

Demand Analysis and its Implications for Fisheries Development

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Demand analysis for fish and fishery products in developing countries has long been neglected. There are several possible reasons for this neglect. There seems imbedded in the minds of fisheries development officials the view that supply creates its own demand – hence there is no need to assess demand. In addition, demand analysis is rarely pursued since the data necessary for the analysis are rarely available and the cost of obtaining data is perceived as being high. For whatever reason, demand analysis appears to have been regarded as an unnecessary refinement in the planning process.

The proposition presented in this paper is that demand analysis is central to the planning process and that it can be achieved in the developing country context. A corollary proposition is that statistical systems for fisheries can be, and should be, revised to meet the requirements for demand analysis.

It is not useful to talk about demand without being more specific. The marketplace within which demand operates must be defined, as must the time frame to which it refers. Further, the product or product mix must be defined along with a set of relevant demand determinants. There exists, for example, one set of demand determinants at the port or first buyer level and another at the retail level. Also there is one set of demand determinants in the short run and another in the long run. Furthermore, the implications for demand analysis of the structure of the market system require consideration. Obviously the nature of demand analysis will be essentially determined by the nature of the decisions to be based upon it.

Consider one typical problem with which a development planner might be confronted – the need to make a long term demand projection for fish. The most common approaches taken are two in number. The simplest and least useful is to obtain a supply projection and argue that demand must equal supply and hence demand will be whatever the supply is at any time. This argument is not easy to assail but we notice that nowhere are prices considered. The other approach to estimating future demand is to calculate present per capita consumption and assume that total demand will increase in proportion to increases in population. Again, in this simple approach no consideration is given to prices (although there is often the implied assumption that prices will remain the same).

A somewhat more complex question arises when a development program has the often incompatible objectives of raising prices to fishermen and reducing prices to consumers. The focus here is clearly on price and some analysis is necessary to determine whether or not the stated objectives can be met. Some aspects of the problem are illustrated in Fig. 1a & 1b.

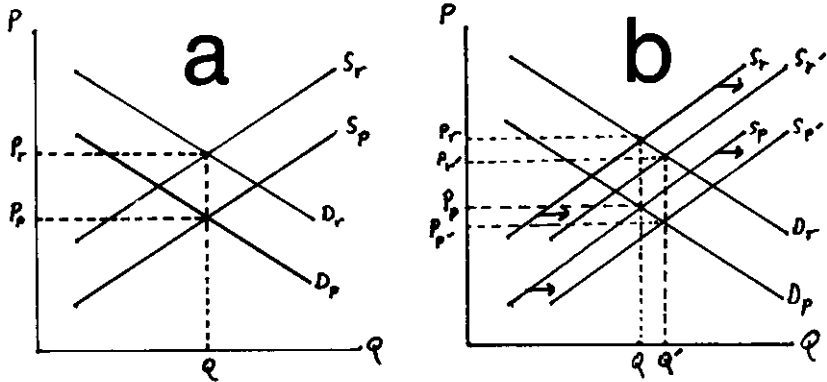


Fig. 1a. Supply and Demand at Retail and at the Fishing Port (P = price, Q = quantity)

Fig. 1b. Conditions in the Market After a Change in Port Supply

Figure 1a shows relationships between supply and demand at the port or landing place and at retail, say in a central major city. The demand curve D_p for the port is a derived demand from the demand curve D_r —the difference between them reflecting the costs of performing the marketing and distribution functions. The Supply S_r at the retail level is the supply derived from the curve S_p which is the supply function of the fishermen. The differences between them again reflect the costs of marketing and distribution. It should be noted that the quantity Q is the same in both markets, and that S_p and D_p intersect at the same Q and S_r and D_r . Obviously the price at retail (P_r) is higher than the price to the fishermen (P_p).

Figure 1b illustrates the effects of a change in supply that might result from improvements in vessels and gear, or from the discovery of a new fish stock. The shift in the fishermen's supply function with unchanged demand will reduce the port price from P_p to P_p' . The derived supply at retail will also shift to the right (or downward) and the retail price will fall from P_r to P_r' . The quantity sold will increase from Q to Q' and both markets will clear.

The precise way in which relative prices at wholesale and retail will change in response to supply changes depends upon the slopes of the supply and demand functions. These slopes in turn depend on a number of factors. The slope of the supply function for the fishermen depends upon the costs and productivity of the gear. The slope of the retail market supply curve depends on the costs of marketing and distribution. The demand at retail depends upon consumers' behavior while demand at the port reflects the costs of distribution and marketing as well. Apart from these factors, the time period considered is important both on the demand and supply sides. The shorter the time period the steeper the curves (in general) and the more marked will be price fluctuations. Both consumers and producers respond differently to influences that persist over time than to those which occur briefly.

Normally one would expect prices to decline as catches increase. Whether or not these price declines will reduce fishermen's earnings depends on many factors, not the least of which is the extent of a price decline as the catch increases. The extent of price changes resulting from production changes is dependent upon a parameter of the demand function called price elasticity. It is a parameter of which economists seem inordinately fond – perhaps because it is a helpful summary statistic even if it does not tell us everything about demand that we might like to know. Briefly, if the price elasticity of demand is equal to -1 , (unit elasticity) a change in the quantity consumed will not change total buyer's expenditures or seller's gross incomes.¹ If the price elasticity is between -1 and 0 (inelastic region) then as production increases, expenditures (gross income) decrease and vice versa. In this case, increased output results in sufficiently great price declines to reduce total expenditures (revenue). The third case, where price elasticity is -1 to $-\infty$ results in a condition where as output increases, expenditures increase even though prices decline, since prices do not decline proportionately as much as production has increased (elastic region).

The relationship between consumption (production), prices and expenditures (revenues) are summarized in Table 1.

Gross revenues or expenditures, of course, do not tell the complete story since cost must be considered. It should appear fairly clear that output increases within a range of inelastic demand are going to make increased net earnings much more difficult if not impossible to realize. It should also be fairly clear that the more elastic the demand function, the better the situation in general. However, since we cannot always be sure that elasticities will favor us it is not surprising that we should seek other solutions to possible declines in net earnings as a result of increases in output. The immediate solution usually open to us is to expand the market. Some possible consequences of market expansion are shown in Fig. 2a & b:

Figure 2a illustrates a case where the demand shift from D_0 to D_1 was sufficient to maintain the price at P_0 in the face of a supply shift from S_0 to S_1 . Figure 2b shows a case where the demand shift from D_0 to D_1 was enough to yield a price rise from P_0 to P_1 when supply increased from S_0 to S_1 . Obviously, a demand shift might well be insufficient and prices would fall but not as much as they might without the market expansion.

It is germane to ask what can cause demand expansion (market expansion). Among the more usual responses are advertising, building more market facilities, providing better quality, increased population and increased incomes. Fisheries development programs can do something about the first three but can do little about population or consumer incomes. In consequence, we will consider first incomes and population as they affect market expansion.

In the case of income in relation to consumption, the notion of elasticity again proves useful. In fact there are two particularly useful elasticity parameters relating to income. These are: the income-consumption elasticity and the income-expenditure elasticity. Briefly, these elasticities indicate the percentage

¹ The negative sign is used here to indicate that quantity and prices move in the opposite directions.

Table 1. The relation of supply changes to expenditures under different demand conditions.

<u>Nature of Demand</u>	<u>Production</u>	<u>Price</u>	<u>Expenditures</u>
	<u>Rise</u>	<u>Fall</u>	<u>Rise</u>
Elastic	Fall	Rise	Fall
	<u>Rise</u>	<u>Fall</u>	<u>Fall</u>
Inelastic	Fall	Rise	Rise

change in consumption (by weight) or expenditures (in money) to a one percent change in income. If the income elasticities are negative so that increased incomes result in lower consumption or expenditures then the life of fisheries developers would be much more difficult than it is. On the other hand, it cannot often be expected that the elasticities are greater than +1 (which would indicate that fish consumption or expenditures would expand at a more rapid rate than income). Hence, we expect to find these elasticities between 0 and +1, and the nearer +1 the better (at least for the fishermen). This, however, is not the only interesting feature of these elasticities. An illustrative case study will outline some of the issues concerning income elasticities and other market factors on development.

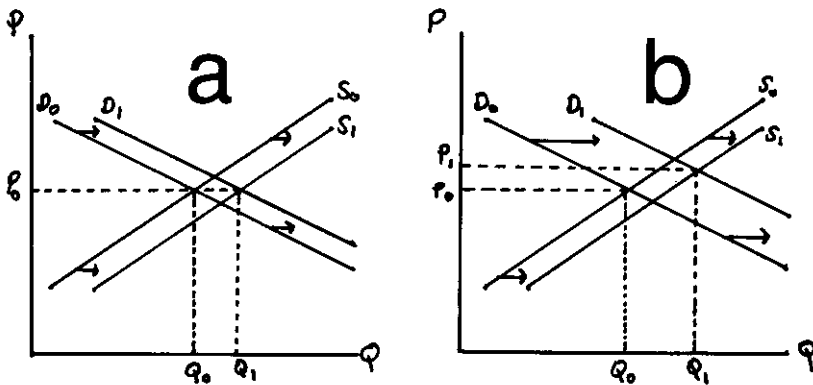


Fig. 2a. Market Expansion (D_0 to D_1) Sufficient to Maintain Original Price (P_0) with Increased Supply (S_0 to S_1).

Fig. 2b. Market Expansion (D_0 to D_1) Sufficiently Large Enough to Raise Prices (P_0 to P_1) in Face of Supply Increase (S_0 to S_1).

A survey of 1,419 households in Guatemala City, Guatemala, was conducted during July-August and early September of 1976. The purpose was to ascertain consumers' attitudes toward fish and fishery products and to gain some insight into possible ways in which the market for fish might be expanded. The households were randomly selected by zone in an effort to obtain a representative sample of income classes. Except for the very poorest households, the sample selected well represents the income groups in Guatemala.

The results of the consumer survey confirm, in many cases, the opinions of professionals working in Guatemala, but provide measures which were not previously available. The survey results also suggest some conclusions that had previously not been considered.

Among the more significant results of the survey are those that relate to income-consumption (IC) and income-expenditure (IE) elasticities. The income-expenditure elasticity is estimated to be .42. That is to say that a one percent change in income will result in a 0.42 percent change in expenditures on fish in the same direction. Hence, as per capita income increases, we would expect the demand for fish to increase. However, it should be noted that the income-consumption elasticity is only .23. This implies that a one percent increase in income will result in a 0.23 percent increase in pounds of fish consumed. The fact that the IE elasticity is higher than the IC elasticity suggests a clear shift from lower priced fish such as jullin and bagre to high priced fish such as robalo or to more expensive products such as fillets. This suggests that the relative market position of lower priced fish will deteriorate relative to that of higher priced fish in the future, and the position of fishermen who specialize in low price species will also deteriorate.

It should also be noted that price consumption (PC) elasticities are very low at -.19. This suggests that a price increase of one percent will result in a 0.19 percent decline in pounds of fish consumed. It also implies that as prices rise, consumer expenditures will increase and as prices fall, consumer expenditures will fall. Available data did not permit the analysis of individual species responses to price changes.

It should be noted that the strongest tendency to shift from low priced to high priced commodities is in the lower one-third of the income groups. This is not surprising since the middle and upper income groups have essentially been able to adjust their consumption patterns.

Several factors place some obstacles in the path of market expansion. For example: 21% of the households indicated that they already eat sufficient fish and would not be likely to increase consumption. Seventeen percent of the respondents indicated that additional fish would not be consumed because not everyone in the household liked it. Nine percent of the respondents stated that eating more fish could be dangerous. A large percentage, 21%, said fish was very expensive. Given the income levels in Guatemala, the latter view is indeed correct; 36% of the respondents paid more than \$0.75 per pound for the last purchase.

On the other hand, the respondents were more regular buyers of fish than had been earlier expected. About one-half of all households had purchased some fish within the two weeks prior to the interview. Thirty-seven percent of the respon-

dents reported liking fish very much, although 37% were also more or less neutral in their like and dislike of fish. While beef and pork are preferred to fish, 51% of the respondents preferred fish to chicken and only 26% preferred chicken to fish.

From the point of view of market development and expansion, the consumer survey does not provide clear directions. For example: 65% of the respondents indicated they would buy more fish if it were available nearer their homes when the question was asked directly. However, when an open-ended question was asked concerning why the households did not consume more fish, just over one percent gave distance to market as a reason. It should, however, be recognized that almost none of the consumers make a special trip to market for fish, in consequence no special distance problem is associated with fish. Further, since the custom is to shop for a variety of foodstuffs at one time, specialized or isolated fish stores would need to provide some special advantages. A surprising 9% of the respondents purchased from street pedlars, so this kind of purchasing is well accepted and some households only purchase fish when the pedlar comes by.

The choice of vendor by consumers is largely based upon the consumer perception of price with 33% indicating lower prices as the criterion by which they chose a vendor. However, a significant 19% said they always bought in the same place. Only 3% reported quality as a consideration. However, in response to another question concerning vendors, 55% of the respondents reported that they went to the vendors they did, because they were clean. This is a surprising result since general sanitary levels among fish sellers are quite low.

Consumer likes and dislikes concerning fish are quite clear. The flavor of the fish was important to respondents with 45% reporting that flavor was a major consideration in purchasing fish. Eleven percent purchased the kind of product they did because it had no bones. Eighteen percent of the respondents reported that what they liked least about fish were the bones. More consumers judged fish quality by the odor than any other single factor (24%), while some looked at the gills (15%) and the remainder considered general appearance.

Since there are no effective information sources concerning fish 82% of the respondents got their information on fish prices and availability personally, only 2% obtained information from newspapers. Consumers' perceptions of the price of fish available in the market place were quite accurate despite the fact that they are not observing the prices regularly. While the differences are not statistically significant, there is a tendency among the poor to overestimate prices particularly of high priced fish.

The results obtained in the above survey suggest certain cautions about future development and certain possibilities for market expansion, which may have general applicability in Spanish speaking countries of Central America and northern South America:

1. As per capita incomes increase, certain market sectors, particularly for cheap fish may be injured, and the producers of these fish further disadvantaged. Provisions will need to be made for providing marketing services.

2. Attention needs to be given to developing products from some less desirable species and from fishes that are bone-free.

3. While results on distance to market as a factor appear to be mixed, the use of mobile vending stations would appear more promising than the building of separate fish stores unless these are near other markets.

4. There is need for better information on prices and availability of fish as well as information on its nutritional value (which is already recognized by a significant, though small part of the respondents - 13%).

5. Since lower priced fish are generally badly handled, some of the shift to higher priced fish might be ameliorated by programs designed to improve handling and preservation of fish.

Demanda y Análisis y sus Consecuencias para el Desarrollo Pesquero

RESUMEN

El análisis de la demanda es absolutamente esencial para la planificación del desarrollo pero ha sido generalmente descuidado por los países en desarrollo al considerarlo muy costoso o innecesario.

Para poder llevar a cabo en análisis de la demanda, es necesario definir no sólo el mercado dentro del cual la demanda se realiza, sino también un lapso de tiempo. Además se debe tener en cuenta la estructura del mercado así como las fuerzas de la demanda a corto y largo plazo a todos los niveles.

Los gráficos nos muestran el cambio efectuado en las relaciones de la oferta y la demanda, tanto en una situación convencional como cuando dicho cambio se debe al aumento del abastecimiento al proyectar un desarrollo futuro.

Se examina el funcionamiento de la elasticidad del precio, ya que relaciona el ingreso de los pescadores con el desembolso del consumidor.

Es una encuesta realizada en la ciudad de Guatemala en 1976 con el fin de conocer la aptitud de los consumidores hacia el pescado y productos pesqueros, además de encontrar los medios de poder expandir el mercado pesquero. Los resultados de dicha encuesta pudieran aplicarse a los países de habla hispana de América Central y del norte de Sur América, sobre su desarrollo futuro y las posibilidades de expansión mercantil. Se debe considerar los siguientes resultados:

1. A medida que aumentan los ingresos aumenta la desventaja de los productos de pescado barato.

2. Se necesita dar atención a especies que tengan poca venta y a los peces sin espinas.

3. El uso de puestos de venta transportables parece ser más ventajoso que la construcción de pescaderías separadas excepto si están cerca de otros mercados.

4. Se necesita una información mejor sobre precios y la disponibilidad de pescado, así como de su valor nutricional.

5. Debido a que el manipuleo del pescado barato es generalmente malo, se pudiera aumentar su precio mejorando la manipulación y la conservación del pescado.