MARKET STUDIES IN CENTRAL AMERICA AS A FIRST STEP OF INVESTMENT PROJECTS

by

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CHAPTER 1

INTRODUCTION

1.1 Purpose and Scope of this Paper

The purpose of this paper is to present some methodological information on how to prepare and present market studies in developing countries, with the specific aim of looking for new investment opportunities and to illustrate the methodology with consideration of a beef slaughtering example.

Investment plays an important role in economic development. It can be divided into public and private investments. The difference lies in the purpose and way of evaluation of each one. Generally speaking, public investments are more socially directed than private ones. Both public and private investments are necessary in the economic development process.

It is commonly recognized that most public investment is preceded by a feasibility study. Feasibility studies may be defined as a systematic way of compiling and presenting the data necessary for accepting or rejecting an investment.

The steps in any feasibility study depend on the kind of investment considered as well as other local and particular circumstances, but generally can be grouped as follows:

> Market study, project engineering, determination of plant size and location, calculation of investments, budget of income and expenditure, and financing and organization[1/]

1/ United Nations. Manual on Economic Development Projects. New York, 1958, 58, II, G.S.

A market study is the initial step in assessing the feasibility of a project. Before looking for the best location of the firm, obtaining financing, and preparing final plant design, it is necessary to know whether or not there will be sufficient market to justify the proposed investment. Any investment decision has associated risks. But risks can be minimized through careful collection and analysis of the appropriate information. Market studies provide an effective way of organizing information needed to make rational investment decisions.

Market studies usually have a point of diminishing returns, so the researcher must be clear on this point, and has to explain to the potential customers the different level of information received at different cost levels.

1.2 Definition of market studies

In everyday language, certain economic concepts are used almost synonymously. They are: market studies, market research and marketing research. In order to be more precise we will consider the following definitions. "By market research is meant research into all the factors conditioning sales of a given product in a given area or to a given group. The emphasis is on defining the nature of the market quantitatively and qualitatively: Who are the consumers? What quantities are purchased? What are price trends? What is the nature of competition?"

"By marketing research is meant research into what the selling unit should do in order to penetrate this market".[2/]

By market study is meant the estimation of "the volume of goods or services provided by a new productive unit which the community would be disposed to acquire at a given price. This volume represents the demand from the point of view of the project, and it is specified for a conventional period (a month, a year, or other period). Since demand usually varies with price, the estimation should be made for various prices, always remembering that enterprise must cover costs and make a reasonable margin of profit".[3/]

If we analyze carefully the concepts or definitions of market study and market research, we will find out that both have almost exactly the same meaning, that is, the estimation of the quantity demanded of specific product, at a given price by a community. For the purpose of this paper, I will use these terms interchangeably.

Marketing research goes a step further: given a quantified demand we try to find out the optimum marketing decisions through understanding consumer behavior as well as competition and internal constraints. In this paper, marketing research is not a major concern.

2/ UNCTAD-GATT. Export Marketing Research for Developing Countries, International Trade Centre, May, 1967, Page 3.

3/ U.N. Manual on Economic Development Projects. New York, 1958, 58, II, G.S., Page 33.

1.3 Some characteristics of market research in developing countries

The material written about market research is very extensive but relatively little has been written about the specific subject of market research in developing countries.

In the less developed countries, one of the least developed activities in the economy is marketing, and of course, market research. There are many techniques which have been applied in industrialized countries with success. If these techniques are applied in a developing country this may or may not have the same success. Several examples may be cited which show the difficulties a researcher will find in these countries when trying to accomplish his task.[4/]

The first problem in accomplishing economic research activities is the lack of good statistics. Excluding some general social and demographic statistics and import data, there is usually almost no current information in these countries. This makes economic research activities more important because whenever someone must analyze the demand or general behavior of a particular product, he must develop his own statistics. In countries where statistical information is available it is possible to have complete information about consumption, suppliers, competitors, etc. in a relatively short time.

4/ Kracmar, J. Z. Marketing Research in Developing Countries - a handbook. Praeger Publishers, N.Y. 1971, Pages 6-23.

A second problem which makes market research more difficult is the level of illiteracy in developing countries. The average percentage of illiteracy in Central America ranges from about 20 percent in Costa Rica to 60 percent in Guatemala.

When consumers are illiterate, it is useless to try to use mail surveys. The alternative is to use personal interviews, which is one of the most expensive survey methods. However, this disadvantage is reduced in developing countries, because interviewers are readily available who can be economically trained and will work for low wages.

A third problem which may diminish the importance of market research activities is the psychology or way of thinking which prevails among many entrepreneurs and economists in developing countries: that supply creates its own demand. For this reason, producers often give too little attention to researching the consumer's needs and wants.

Finally, a statement sometimes made is that "If you produce stones, they will buy stones". This overstatement explains the significance of their production orientation in which an efficient production system is emphasized over a well organized distribution system.

1.4 Summary of the content of this paper

As already stated, the purpose of this paper is to gather some methodological ideas about procedures and problems associated with identification of market opportunities. It is divided into

five chapters. Chapter 1 sets up the purpose of this paper as well as several other concepts related with the central theme. Chapter 2 forms the economic conceptual framework. It attempts to make a summary of the main concepts of demand and supply related with a market. In Chapter 3 a practical way of estimating the apparent consumption of a product is presented. Chapter 4 suggests some well-known procedures for projecting the demand and finally, in Chapter 5, the demand and supply of beef industry in Central America is analyzed looking for some gap which could be filled by a new firm or firms.

CHAPTER 2

ECONOMIC THEORIES AND CONCEPTS

Market research presupposes knowledge of economic theory, especially of microeconomic part related with the concepts of demand and supply. Therefore, the purpose of this chapter is to present economic theories and concepts of demand and supply which are believed to be implicitly or explicitly the theoretical support of market studies.

2.1 Economic concepts of demand

We are interested in the market demand for a product or products and how this demand is met. Demand for a product can be defined as a schedule of all the possible quantities which consumers will be willing to buy at particular prices, holding everything else constant.[1/]

The factors affecting the level of demand depend on the product being analyzed, but generally it can be said that the determinants of demand are:[2/] 1) Price of the commodity under consideration; 2) Disposable income of consumers; 3) Consumers' tastes and preferences; 4) The prices of related commodities; 5) The number of possible consumers; 6) The level of availability of the product.

These factors determine the level of market demand for a product and the quantity demanded at each different price. There is an inverse relationship between price and quantity

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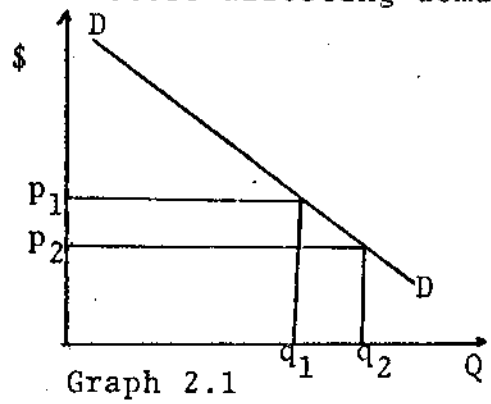
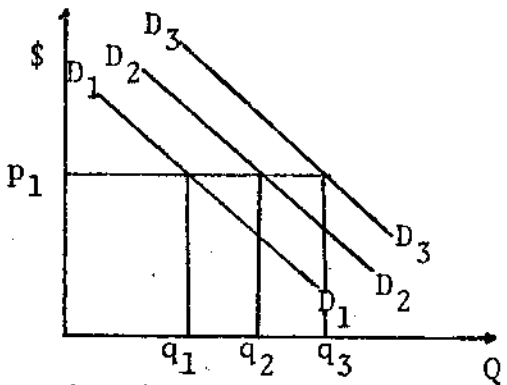
1/ The material presented in this chapter without footnotes is generally accepted economic theory and concepts. This material can be found in any economic text book, but the consulted text books are: (see page 8)

purchased, that is, the higher the price of the product the less the quantity will be, and vice versa. This inverse relationship between price and quantity is known as the law of demand.

It is necessary to distinguish between a change in quantity demanded and a shift in demand. A change in quantity demanded is caused by a change in the price of the product and it occurs along the demand schedule. A shift in demand occurs when the quantity demanded at each price changes. This shift of the demand schedule or demand curve is caused by changes in the factors affecting demand, mentioned above.



Graph 2.1



Graph 2.2

The graph 2.1 shows changes in quantity due to a change in price and the graph 2.2 shows changes in demand curve.

1/ Snavely and Carter. Intermediate Economic Analysis. 1961 McGraw-Hill Book Co. Inc., N.Y.

Ferguson. Microeconomic Theory, 1969. Revised Edition. Richard D. Irwin Inc., Homewood, Illinois.

Nicholson, Walker. Microeconomic Theory - Basic Principles and Extensions. The Dryden Press Inc., Hinsdale, Illinois, 1972.

Samuelson, P.A. Economics, An Introductory Analysis. Seventh Edition. McGraw-Hill Book Co., 1967.

2/ Ferguson, op. cit., page 74.

A demand curve can refer to either the individual consumer or the market demand for a commodity, since "the market demand for a specific commodity is nothing more than the horizontal summation of the individual demands of each consumer".[3/]

The time period is a factor which needs to be considered in order to give meaning to the quantity demanded at each price level. It may be important to determine the quantity demanded at certain prices during a day, a week, a month or a year. Usually market demand is determined yearly.

It is practical to analyze just one or two factors affecting demand which are considered the most relevant, keeping all other constant.

In the next sections we will analyze separately price of the product in question, prices of other products and consumers' income. In doing that we are going to consider that the factors affecting demand are constant except for the factor being analyzed. The purpose is to present some elasticity concepts used in order to measure the functional relationships existing between prices, income and quantity of commodities demanded.

2.1.1 Price elasticity

Price elasticity of demand is commonly defined as the percentage change in the quantity of a good purchased in response to a one percent change in price. Price elasticity of demand is usually referred to as elasticity of demand.

3/ Ferguson, op. cit., page 76.

The mathematical expression for the price elasticity of demand is:

$$Ed = \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

where Q is quantity and P is price.

Demand is considered to be elastic in absolute value if the elasticity coefficient is greater than 1, unitary if it is 1, and inelastic if it is less than 1. In absolute terms demand is elastic if a fall in price will increase total consumer expenditures for the product (P x Q). If it is unitary P x Q does not change, and if it is inelastic P x Q decreases.

2.1.2 Income Elasticity

Income elasticity of demand relates consumers' income and quantity purchased. It is defined as the percentage change in the quantity purchased given a one percent change in income. The formula is similar to that used for price elasticity.

$$I E = \frac{\frac{\Delta Q}{Q}}{\frac{\Delta I}{I}} = \frac{\Delta Q}{\Delta I} \cdot \frac{I}{Q}$$

where Q is quantity and I is the income.

The income elasticity coefficient is generally positive. That means that an increase in income results in an increase in quantity purchased. Sometimes this coefficient is negative,

that is, an increase in income results in a decrease in quantity purchased. This kind of commodities are called inferior goods.

2.1.3 Cross elasticity

Cross elasticity measures the degree of relationship which exists between two commodities. Cross elasticity is defined as the percentage change in the quantity of a commodity due to a 1 percent change in the price of another related commodity. Mathematically it can be expressed as:

$$C\text{-}E = \frac{\frac{\Delta Q_1}{Q_1}}{\frac{\Delta P_2}{P_2}} = \frac{\Delta Q_1}{\Delta P_2} \cdot \frac{P_2}{Q_1}$$

where Q_1 is the quantity of a commodity and P_2 is the price of a different commodity.

If the cross elasticity coefficient is negative the products are substitutes. If the coefficient is positive the products are complementary and it is zero, the products are not related to each other. They are independent.

2.2 Economic concepts in the supply side

Supply is defined as a schedule of all the quantities which producers would offer at all possible alternative prices.

"Costs are vital determinants of how much a firm will be willing to supply."[4/] To determine the aggregate supply of a product we have to add horizontally the supply curves of all the

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4/ P. A. Samuelson. Economics. An introductory analysis. Seventh Edition. 1967. McGraw-Hill Book Co., N.Y., page 436.

firms in the industry. "An industry is a collection of firms producing a homogeneous product."[5/] So in order to determine the industry supply we have to start analyzing the individual firm supply, but first of all, we will start with related cost concepts.

Cost, in general, is something that has to be given up for obtaining something else. In the case of production, cost is the value of all factors of production required to produce a specific volume of output.

The cost in a firm may be divided into fixed and variable costs: "Fixed costs are those that remain constant in total amount regardless of the amount of output. Variable costs are those which vary in amount with changes in the volume of output."[6/] This division is related with a period of time and may be applicable in the short-run when the fixed factor cannot be changed. In the long-run this division is not applicable since all the production factors, and hence all the costs, are considered to be variable.

2.2.1 Short-run cost curves.

We want to consider the short-run cost curves of the firm. "At any one time, given the state of its technical knowledge and given the prices of the labor and other inputs it must buy, its

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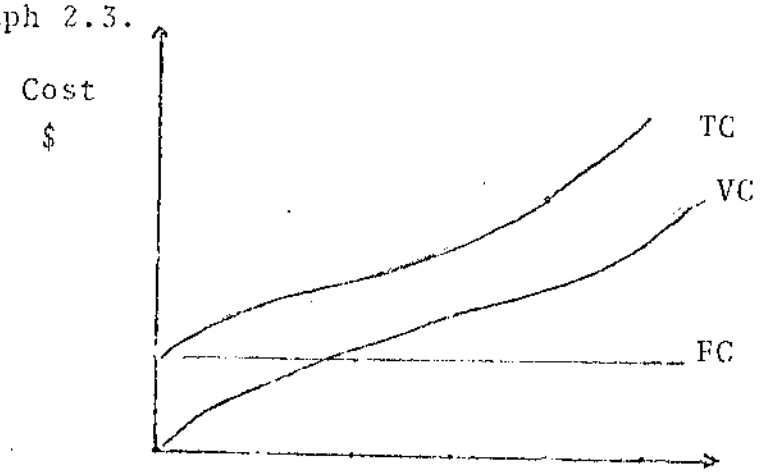
5/ Carter and Snavely. Intermediate Economic Analysis, 1961. McGraw-Hill Book Co. Inc., N.Y., Page 51.

6/ Carter and Snavely. op. cit., page 96.

accountants should be able to calculate what will be its total dollar costs for producing each different level of q".[7/] According to the above classification, total costs may be divided into fixed and variable costs. This is shown in Graph 2.3.



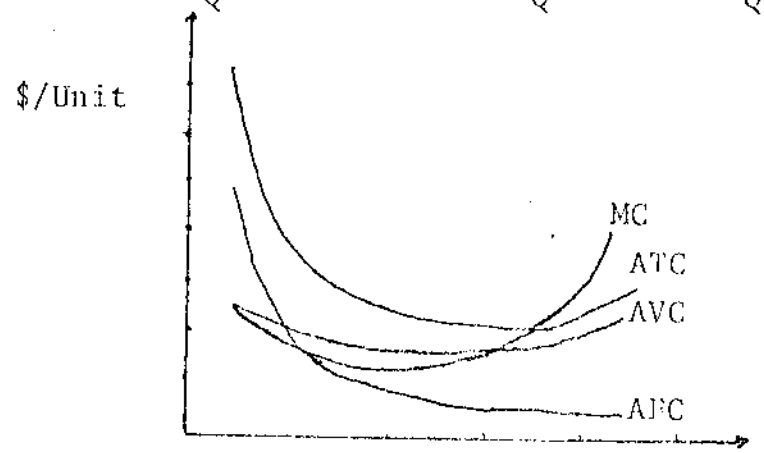
TC = VC + FC

Where:
TC = Total Costs
FC = Fixed Costs
VC = Variable Costs

Graph 2.3

From the total cost curve we can derive the average and marginal costs, which might have this shape.

$ATC = \frac{TC}{Q}$ and $MC = \frac{TC}{Q}$; $AFC = \frac{FC}{Q}$ and $AVC = \frac{TVC}{Q}$;



Where:
ATC = Average Total Cost
MC = Marginal Cost
AFC = Average Fixed Cost
AVC = Average Variable Cost
Q = Quantity

Graph 2.4.

7/ P. A. Samuelson, op. cit., Page 453.

The most relevant curve here is marginal cost curve (MC). "The firm's supply curve is given by its rising marginal cost curve."[8/] When MC is lower than ATC the latter is decreasing. When MC is bigger than ATC the latter is increasing. When MC is equal to ATC the latter is at its minimum.

The MC curve representing firm's supply curve starts at the shut down point in which AVC is equal to MC and it is the point in which the firm recovers its variable costs. As already stated we have to add the MC of all firms in the industry to get the industry supply curve.

2.3 The firm and the market in the short-run

"There are three major factors to consider in classifying markets with respect to competitive conditions - number of buyers and sellers, nature of the product, and ease of entry and exit of firms."[9/]

From these three factors the different forms of competition generally used in the economic analysis can be derived. Two main types of markets: perfect competition, and imperfect competition will be considered here.

2.3.1 Perfect competition

"An industry is said to be competitive only when the number of firms selling homogeneous commodity is so large and each individual firm's share of the market so small, that no individual

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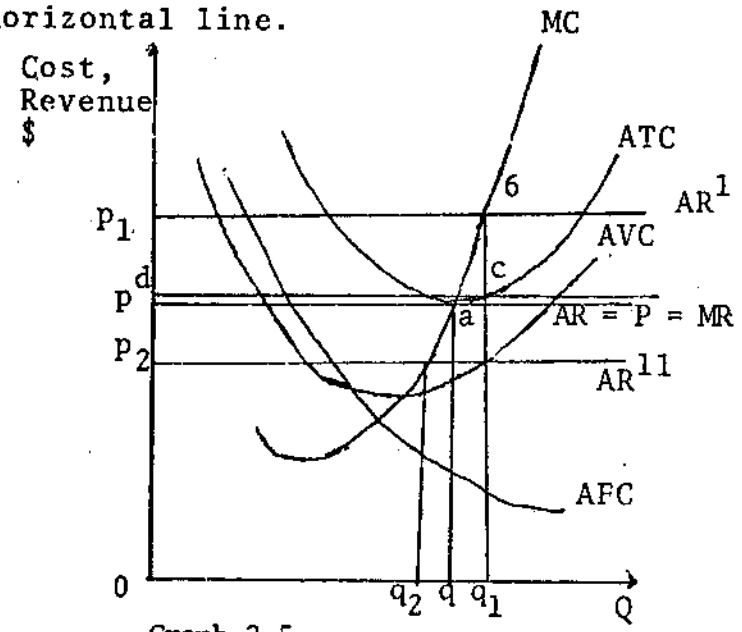
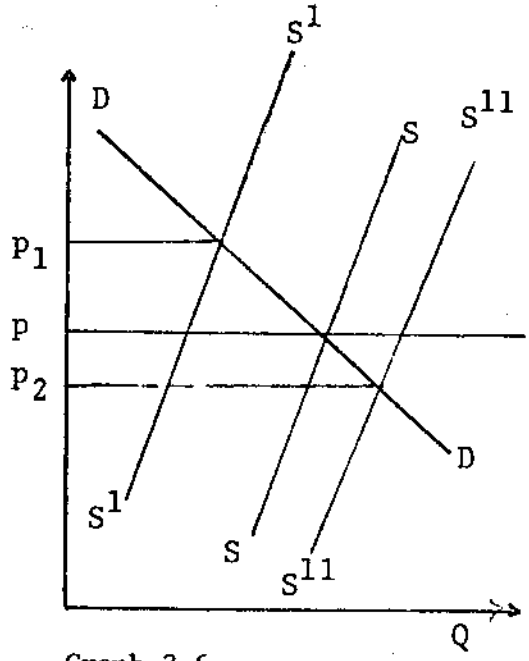
9/ Carter and Snavely, op. cit., page 121.

firm finds itself able to influence the commodity's price significantly by varying the quantity of output it sells."[10/]

In these conditions the individual firm gains nothing by lowering its price since it can sell its whole production at the market price. If the individual manufacturer increases his price, he will lose all of his sales since consumers will buy the same commodity from his competitors at the market price. Thus, from the point of view of an individual firm the price will be the same regardless of the quantity he sells. Therefore, the demand for his output will appear to him to be a horizontal line.



Graph 2.5



Graph 2.6

[10/] F. M. Scherer. Industrial Market Structure and Economic Performance. Fourth Printing. 1973. Rand McNally & Co., Chicago, page 9.

Graph 2.5 shows the short-run cost curves of the firm and three alternative average revenue curves in perfect competition. The quantity is determined by the intersection of MC and AR. And the equilibrium situation will be at the quantity where MR = P = AR = ATC = MC. In graph 2.5 the equilibrium position will be at the quantity produced Oq and at the price of Op. Total revenue and total cost are represented by the rectangle Opaq. There is no excess profit. At Op_1 the quantity produced will be Oq_1. The total revenue is the rectangle Op_1bq_1. The ATC is od and the total cost is $odcq_1$ leaving the extra profit represented by dp_1bc.

The graph 2.6 shows the equilibrium of the market in the short run. If the price is P_2 firms will lose money and will reduce the quantity produced shifting the supply curve upward. If the price is p_1 firms will have an excess of profit and will increase their production, shifting the market supply downwards, reaching the equilibrium when the firm's P = MC = ATC.

2.3.2 Imperfect competition

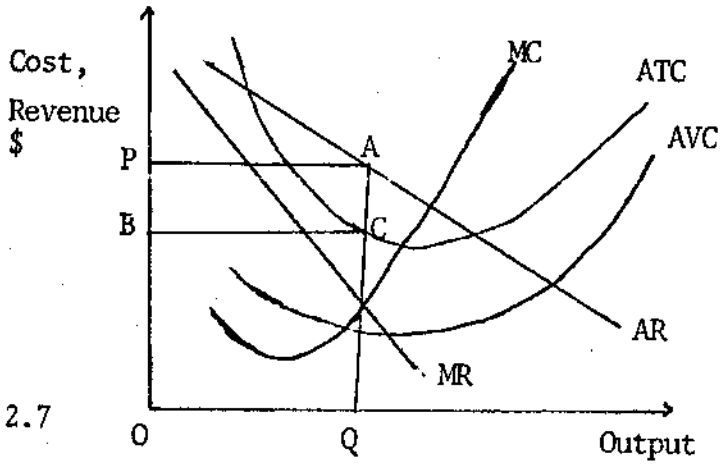
Imperfect competition includes several types of competition such as monopoly, oligopoly, and differentiated products.

"Pure monopolistic, oligopolistic, and monopolistic competition share a common characteristic. Each recognizes that its output decisions have a perceptible influence on price or, in other words, each can increase the quantity of output it sells under given demand conditions only by reducing its price."[11/]

11/ F. M. Scherer, op. cit., page 10.

The basic economic tools for analyzing imperfect competition are the same as those used in perfect competition: Average and marginal revenue curves and the cost curves of the firm. The average revenue curve of firms operating under conditions of imperfect competition slope downward to the right and coincide with demand curves.

Marginal revenue is the increment in total revenue obtained by selling an additional unit of production. Marginal revenue is generally lower than average revenue and its difference depends on the price elasticity of demand.



Graph 2.7

The principles of cost analysis are applicable to all types of markets so they have been analyzed in the perfect competition.

Equilibrium for the industry as well as the individual firm will be found at the intersection of MC and MR. The graph 2.7 represents the short-run equilibrium of imperfect competition. The quantity is OQ, and the price is OP. The total revenue is OPAQ, the total costs are OBCQ, leaving a profit of BPAC.

2.4 The firm and the market in the long-run

Finally, some brief general ideas about the firm and the market in the long-run will be considered. There are two basic assumptions: 1) In the long-run there are no fixed costs, since every cost is considered variable; 2) In the long-run output can be changed by adjusting firm plant capacity and/or the number of firms in the industry.

Businessmen should have an understanding of the general shape of the long-run average costs-curve since it represents the lowest average cost at each level of output. However, "the calculations involved in long-run decisions involving size of plant present serious difficulties. The determination of the long-run cost curves requires estimates of costs for various alternative plant capacities. The estimates must be based on engineering and cost accounting calculations and can only be approximated."[12/]

As already stated at the beginning of this chapter this is a brief review of the basic principles which are believed to be the theoretical support of market studies. In the following chapters, some of these concepts, especially the demand side, will be applied explicitly or implicitly.

12/ Carter and Snavely, op. cit., page 171.

CHAPTER 3

ESTABLISHING RELIABLE DATA FOR DEMAND ANALYSIS

The purpose of this chapter is related to the existing difficulty of getting reliable information for market studies in developing countries. Its purpose is to present a practical mathod for collecting data to be used in the analysis of past and present demand of a product. "The statistical data by themselves give only one observation--a point--on the unknown demand curve or surface for each time interval."[1] If a series of quantities and prices is available, it is possible to derive the demand curve, but the concern of this chapter is concentrated on the methods of collecting reliable data, emphasizing its application in looking for market opportunities for new firms in a given industry.

3.1 Collection of data--procedures, sources and uses

The information to be collected in a market study varies according to the product, but generally the information of major concern is: 1) physical quantities, 2) prices, and 3) marketing problems related to the product being analyzed.

1) Physical quantities: The collection of data related to physical quantities is essentially information

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[1] H. Schultz. The theory and measurement of demand. The University of Chicago Press. Chicago, Illinois, 1938, page 61.

related to production, imports, exports and changes in stocks. It is necessary to have this information for several years. "Statistics covering several years constitute a time series. This can be used to calculate actual consumption of a good (or effective demand) by the following equation in physical quantities:

$$\text{Consumption} = \text{Production} + \text{Imports} - \text{Exports} + \text{Changes in Stocks}$$[2]

In the literature of demand analysis this equation receives different names: consumption,[3] apparent consumption,[4] total disappearance,[5] and total utilization.[6]

2) Prices: Physical quantities have to be complemented by their correspondent prices. This information is often more difficult to collect. In a time series, prices are often deflated by an index number of prices, especially where accurate results are required.

3) Marketing problems: This analysis is at production level, so marketing problems are a step further, and they are not emphasized in this paper. However, it is useful

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[2]OECD. Manual of industrial project analysis in developing countries. Volume 1, OECD, page 33.

[3]Ibid.

[4]United Nations. Manual on economic development projects. New York, 58 II, G.S. page 40.

[5]Used by U.S.D.A. See, for example, The demand and price structure for corn and total feed concentrates. Technical Bulletin, No. 1061, pages 16-17.

[6]Used by H. Schultz in op. cit., page 163.

to recognize the influence of marketing on the volume of present demand and prices. In the next sections, production imports, exports, and stocks will be analyzed.

3.1.1 Production data

In developing countries and especially in Central America, the availability of production statistics is very poor. Now and then the countries carry out a census of production. In most countries there is no regular census of production. They take place at infrequent and uncertain intervals and most of the time the available production information is out of date.

To gather production information within the countries it is necessary to carry out additional research to find directly as much information as possible. Quite often even direct investigation is not very successful because firms will not supply information. In these cases it is necessary to take indirect information, comparing firms with other similar ones from which we already have information, or to make estimates through economic variables such as level of employment, level of investment, etc.

It is usually not necessary to apply statistical inference in gathering industrial production information from the firms because of the high degree of economic concentration among relatively few producers of any given product or product group.

3.1.1.1 Consumer survey

If the firms actually in the market react against giving information and there is no other way to find acceptable estimates we have to embark on the task of consumer or retailer surveys. The purpose of such surveys is to determine consumption of a particular product by asking sellers or buyers.

This survey will intend to gather information, not only about actual consumption, but about many other qualitative and quantitative aspects. Detailed information about size, quality, brands, varieties, packages, etc. may be very useful for the success of the new firm, as well as how the products are distributed, what the main competitors are, prices and substitutes, etc.

However, the information collected through consumer surveys has limitations regarding the length of time which might be a big inconvenience when someone needs a relatively long series for the purpose of projecting the data.

By careful sampling and analysis it is possible to make accurate inferences about a population based upon information contained in a sample. This is worthwhile when the population or universe is so large that the cost of looking for the universal information is relatively high. In that case, it is more convenient to use sampling techniques.

Sampling procedures are based on the assumption that testing a portion of any object or a universe will tell us something about all of it. The universe value is called a parameter, while the sample value is called a statistic.

Sampling as a technique is very common. A sip of tea will tell us whether it is sweet enough or not. A toe in the bath will test the temperature for the whole body. A short trip in a new car will show the actual condition of the car.[7]

There would be no sense in drinking all the tea to find out whether all of it was not sweet enough, etc. The principle lies in the fact that the decision is made on the basis of less than total information and we still hope to obtain the same result: as if the whole universe were tested. The big problem in sampling is to select such a sample that it could properly be called a representative sample, because each group in the population would be represented properly in the sample.

Suppose we don't stir the tea. A taste will not say very much about the whole cup. The sugar may remain on the bottom.

A sample rarely gives the exact information. It always has some error. The more random is the method for taking the sample, the less error it will have. In technical

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[7]J. L. Sewell. Marketing and market assessment, London: Routledge and Kegan Paul. 1966. Pages 25-32.

sciences it is very common to use probability sampling in which all the elements in the universe have an equal chance of being included in the sample. However, in social sciences, it is more common to use non-probability sampling. This kind of sampling does not imply a complete, randomization, rather the procedures of selecting elements are according to personal convenience (minimize cost) or expert judgment.[8] This method is very common in marketing research and in economic research in general.

It is obvious that not any given part of the population can be a representative sample of the total. If somebody in Central America wants to find out how many people drink canned juice, for example, and he asks his friends and colleagues whether or not they drink these products, the proportion of these people may represent the correct proportion of canned juice drinkers in the total population of his sales area. This selection is not a probabilistic sampling, rather is called biased.

If he goes to a busy street corner and asks every passerby, this procedure has more randomness, but is not completely random because the people who pass this corner do so for particular reasons that other people do not have. This researcher has to devise a method by which he can select a representative sample of the universe. The accuracy of any estimate of total market size will depend on the correctness of the sample. The purpose of selecting the correct

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[8]Spurr and Bonini. Statistical analysis for business decisions. 1973. Pages 218-224.

sample is to obtain the universe in miniature to permit the projection of the results of the sample to the whole universe. If 80 percent of the people inside the sample said they drank canned juice and the population in the market area is five million, the estimated number of canned juice drinkers will be four million (.80 x 5,000,000).

Besides sample selection, one of the most crucial points in statistical inference is the determination of the sample size. When we are determining sample size, we are purchasing information, but this information has a cost.

By intuition we can say that the larger the sample for any survey the more accurate the data will come out. The basic principle of the sample size theory lies in the fact that there is an adequate sample size that is large enough to represent accurately the group we want to analyze. If we increase our sample size, we will decrease the chance of error beyond the necessary point, but as a result, we will increase unduly the cost of making the survey.

An example of sample size follows:[9]

We know that the formula for standard error is:

$$G_{\cdot p} = \sqrt{\frac{p \cdot q}{n}}$$

where p = percentage of people drinking canned juice

q = percentage of people not drinking canned juice

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[9]Fred T. Schreier. Modern marketing research. Wadsworth Publishing Company, Inc., Belmont, California. 1963. Pages 133-135.

G_p = standard error of percentage

n = sample size

If we don't know p or G_p we can obtain an estimate from a very small preliminary survey. We can ask a small number of people chosen at random, whether or not they drink canned juice. We must decide how much deviation from the true p we can tolerate in the sample percentage, and the confidence levels.

Suppose we want to accept a permissible error of ± 4 percent with a confidence level of 95 percent, in which the universe will not be less than 76 percent and more than 84 percent (we are considering p equal to 80 percent). That means that $2G_p$ equals 4 percent.

$$2G_p = 4\%$$

$$G_p = 2\% = \sqrt{\frac{p \cdot q}{n}}$$

$$2^2 = \frac{p \cdot q}{n} = \frac{80 \cdot 20}{n} = 4$$

$$\frac{20 \cdot 80}{n} = \frac{1600}{n} = 4$$

$$n = 400$$

We will have to interview 400 people.

Once the researcher has selected the sample and determined its size, the following step will be to decide the research instruments. These are mainly influenced by the type of information sought and the method by which it is to

be gathered. The most common survey methods are telephone interviews, mail questionnaires and personal interviews. All these have advantages and disadvantages, and their detailed explanation is beyond the scope of this paper.

The main point is that all of them need a research instrument: the questionnaire.

The questionnaire is one of the crucial elements in any survey and one of the most difficult to do. The construction of a good questionnaire calls for considerable skill. The main purpose of the questionnaire in market research is to know who the customers are, how much they spend on the particular kind of product. As an extra information, it will be useful to know where they live, at what shops they buy the product, what they know about the different brands on the market, and so on.

These are common questions to be asked. Now, the problem is how to put all these questions in the most specific way, in the simplest way, without any ambiguity, without any vague words, without leading questions, etc.[10] Questionnaire construction is a subtle art, not a science. For this reason, there is no fixed rule for preparing a good questionnaire. Researchers have to be very careful in this step of the survey in order to avoid problems later and to come out with acceptable results.

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[10] Moser and Kalton. Survey methods in social investigation. Second edition. 1972. Basic Books, Inc., Publishers, N.Y., Pages 303-331.

3.1.2 Import data analysis

In Central America the analysis of imports may give ideas and suggestions for many investment opportunities. It is an obvious conclusion that, if a product is imported in large quantities, there is a signal of an unsatisfied demand left by domestic production. When a product is totally or substantially imported, its apparent consumption can be very easily found with a high accuracy, given that the customs statistics are reliable and up-to-date. In Central America, these statistics can be found in the respective National Statistics Offices or other official branches.

SIECA (Secretaria de Integracion Economica Centro Americana), an institution for Central American Common Market has an annual publication "Anuario Estadistico de Comercio Exterior Centro Americano" which has import and export data by product and by country of origin for every Central American country.

The classification procedure used by Central American Statistics Institutions is similar to the SITC (Standard International Trade Classification) or BTN (Brussels Tariff Nomenclature) which are well known all over the world. , The Central American classification is called NAUCA (Nomenclatura Arancelaria Uniforme Centro Americana). The task of getting detailed information about some kind of product is complicated but reliable. The fact that the coded groups

may include many products from a family of products creates a problem of identification for specific products. For example, the group 024-01-00 is cheese and curd of any kind.[11] Any cheese importation, regardless of brand, origin, quality, etc., is included in the above code.

In order to overcome this situation, if someone is interested in only one product of the group, it is necessary to go to the office of customs to analyze "customhouse permits"--a kind of invoice made by the customs office in each country.

This documentation gives the analyst product information such as size, quality, grade and price. The products can be classified by size, quality, grade, etc., so the information of demand of these products is available not only about quantity in general, but about all of the characteristics mentioned above. On the other hand, price structure information may be available as follows:

-- price FOB (free on board) or FAR (free along side rail)

-- price CIF (cost, insurance, freight)

-- price after paying customs tariffs

and, with additional small surveys, it is possible to obtain:

-- price at wholesale level, during the same period

-- price at retailer level, during the same period.[12]

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[11] NAUCA. Nomenclatura Arancelaria Centroamericana. E/CN.12/431/add.1. 1957.

[12] OECD. Manual of industrial project analysis. 1968. Volume 1, page 34.

I personally have made this kind of analysis several times and for different products and I have found out that customhouse permit analysis, even though long and tedious, is a useful way to obtain the detailed information needed to calculate domestic demand for foreign products.

Experience has shown that it is not necessary to analyze all the customhouse permits (polizas). A way can be found to analyze 80 percent of the importation with the analysis of 20 percent of the customhouse permits (polizas) which correspond to a group of products. For example, let's suppose that the group 024-01-00 mentioned above, registered 2000 customhouse permits during 1973. If we classify them by volume and start analyzing them from the biggest, presumably we will get nearly 80 percent of the volume with the analysis of just four or five hundred of them (20 percent approximately).

The information of volume and value as well as the number of customhouse permits can be found from the summarized information cards used to make the statistical yearbook.

The classification part can be done manually or by computer, but the customhouse permit analysis has to be done by hand.

3.1.3 Export data analysis .

The analysis of exported products has to be made in such a way similar to that described in imported products. That means that everything that has been said about import data analysis can be repeated for export data analysis.

However, there are some extra aspects that have to be taken into account in a foreign market. It is necessary to determine the conditions of access to this market. The conditions of market access cover five main topics or problems:[13]

-- customs tariffs

-- internal taxes and charges

-- nontariff restrictions (quotas, licenses)

-- the governments' trade policy in general

-- miscellaneous regulations affecting the product.

The customs tariffs are published in every country in the form of a customs code, or under some other title, in the national language.

The United States Department of Commerce Publication, World Wide Customs Data, presents in a highly summarized form the tariff system used, tariff levels and sources of tariff information, for most countries in the world. The International Customs Tariffs Bureau, Brussels, publishes translations of the customs codes in five languages (English, French, Spanish, German and Italian).

Internal taxes and charges are other extra expenses incurred such as excise, compensatory charges, etc.

Nontariff restrictions are very important for anyone who intends to export. In this case, no matter what the

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[13]Untad-Gatt. Manual on the compilation of basic information on export market. Geneva: 1968. Page 91-94.

the market, the possibility of exportation is regulated by the import quotas and other quantitative restrictions made by the importing countries.

Quotas are usually established on an annual basis either globally or according to the country of origin, determining the quantities authorized for import in the course of the year. Information on quotas will have to be obtained by the foreign-based representative, when possible, directly from the appropriate Ministry in the importing country.

Most countries have some kind of publication giving the government's general trade policy. International Commerce published weekly by the United States Department of Commerce prepares each year a supplement showing general import rules in 120 countries.

Croner's Reference Book for World Traders presents a more detailed publication indicating the general regulation of foreign trade for 120 countries.

Miscellaneous regulations are rules affecting specific products, for example, sanitary regulations for meat and foodstuffs in general, fire regulations which are essential for timber, etc.

3.1.4 Change in stock data analysis

This is the last component of apparent consumption. Quantitification of changes in stocks is by itself, one of the most difficult problems in determining the effective demand of a product. Stock quantification supposes another

additional survey that sometimes is not worth the money because the importance of this component as a part of the apparent consumption varies from product to product. In the case of perishable products, for example, this factor can be forgotten without changing the results substantially since it is known that it is very difficult and expensive to store this kind of product. In other products, easily preserved, however, such as the case of grains, the omission of stocks may lead to serious errors.

3.2 Apparent consumption

If we can quantify the four elements of apparent consumption in some detail, these figures become true consumption in the area or country being analyzed. For effective projection we need a good time series data base.

According to the OECD,[14] the length of period chosen will depend on:

-- the period for which homogeneous statistics are available

-- the factors which may have appreciably modified the trend of demand for a product.

An important consideration in a long statistical series of a product is the legislation concerning these products. Therefore, it is the task for the analyst to take into account legislative changes in order to be able

[14] Manual on industrial project analysis in developing countries. Volume I. Page 31.

to explain some distortion in the data.

The growth of imports in apparent consumption will give us an idea of the extent to which the domestic demand can be supplied by internal production. Similarly, the growth of exports will suggest possibilities of the domestic production abroad.

The analyst may present a table showing the historical apparent consumption. As an example which will be used in the rest of the paper, the apparent consumption of beef in Central America and its components will be presented.

Table 3.1 C.A.: Edible Beef. Apparent Consumption and its Components, 1963-1972, Thousand Metric Tons

Year	Domestic Production	Imports	Exports	Apparent Consumption
1963	140.9	--	13.1	127.8
1964	144.3	--	28.3	116.0
1965	144.0	.1	25.3	118.7
1966	146.0	--	32.1	113.9
1967	156.2	--	41.0	115.2
1968	161.2	.2	48.4	113.0
1969	165.2	.1	61.4	103.9
1970	190.9	.2	67.4	123.7
1971	197.5	.5	76.0	122.0
1972	206.5	.4	71.0	135.9

Source: FAO, Trade and Production Yearbook 1972, for 1967-1972, and Trade and Production Yearbook 1969, for 1963-1966.

The procedures for constructing the above table were as follows: The production estimate was based on cattle inventories available for each year from 1963-1972.[15]

[15]FAO. Trade Yearbook and Production Yearbook 1969 and 1972.

Based on slaughter statistics for three years[16] during that period, it was possible to determine the average percentage of the herd slaughtered annually. This percentage was estimated as 12.4 percent from 1963 to 1969 and 13.6 percent from 1970 to 1972. The average live-animal weight was estimated at 387 kilograms.[17] The technical coefficient to convert live animal weight to edible meat was 44 percent[18] or 170 kilograms per head. Applying all these coefficients to the cattle inventories it was possible to estimate the domestic production of edible beef shown in Table 3.1. The production estimate seems to be reliable, since the source for cattle inventories is commonly accepted, the percentage of extraction yearly seems to be reasonable according to personal experience, and the technical coefficient applied is experimented and accepted as an average in Central America. It was not necessary to use statistical inference procedures since there were faster and more reliable methods for quantifying beef production.

The information related to exports and imports is reliable, too. This was taken as such from the sources cited, since there is a group of imports and exports for edible beef, without any level of aggregation.

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[16]Battelle Memorial Institute. Projection of supply and demand for selected agricultural products in Central America through 1980. Under contract with the U.S.D.A. Page 202.

[17]Ibid., p. 212.

[18]Ibid.

In the next chapter, apparent consumption of edible beef in Central America will be used for projecting beef demand during the next few years.

CHAPTER 4

DEMAND PROJECTION

The purpose of this chapter is to suggest some general procedures to estimate the future demand of a product and to illustrate those procedures using the Central American beef market as an example.

Projection is a complicated task because we are dealing with many variables which may or may not follow past trends. But, in spite of these limitations, it is indispensable to have an idea about future demand, based on the past and supplemented by any other factors that may be predictable. However, in the projections we will not attempt to determine exactly what quantities will be sold and at what prices. The projection will suggest an approximate tendency, given the existing circumstances.

Many projection techniques could be introduced here, taken from many books related to this subject matter. The method to be selected is going to depend on the data available, the level of precision we are looking for, and the product itself.

The demand for a product is often related to the general economic situation. Hence, one could project GNP as a rough guide for explaining the future behavior of demand for a product and then to project directly the product demand, using appropriate techniques. This will be done in the next sections.

4.1 Analysis of national economy projections

Gross National Product (GNP) is one of the most effective measures of the country's economic state, in general.[1] The GNP is an estimate of the market value of goods and services produced in a country, during specific intervals. GNP can be considered roughly equal to the national income, even though economically speaking national income is slightly less than GNP.

Businessmen consider GNP as a good thermometer in measuring or in predicting firm sales forecasts. Normally total sales of a product are positively correlated with GNP. The trend-projection approach is an effort to predict GNP for the future on the basis of several years' trend. The length of historical data of GNP varies according to many circumstances, but ordinarily we can say that a period from 10 to 20 years is the most common period needed to project GNP. We can apply the least square method or any other technique to find the trend and be able to project the data for several years. GNP trend projection is an estimation about what is going to happen in the future. A major limitation of this technique is that it assumes, everything else being equal, i.e. conditions of the past will continue unchanged in the future.

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[1] Haynes and Henry. Managerial economics: analysis and cases. Third edition. 1974. Business Publications, Inc., Dallas, Texas. Pages 108-136.

Any number of possible changes in political, social, and economic conditions could significantly affect GNP leaving projected trends far from reality. But at this high level of aggregation the so-called "mutual compensating effects"[2] may work since the possible changes in factors affecting GNP may cancel each other out, and consequently their combined effect will be the same as in the past.

However, sudden changes affecting GNP can happen and they are almost unpredictable or at least very difficult to predict.

These sudden changes may be downward or upward movements. If GNP increases rapidly, firms may miss sales opportunities; if it decreases suddenly, they may be forced to pile up inventories. In any case, no sudden change will benefit business in general. In spite of the fact that sudden changes may occur in any projection, we assume that economic variables will behave as in the past. To partially overcome this difficulty it may be beneficial to make several alternative projections, e.g. an optimistic, a pessimistic and an average projection in order to place our estimation in a range rather than a single line.

4.2 Analysis of product demand projections

The past and present demand of a product is determined in the data we have already about apparent consumption. Time

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[2]OECD, op. cit., page 39.

series data on product consumption is one of the factors used in making demand projections for that product. Another important factor for the accuracy of projections is the method used for projection purposes.

There are several well-known methods for estimating future demand of a product. Each one by itself has its limitations. For this reason the analyst should try a few of them for making comparisons and analyzing if there are any obvious contradictory results among them.

The length of this part of the market study will depend on the money available for the study, but we can suggest that the cost in assuring the accurate projections can easily be justified since this part is one of the most crucial in the market study.

The Manual of Industrial Project Analysis in Developing Countries by OECD[3] and a United Nations Manual[4] on the same subject suggest different methods for estimating future demand for a product. I will select several methods from these books, making some comments about each. The methods are:

-- projection of GNP in correlation with product demand

-- projection of the trend of demand for the product

-- econometric methods

-- possibilities for export or for import substitution.

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[3] Ibid., p. 38-45.

[4] Ibid., p. 68-74.

4.2.1 Projection of GNP in correlation with product demand

This method consists basically in examining the correlation between GNP and demand for production of the product analyzed. Product demand and GNP are often closely related, but that does not mean that the increase in one is going to be proportional to the increase in the other. For example, a five percent increase in GNP will not lead exactly to a five percent increase in the consumption of canned vegetables. There may be other variables that must be considered. Therefore, it will be appropriate to determine the degree of correlation between these two variables assuming everything else is constant. We can do that by plotting the coordinates of GNP and product demand on a scatter diagram and calculating the coefficient of correlation between the two. Once we have established this coefficient, it is used for projecting the product demand into the future after having a projection of future GNP.

4.2.2 Projection of the trend

This method consists simply in plotting future demand following the historical data tendency. If we want to be more precise we must use per capita consumption. If we want just a rough detail we can use total consumption. From historical data we can generate an equation which will be used for extrapolating and plotting the points on a graph indicating demand in future years. The length of a series varies according to products and circumstances, but it must

be long enough to avoid changes in the trend line from short-run cyclic variations.[5]

The theory behind this form of demand projection is the fact that everything has been influenced, production and consumption in the past will remain unchanged in the near future. This technique of projecting demand has many limitations. One of them is that many observations may be caused by other factors like strikes, drought, etc. different from the usual variables, and for this and other reasons the confidence in the projection of trend is very limited. The extrapolation of the trend will be useful when we do not have any other method to utilize in demand projection.

4.2.3 Econometric methods

Econometric methods are commonly used in preparing demand forecasts. The essence of an econometric model in this case is to establish in a concrete formula the relationship between several variables and to specify the level of confidence which we can attach to these relationships.[6] This presupposes some knowledge of mathematics, statistics and economics, so the person who wants to apply them has to be aware of that, as well as of the fact that computer work is often necessary.

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[5] Spurr and Bonini. op. cit., page 583.

[6] OECD, op. cit., p. 42.

I do not intend to present a complete exposition of the methods of demand forecasting by econometric techniques. However, as a general procedure we can say that these methods usually analyze the historical data of demand as a function of income price of the product, population factors, prices of substitutes, changes in tastes, etc.

With this information it is necessary to establish mathematical models for explaining past relationships between the variables considered and then to project the demand based on the mathematical model, modified by qualitative assessments. In formulating mathematical models one has to be careful to select the correct causal variables. Sometimes, mathematical models can omit a variable which has great explanatory and predictive power. Hence, one of the principal steps has to be the careful selection of the variables included in the model.

Another important question is what is the relation between each independent variable: linear, logarithm, etc. Suppose we have decided the variables to be included in the determination of demand for a product and suppose that the kind of relation between the dependent variables and each independent variable is linear. We may express the demand for our product as a joint effect of these variables by the following linear equation:[7]

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[7]This section is based on the following books: Spurr and Bonini, Statistical analysis for business decisions, Richard Irwin, Inc., Homewood, Illinois; Johnston, Econometric methods, McGraw-Hill Book Co., Inc., N.Y., 1960; Tomek and Robinson, Agricultural product prices, Cornell University Press, Ithaca and London, 1972.

$$Q = a + b_1 p + b_2 I + b_3 P + b_4 p_5 + e$$

where p = price of the product in question

I = disposable income

P = population

p_5 = prices of substitutes

The a is the intercept (projected when the variables equal zero) and b_1 to b_4 are the estimates of the net relationship between the respective independent variable and the dependent variable. In other words, they measure the change in the dependent variable, Q, to a one-unit change in the particular variable, (I, for example), holding the other independent variables constant. e is a random variable which represents the variability of the dependent variable from the true regression line. A major concern here is the standard error of estimate which will tell us how confident we can be with the prediction based on this regression line. After establishing the relationship among the variables and calculating the standard error we are ready to make predictions about the value of the dependent variable in the future. The above consideration is a simple and superficial explanation of one of the many alternatives we have for making a projection using econometric methods. The analyst could experiment with other mathematical relations and other variables to determine which seems to be more acceptable.

Lack of appropriate data (observation on the variables) can represent a serious problem for projecting demand by

this procedure. In practice, the most common variables used for projecting demand are price and income.

In the following paragraphs we will consider the simple cases of price, income and population as explanatory variables of demand.

4.2.3.1 Relationship between quantity demanded and price

Elasticity plays an important role in quantification of demand, and sometimes it can be considered as the coefficient which most affects demand. If in the above equation we take price and hold all the other variables constant, we will have:

$$Q = a + b_1 p + [b_2 I + b_3 P + b_4 p_5] + e$$

The relation between price and quantity is negative. The coefficient b_1 is the change in quantity demanded to one-unit change in price. The derivative of this equation (holding everything else constant) is $\frac{dQ}{dP} = b_1$ or $\frac{\Delta Q}{\Delta P} = b_1$. The price elasticity of demand has already been defined as $E = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = b_1 \frac{\bar{P}}{\bar{Q}}$ where $\bar{P}$ and $\bar{Q}$ are the average price and the average quantity. As a simple illustration, if the elasticity of demand for a product is .8 and if the price decreases by 10 percent, the expected demand will increase by (.8 x 10) 8 percent (everything else held constant).

4.2.3.2 Income elasticity of demand

Using the same equation as above, taking income as the explanatory variable for demand, and holding everything else constant, we have:

$$Q = a + b_2 I + [\, b_1 p + b_3 P + b_4 P_5] + e$$

This is a similar situation as in price elasticity of demand, but in this case there is a positive relationship.

It is a logical assumption to think that demand for a specific product is going to increase in direct proportion to an increase in income. As in almost everything, there are exceptions. One of the most notable exceptions is, as already stated in Chapter 2, with the so-called inferior goods. In Latin America, tortilla is often an inferior good. In most of these countries, as income rises, demand for corn (in tortilla form) falls because bread is substituted for tortillas.

Projection of volume of demand due to income is simple. For example, if we can establish that per capita income will increase at the annual rate of 3 percent, and that the income elasticity of demand for the product in question is 1.6, then the demand for this product may be expected to increase at the rate of 4.8 percent annually (3 x 1.6).

4.2.3.3 Relationship between population and demand

The explanatory variable for demand in this case is population, holding everything else constant:

$$Q = a + b_3P + [b_1p + b_2I + b_4p_5] + e$$

The elasticity concept can be applied to population in a similar way as in income or price. For the purpose of this paper, population elasticity will be considered constant and changes in demand will be considered proportional to changes in population.

4.3 Possibilities for export or for import substitution

This analysis is not a statistical method of forecasting demand. However, it is important to recognize that the demand for sepcific products can come from foreign markets. Similarly, domestic demand can be supplied for foreign production. An analysis of apparent consumption could indicate the importance of imports and/or exports. We will then have to decide how carefully to analyze each of the two components. Experience shows that projects are normally directed from the beginning toward export or domestic markets. At least they are substantially oriented toward the one, and secondarily to the other, but the analysis of the apparent consumption may be used as a check point.

4.3.1 Export possibilities

If in the quantification of apparent consumption, exports appear to be a substantial component we can consider the possibility of foreign market opportunities for the product being analyzed. That means that we have to analyze the demand trend for this particular product in one or several countries, considered as the main importers of this product. In analyzing export markets, we have to essentially estimate the same as we would in the domestic market: to visualize the qualitative and quantitative aspects which may influence the expansion of demand.

Technical teams may have to go to foreign countries to collect the necessary information. This is much more expensive than the analysis of domestic markets. However, much of the information required for this purpose might be obtained from the diplomatic mission of the target country stationed in the exporting country.[8] The Commercial Attaché of this mission usually has many of the figures needed by the analyst.

4.3.2 Possibilities for import substitutions

If in the quantification of apparent consumption, imports were relatively high, we might conclude that the new firm will be able to capture a portion of the market previously

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[8] UNCTAD-GATT, op. cit., page 84.

served by foreign firms. However, the mere existence of imports is not reason enough to predict a demand for a given firm's products. It is necessary to analyze other variables such as the cost of domestic production and the laws related to this import product. If the production costs are lower, or at least at the same level of those purchased abroad, there could exist a real potential demand for domestic production.

4.4 Projections of beef demand in Central America

This can be considered as a practical example for illustrating a simple way for hand calculating demand projection. The present demand projection is made based on population, income per capita and price. The population growth rate used is 3.2.[9] The average beef consumption in Central America was estimated as 9 kilograms per capita annually, dividing the apparent consumption of Table 3.1 by the population estimates of the respective years. The estimation of demand using population is a simple multiplication of the consumption per capita per year by the projected population for each year. The projection of demand using income per capita and income elasticity consists in multiplying demand estimates using population by the percentage resulting from multiplying the income per capita growth rate and the

[9]This was estimated based on data from BID, Socio-economic progress in Latin America. 1970.

income elasticity. The income per capita growth rate was 2.2 percent annually, as the difference between per capita GNP growth rate and population growth rate, based on data from BID.[10] The income elasticity for beef in Central America was estimated by Battelle[11] as .59.

It was not possible to estimate price elasticity because of lack of information about domestic prices. As an illustrative example, the price elasticity for beef is going to be considered .8 since the price elasticity for food in general appears to range between .6 and .8,[12] and beef is a food product considered as one of the most sensitive to price.

"A frequent hypothesis used in demand projection is that the relative price of a product is constant over time."[13] Absolute prices increase, but in deciding how much to buy of a given product, the consumer is guided mainly by relative prices. That is, if the price of beef and fish increase proportionally, as well as consumer's income, the quantities demanded of both products will remain constant. However, if the price of beef goes up relative to the price of fish,

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[10] Ibid.

[11] Battelle Memorial Institute. Projections of supply and demand for selected agricultural products in Central America through 1980. Under contract of U.S.D.A. 1969.

[12] U.S.D.A. Elasticity food consumption associated with changes in income in developing countries. 1965. Page 24.

[13] Van de Wetering and others. Peru long term projections of demand for and supply of selected agricultural commodities through 1980. 1969. Published by the U.S.D.A. Economic Research Service. Page 57.

Table 4.1. C.A.: Projections of Beef Total Demand, Using Population, Consumption Per Capita, Income and Price Elasticity, 1971-1982.

Year	Population[a/] (thousands)	Beef domestic demand using consumption per capita (thousand metric tons)[b/]	Beef domestic demand using income elasticity (thousand metric tons)[c/]	Beef export demand (thousand metric tons)[d/]	Beef total demand (thousand metric tons)[e/]	Beef total demand using price elasticity (thousand metric tons)[f/]
1971	14,766	122.0	122.0	76.0	198.0	198.0
1972	15,238	137.1	138.9	77.9	216.8	214.2
1973	15,726	141.5	145.2	84.9	230.1	224.5
1974	16,229	146.1	151.9	91.9	243.8	234.9
1975	16,749	150.7	158.8	98.9	257.7	245.1
1976	17,285	155.6	166.2	105.9	272.1	255.3
1977	17,838	160.5	173.7	112.9	286.6	265.2
1978	18,409	165.7	181.8	119.9	301.7	275.2
1979	18,998	171.0	190.2	126.9	317.1	285.0
1980	19,606	176.5	199.0	133.9	332.9	294.7
1981	20,233	182.1	208.2	140.9	349.1	304.3
1982	20,880	187.9	217.7	147.9	365.6	313.6

a/ The year basis is 1971 and the population growth rate is 3.2 percent annually.

b/ Elasticity of population is considered unitary through the series. Consumption per capita is considered 9 throughout the series.

c/ Income elasticity is .59 and per capita income growth rate is 2.2 annually.

d/ Least square trend line for exports based on 1963-1971 data. QE = 42.9 + 7.0X where QE is quantity exported in 1000 metric tons an X is the time (1967 = 0).

e/ This column is the summation of domestic and export demand in each year.

f/ Price elasticity is considered to be .8 and it is assumed that relative price will increase in 1.5 percent yearly.

this would affect negatively the demand for beef.[14] As an example, illustrating how to use changes in relative prices, it will be assumed that relative price of beef will increase 1.5 percent annually.

This percentage, even though it is not based on real statistics, may be acceptable as a conservative estimate for domestic as well as foreign consumption. Since beef proteins are relatively more difficult to produce and more desirable than any other kind of proteins, its price will expect to rise faster than other substitution products. In the case of beef, total demand is made up by domestic demand and foreign demand or export. Export statistics appear to make up a substantial percentage of the total domestic production. Hence, it is necessary to make some projections about this part of the demand in order to estimate total demand for beef in the future. Using the export data in table 3.1 and applying the least square technique, the equation relating exports with time will be: $QE = 42.9 + 7.0X$ where QE is the quantity exported in thousand metric tons and X is the year (1967 = 0). Export projection for 1971-1982 is shown in table 4.1. If a price elasticity of .8 and an increase of 1.5 percent annually are applied to both domestic and foreign demand, the total demand projection for beef will be represented in the last column of table 4.1. Thus for 1982 total projected demand is 294.7 thousand metric tons. In the next chapter, some supply aspects will be considered.

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[14] Ibid.

CHAPTER 5

ANALYSIS OF SUPPLY AND ITS RELATIONSHIP TO DEMAND

The purpose of this chapter is to analyze beef supply perspectives, in order to compare it with demand projections to find out how the equilibrium can be reached. Discussion will be centered on the analysis of the expected supply of cattle related to the projection of demand for beef.

5.1 Supply perspectives

The first step in analyzing the supply of beef will be to consider its availability, since this industry depends heavily on the availability of animals for slaughtering. In this context, land is the main factor in the production of cattle: "Since practically all cattle are grass fed, the amount of pasture was seen to be the most important variable affecting future beef production".[1/] The primary feeding method in Central America is called rotational grazing, in which animals spend a few days in a portion of pasture, being moved after that to another portion.

One of the shortcomings of this feeding method is that there is shortage of feed during the dry season (November - April). "The problem of providing adequate feed for cattle throughout the dry season has been cited as the most critical factor facing the cattle industry".[2/]

1/ Battelle Memorial Institute, op. cit., page 211.

2/ Fletcher, Graber, Merril, Thorbecke, Guatemala's Economic Development: The Role of Agriculture. 1970. Iowa State University Press, page 107.

On the other hand, it is known that domestic beef demand is increasing as well as foreign demand. The assumption that the price of beef in international markets will be favorable, makes it more profitable to allocate additional lands to raise cattle. In addition, new pasture lands are opened up by new roads.

Considering these factors, and in the absence of further information, one must conclude that there is considerable uncertainty about future development of the cattle industry in Central America. However, if the number of cattle recorded over a period of the ten years, 1963-1973,[3/] is projected, using the least square technique, the equation relating number of cattle to time will be: $Y = 7464 + 255.5 X$ where Y is 1 thousand head and X is the year (1967 = 0). Thus in 1980 there would be 10.785.5 thousand head. The technical coefficient for transforming animals to edible meat, and the average animal weight are considered constant during the projection. If the average weight is considered 387 Kg. per animal, the technical coefficient .44[4/] and the percentage slaughtered 13.6[4/] the supply of beef meat in 1980 would be 249.4 thousand metric tons.

5.2 Supply-Demand Balance

In the last section the supply of cattle has been analyzed. The projected quantity supply of beef for 1980 is 249.4 thousand metric tons. In chapter 4, total demand for beef was projected

3/ FAO. Production Yearbook 1972 for 1967-1972 and 1969 for 1963-1966.

4/ Average taking from Battelle Memorial Institute, op. cit.

as shown in table 4.1. The total quantity demanded estimated for 1980 is 294.7. These figures show an excess of demand for 1980 of 45.3 thousand metric tons.

The fact that supply of beef would fail to respond adequately to the demand implies that beef prices might tend to move upwards, if the price acted freely without any government control (or other economic controls).

This price increase will induce existing cattlemen to expand beef herds as well as new cattlemen may start raising cattle, increasing the availability of beef and as a result, decreasing price.

Final equilibrium will depend on the elasticity of demand and supply, that is, how much quantity demanded will be reduced and how much beef will be increased, due to relative increases on price. More efficient feeding methods and new technology in general, could have a positive effect increasing supply, reducing cost, and as a result, reducing price. In the next chapter, some aspects of slaughtering plants will be discussed as well as the market opportunities for new slaughtering plants.

CHAPTER 6

ANALYSIS OF MARKET OPPORTUNITIES FOR NEW FIRMS

The purpose of this chapter is to briefly analyze some further aspects of beef supply as related to number and size of beef slaughtering plants, slaughtering costs and potential expansion of output, and to draw some conclusions about market possibilities for new firms.

6.1 Beef slaughtering plants

In Central America, according to ICAITI[5/] in 1971 there were 18 slaughtering plants, (Guatemala had 2, El Salvador 1, Honduras 4, Nicaragua 4, and Costa Rica 5), excluding the municipal slaughterhouses.

The total beef production in 1971 was 238.3 thousand metric tons valued at 227.4 million $ CA (US$). From this production 76.0 thousand metric tons, valued at $81.2 million were exported, leaving the rest, valued at $146.2 million for domestic consumption. The exports were sent substantially to the United States.

The fixed assets[6/] of this industry for the same year were $23.1 million ($14.5 million in land and buildings and $8.6 million in equipment and machinery). Current assets were $21.6 million, making a total investment of $44.7 million. The annual cost of raw materials was $157.8 million, wages were $4.3 million and other expenses were $21.4 million.

5/ This section is based on ICAITI. Informe sobre la situacion del sector fabril productor the alimentos y bebidas en Centroamerica. Guatemala. 1973.

6/ ICAITI, op. cit., pages 113-114.

There is a lack of information about installed and used capacity. As a rough guide it can be said that most of these plants operate ordinarily at the level of design, but only eight hours daily, and on some days they operate at less than the level of design because of shortages in supply of cattle.

6.2 Cost structure of the beef industry.

From the data in the last section it is possible to estimate total, fixed and variable costs for that specific level of production:[7/]

Fixed costs:	$ 23.5 million
Variable costs:	$160.3 million
Total costs:	$183.8 million

In order to analyze the industry one can derive an average firm by dividing every figure by 18 plants, or one can leave the figures as they are considering all the firms combined as a unit. In the illustrative example, the latter method is used. The level of profit for the beef industry in Central America during 1971 was:

Total revenue:	$227.4 million
Total costs:	$183.8 million
	$ 43.6 million

7/ Based on information of ICAITI, op. cit.

Gross return on sales: $\frac{\text{Profits}}{\text{Total Sales}} = \frac{43.6}{227.4} = 19\%$

Gross return on investment: $\frac{\text{Profits}}{\text{Total Investment}} = \frac{43.6}{44.7} = 97\%$

6.3 Potential expansion of output by existing plants

The analysis of the beef industry in Central America has been carried out at high level of aggregation due to the lack of more precise data. For this reason it is not easy to make detailed observations about the future of this industry. However, some general conclusions can be drawn. As already stated, plants generally work an 8 hour shift. Production can be doubled if existing plants were to operate 16 hours per day. In 1971, the production of existing plants was 197.5 thousand metric tons. Supposing that no restrictions existed in the availability of cattle such that beef production could be maintained at the desirable level; if the number of working hours were doubled, the production in 1971 could have reached 395.0 thousand metric tons.

6.4 Conclusion: Market opportunities for new firms

This is an attempt to put together all the available information to analyze the possible market opportunities for new firms in the slaughtering beef industry. In 1971, there seemed to be an excess capacity in the beef slaughtering plants.

Analyzing the data worked out for the purpose of this paper, the estimated installed capacity for 1971, working 16 hours per day, was 395.0 thousand metric tons, and the projected demand for 1980 is 294.7 thousand metric tons. Apparently there is installed capacity for supplying near future demand with the existing plants. This excess of installed capacity may lead to the conclusion that there are no possibilities for new firms to enter. However, theoretically, it can be said that there are market opportunities whenever an unsatisfied demand exists. According to the United Nations Manual, "the possible existence of an unsatisfied demand can be seen from two general types of indicators; one of prices, and the other of the establishment of some types of controls".[8/] In the beef industry in Central America both prices and controls seem to be present. Prices are very high in relation to production costs, resulting in the high profit rates discussed earlier.

The existence of control is obvious from the following: "Beef production in Central America could speed up this year, but meat exports which move principally to the United States, are not expected to gain much. Most governments have taken no action to increase beef export quotas, many of which were cut back last year to relieve high meat prices and shortages".[9/] The latter states clearly the existence of export quotas.

8/ op. cit., page 34.

9/ U.S.D.A. Foreign Agriculture, Vol. XII. 14, 15. April 15, 1974. Page 2.

These quotas are established at the beginning of the year as a fixed quantity. This quantity is distributed among the existing plants according to their installed capacity. The purpose of quotas is to protect domestic consumers. Since export prices are higher, producers would export as much as possible, having as a result, shortages of beef in domestic markets. As a conclusion, the level of exports would be higher if there were no restrictions.

We have already seen that the expected domestic demand due to population and adjusted by the 1.5% price increase will exceed supply in 1980 by 45.3 thousand metric tons. This excess of demand over supply will result in upward pressures on price. Even if rising cattle prices induced additional cattle suppliers, there would appear to be sufficient existing plant capacity to supply demand up to 1980. One important consideration would be to analyze the effect of an elimination of export restrictions or an expansion of export quotas on the supply of cattle. This policy might induce sufficient cattle supply, raising exports above projected levels. Even in this case existing firms will be in the best position to capture this market since there is an existing overcapacity of more than one hundred thousand metric tons. Therefore, it appears unlikely that new firms will easily find market opportunities.

However, because of a lack of information, this paper has not taken into consideration the municipal slaughteringhouses which ordinarily supply small towns and rural areas. A tendency

in Central America is to substitute modern export oriented plants for these inefficient and unsanitary slaughteringhouses. As a matter of fact, Costa Rica is in the advanced stages of a program to gradually discontinue municipal slaughtering houses. Most of the beef for local markets is presently processed in these modern plants. The substitution of modern plants for traditional municipal slaughteringhouses would be a possibility for increasing output and maybe even saturating the existing installed capacity. This, along with a possible increase of export quotas might push the demand to a point where the entry of new firms would be feasible. However, further analysis would be necessary since the substitution of modern beef processing plants for traditional slaughterhouses would probably increase the price of beef for small towns and rural areas with a consequent reduction of demand.

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