES	5	21		26
	19.2	89.8		20.2
	16.7	22.1		
	4.0	16.8		
CCLUMP	10	95		125
TOTAL	24.0	76.0		100.0

RAV CHI SQUARE = 0.51927 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = 0.9696
 CRAMER'S V = 0.06390
 CENTINGENCY COEFFICIENT = 0.06358
 LAMBDA (ASYMMETRIC) = 0.0 WITH 10XAO73 DEPENDENT.
 LAMBDA (SYMMETRIC) = 0.0 WITH 10XAO73 DEPENDENT.
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.00107 WITH 10XAO73 DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.00235 WITH 10XAO73 DEPENDENT.
 NUMBER OF MISSING OBSERVATIONS = 15

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APPENDIX I

CROSS-TABULATION RESULTS: THE RELATIONSHIP BETWEEN QUANTITY OF INFORMATION, MIDDLMN AND MKTSALE (MKTMIDDLMN) (AGGREGATE SAMPLE)

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CONTINGENCY ANALYSIS I FILE MARKET (CREATION DATE = 04/13/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR

MIDDLMN BY QUANTINF PAGE 1 OF 1

COUNT	QUANTINF					CONSIDER AMPL	ROW TOTAL
	1	2	3	4	5		
0	11	19	3	6	6		
1	40.4	25.0	22.4	11.8	9	76	60.3
2	79.5	54.3	53.1	49.0	11		
3	24.6	15.1	13.8	7.1	11		
4	16.0	32.0	10.0	32.0	11	50	39.7
5	20.5	45.7	46.9	55.0	11		
6	6.3	12.7	11.0	8.7	11		
COLUMN TOTAL	11.0	27.8	25.6	15.0	20	126	100.0

RAW CHI SQUARE = 9.17150 WITH 3 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0271
 GAMPLER V = 0.26090
 CONTINGENCY COEFFICIENT = 0.26090
 LAMDA (ASYMMETRIC) = 0.04000 WITH MIDDLMN DEPENDENT.
 LAMDA (SYMMETRIC) = 0.07209
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.05710 WITH MIDDLMN DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.01777

NUMBER OF MISSING OBSERVATIONS = 14

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APPENDIX I

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CONTINGENCY ANALYSIS I FILE MARKET (CREATION DATE = 04/13/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR

***** C H O S S Y A B ' J L A T I O N U F *****
 ***** BY QUANTINE ***** PAGE 1 OF 1

COUNT	QUANTINE				CONSIDER	RDY
	LITTLE	ENOUGH	ABLE	TOTAL		
NO	13	7	4	24	29	
YES	26	25	16	67	77	
TOTAL	39	32	20	91	106	

RAM CHI SQUARE = 3.07473 WITH 3 DEGREES OF FREEDOM. SIGNIFICANCE = 0.2642
 CONTINGENCY COEFFICIENT = 0.17067
 LAMDA (ASYMMETRIC) = 0.0 WITH MKTSALE DEPENDENT.
 LAMDA (SYMMETRIC) = 0.03644
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.00904 WITH MKTSALE DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.0165
 NUMBER OF MISSING OBSERVATIONS = 10

APPENDIX J

CROSS-TABULATION RESULTS: RELATIONSHIP BETWEEN RELIABILITY OF MARKET INFORMATION, MIDDLEMAN AND MKTSALE (MKTMIDDLEMN) (AGGREGATE SAMPLE)

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CONTINGENCY ANALYSIS I FILE MARKET (CREATION DATE = 04/12/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR

RELIABLE BY MIDDLEMN C R O S S T A B U L A T I O N U F * * * * * PAGE 1 OF 1

RELIAELE	NO	YES	TOTAL	RCM TOTAL
COUNT	58	32	90	
ROW PCT	64.4	35.6	64.3	
COL PCT	65.2	62.7		
TOT PCT	41.6	22.9		
COUNT	11	19	50	
ROW PCT	62.0	38.0	35.7	
COL PCT	36.8	37.3		
TOT PCT	22.1	13.6		
COLUMN TOTAL	69	51	140	100.0
	63.6	16.4		

EXPECTED CHI SQUARE = 0.01097 WITH 1 DEGREE OF FREEDOM. SIGNIFICANCE = 0.9166
 PHI = 0.02434
 CONTINGENCY COEFFICIENT = 0.02433 WITH RELIABLE DEPENDENT.
 LAMBEA (ASYMMETRIC) = 0.0 WITH RELIABLE DEPENDENT.
 LAMBEA (SYMMETRIC) = 0.0 WITH MIDDLEMN DEPENDENT.
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.00045 WITH RELIABLE DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.00045 WITH MIDDLEMN DEPENDENT.

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APPENDIX J

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04/12/76

CONTINGENCY ANALYSIS I

FILE MARKET (CREATION DATE = 04/12/76) INFORMATION AND POTATO PRICE INSTABILITY IN ECUADOR

***** C R O S S T A B U L A T I O N O F *****
 * * * * * R E L I A B L E * * * * * M Y M K T S A L C * * * * * P A G E 1 O F 1

		MKTSALE		COUNT		ROW PCT		COL PCT		TOTAL	
		MKTSALE		COUNT		ROW PCT		COL PCT		TOTAL	
RELIABLE		0	1	21	69	23.3	76.7	21.0	79.0	90	64.3
NO		58.3	66.3	15.0	49.3	15.0	49.3	15.0	49.3	50	35.7
YES		30.0	33.7	10.7	25.0	30.0	33.7	10.7	25.0	140	100.0
	COLUMN TOTAL	25.7	74.3	104	100.0						

CORRECTED CHI SQUARE = 0.43958 WITH 1 DEGREE OF FREEDOM. SIGNIFICANCE = 0.5073
 PHI = 0.07309
 CENTRALITY COEFFICIENT = 0.07289
 LAMBDA (ASYMMETRIC) = 0.0 WITH RELIABLE DEPENDENT.
 LAMBDA (SYMMETRIC) = 0.0 WITH MKTSALE DEPENDENT.
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.00404 WITH RELIABLE DEPENDENT. = 0.00462 WITH MKTSALE DEPENDENT.
 UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.00431

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