

TOWARD AN ADOPTION DECISION MODEL FOR
PROCESSED FOODS IN DEVELOPING NATIONS

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Discussion Paper No. 110, November 1984.
Published by the Center for Research on Economic Development,
University of Michigan, Ann Arbor, MI 48109, U.S.A.

ABSTRACT

This research is concerned with determining factors that are related to consumers' decisions to adopt or reject processed food products in developing nations.

Data for this study were collected from open-ended questions administered to 162 Ivory Coast households. A cluster sampling method was used to select the respondents. Frozen beef imported from Argentina was chosen. Chi-square and logit analyses were applied.

The results of the study show:

1) the trial decision is stimulated by word of mouth communication of experience, perceived nutritiousness, novelty, and price advantage of the new product. The most likely triers are those consumers who attended secondary school.

2) the repeat trial purchase decision is motivated by advantage perception of the product price, novelty and taste.

3) the commitment decision is explained and predicted mainly by the price advantage of the product.

Replication of this study on other food products and other countries was advised. Further investigation on the multiple choice that consumers face was suggested.

RESUME

L'objectif de cette étude consiste à déterminer les facteurs qui influencent l'acceptation ou le refus d'aliments industriels par les consommateurs dans les pays en développement.

Les données proviennent de questionnaires à réponse libre distribués parmi 162 ménages ivoiriens. Les membres de l'échantillon furent sélectionnés en groupes. L'enquête portait sur la viande congelée importée de l'Argentine. L'on a effectué des tests de chi-carré et logit.

Les résultats de l'étude sont les suivants:

1) Les facteurs qui ont incité les consommateurs à essayer le produit sont la communication orale, la valeur nutritive perçue, la nouveauté et l'avantage de prix. Les consommateurs les plus disposés à essayer ce produit avaient fait des études secondaires.

2) La perception d'un avantage de prix, la nouveauté et le goût ont influencé la décision de faire des achats expérimentaux subséquents.

3) La décision d'acheter régulièrement ce produit s'explique et s'annonce surtout par l'avantage de prix.

L'on recommande que des études pareilles orientées vers d'autres produits alimentaires soient réalisées dans d'autres pays. L'on propose aussi une étude approfondie traitant des divers choix qui se présentent aux consommateurs.

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INTRODUCTION

In more recent times, great attention has been focused on the food problems of poor nations. Final solutions to these problems have not been found. Nevertheless, it may be suggested that greater use of preserved forms of food such as frozen, fried, or canned food products, and larger use of nutritive supplements such as high-protein soft drinks, are partial solutions to malnutrition in the Third World. In fact, development of a processed food industry may motivate small farmers to produce more food, since they would be assured of selling their crop. This would also increase trade between Third World countries as a result of gains from economies of scale, lower transportation costs, and decreased spoilage. To a large number of consumers from developing countries (LDCs), some of those processed food products would be new. Obviously, all of the foregoing reasons suggest that adoption of new products in LDCs, in particular adoption of new food products, is an area where research is urgently needed. An answer to the following questions should be beneficial to LDCs' policy makers:

How can the adoption of new processed food products highly needed in developing countries be explained and predicted? How can the widespread adoption of health hazardous products be prevented?

The present study attempts to provide an answer to these questions. The succeeding chapter presents the objective of this study, its scope, limitations, and anticipated contributions. A survey of the existing relevant literature on innovations new product adoption is briefly presented in Section 2. The proposed model, showing the hypotheses tested and methodology including sample, the questionnaire design and the analysis is presented in Section 3. Findings will be presented in Sections 4 and 5. Section 6 shows some implications for marketing strategies and research.

1. NATURE OF THE RESEARCH

Research Objective

The main objective of this research is the determination of key factors which affect the adoption of processed food products in a developing nation and the relative contribution of these key factors in explaining and predicting the likelihood that a new food product will be accepted.

Importance

The findings are intended to help the marketer increase the number of adopters and speed up or slow down the diffusion process. By isolating those factors involved, it can be shown to what extent these factors contribute to an adoption level much different than anticipated. Public policy makers may also be able to draw on the findings in order to influence consumption patterns in ways which would benefit their countries most. It is believed that new products, uniquely conceived for LDCs, taking into consideration local production resources (capital, labor and technology) and health factors such as harmlessness and nutritiousness, would be more likely to penetrate the market. This would enhance economic development under the following conditions:

- a) Farmers would feel that their crop sale is more secure than before and have higher incomes.
- b) Producers would take into consideration health factors and use local inputs in a way that is beneficial to the local economy.

Scope and Limitations

The scope of this study is limited in several ways.

1) Attention is concentrated on one industry of nondurable consumer goods, the processed food industry. The reason for focusing on one industry is that an in-depth study of one industry can yield deeper insights than a less detailed investigation which embraces a number of industries. The choice of a food product could also be justified by the urgent need of a solution to the nutrition problems in LDCs.

2) A cross-sectional survey was adopted, which relies on the respondents' ability to recall. This methodology has been subject to criticism. One criticism is that it does not take into account the change in variables over time. Another is that when recalls are requested, the importance of the product, as perceived by the respondents, generally affects the response accuracy. For this research, however, this limitation is not prohibitive because the survey data collected did not require tremendous memory effort. Furthermore, as the objections previously mentioned appear insignificant at this stage of adoption theory, the one-shot survey has been the most widely used methodology in adoption research.

3) Given the unavailability of funds and time for a multicountry study, only one developing country was considered. The country (Ivory Coast) where this research was conducted, however, has a variety of social systems consisting of different levels of economic development and cultural backgrounds.

Despite the limitations previously cited, the findings could be applied to developing nations with similar socioeconomic characteristics.

Contributions of this Study

The contributions to the theory of new product adoption include the following. Firstly, since there has been no such research previously conducted in the Ivory Coast, this study brings additional insight into the convergence and generalization of existing findings at the international level.

Secondly, this study shows whether there is another way of looking at adoption theory. In fact, the influence of each factor on each stage of the adoption decision process is studied.

Thirdly, the likelihood of taking the adoption decision instead of its earliness is considered as the dependent variable.

2. LITERATURE SURVEY

The adoption of a new product is a mental process by which an individual or group of individuals (adopting units) passes from first knowledge of that product to a decision to adopt or reject it and to confirmation of this decision. Purchase of a new product is a necessary but not a sufficient condition for its adoption. Adoption implies the consumer's commitment to use the product over time.

Interestingly, most of the previous studies agreed on the existence of two stages, at least, in the adoption decision process: trial and adoption. At the trial stage, the consumer uses the product on a small scale. The trial stage would be a way of evaluating the product. At the adoption stage, the consumer accepts the product and continues to use it.

The trial stage may be skipped for the adoption of durable products. But, when dealing with frequently purchased goods, such as grocery products, both steps must exist. The trial step involves repeat purchases. The repeat

purchases notion has been of great interest in predicting the acceptance of consumer nondurable goods (Fourth and Woodlock, 1969; Parfitt and Collins, 1968).

The trial stage of nondurable products could be split into two decision steps: the initial trial decision, and the subsequent trial purchases decision. In other words, the adoption decision of new frequently purchased products includes three decision stages. The first stage is the first trial. The second stage is the decision to purchase the new product after an initial trial. The third stage is the decision to commit oneself to the regular purchase of the new product.

Although consensus is not met on the definition of the adoption stages (Rogers, 1962, 1971; Robertson, 1971; etc.) the three stage-schema can be very useful in the study of grocery products. Unfortunately, researchers have paid very little attention to all three stages. In fact, most of previous studies have been concerned with consumers' innovativeness, that is the earliness of reaching the third stage (Kleyngeld, 1974; Rogers, 1976; Midgley, 1978). For this study, a three-stage path of adoption decision process is considered.

Previous studies have established that the consumer decision to adopt a new product depends on their perception of the new product attributes, their own characteristics as well as their social interaction (Rogers, 1971; Robertson, 1971; Rogers, 1976). The role of these variables in predicting and explaining new product adoption varies with the product itself. For the case of food products, Ostlund (1974) found that, in the United States, the adoption of cake mix is possibly related to the relative advantage and negatively to the risk and the complexity that the potential adopters perceive. He also found that the more compatible is the food product to the adopter's beliefs and experiences, the more observable and the more trialable it is, the more likely it would be adopted.

In addition, the effects of perceived observability and trialability, as measured by their standardized discriminant function coefficient, were found to be very small. In this same study, product attributes were proven to be the better predictors of early adoption than were personal characteristics. In fact, only venturesomeness and socioeconomic status (measured by income, rather than by occupational status) were positively related to innovativeness.

Since grocery products, such as the one studied here, are generally observable and trialable, it could be expected that these two attributes will

have little impact on the new product adoption in nonindustrialized nations.

Midgley (1977) indicated that an individual's perception is a function of personal factors and product knowledge. Product knowledge refers to the "actual characteristics of the new product" (cost, function, etc.) as communicated to the individual by observation, the mass media, or interpersonal communication.

In the example of cake mix mentioned above, since most Americans can read and watch television advertising, product knowledge is acquired very quickly and easily. In the developing world, in contrast, where the literacy rate is very low and consumers are not experienced with so many brands as Americans, product knowledge may not be adequate. Thus, consumers of developing countries may perceive more risk and more complexity in new products than do their American counterparts. Educational level may then be a determinant factor for new food product adoption since it may facilitate product knowledge (Bettman and Park, 1980; Henry, 1980).

As listed by Robertson (1971, p. 103) factors that may affect the adoption decision include income, age, occupational status, number of children and social interaction. It is important to note, however, that studies on these factors, listed above, are so few that one can hardly infer their impact on consumers' adoption decision in developing areas.

As very little is known about grocery products in developing nations, it would be highly risky to design marketing programs for processed food products in those countries, based on findings presented above.

3. RESEARCH DESIGN

Model of Adoption Decision

The review of literature revealed that previous studies of the adoption process typically concentrated on consumers' innovativeness rather than the adoption decision. The characteristics of adopters were considered most frequently. New product attributes were considered most often in studies of the adoption rate. In a few cases (e.g., Ostlund, 1984), the perception of attributes was shown as an influence on the adoption decision. In the present study, however, both the perception of attributes and consumer characteristics are considered. Furthermore, in contrast to previous studies, three decisional stages of the adoption process are examined. In this section, the

variables affecting the consumers' decision to adopt new food products, shown in Figure 3.1, are presented in the form of hypotheses as follows:

- 1) The adoptive decision is positively related to the advantages the prospective adopter perceives in the new product. These advantages include the price, taste, smell, nutritiousness and appearance. The incompatibility of the new product to consumers' cultural values inhibits its acceptance.
- 2) The likelihood that a consumer adopts a new processed food increases with his or her information processing power, his or her household income level, his or her urban residency length, his or her status of venturesomeness and outside employment.
- 3) The likelihood that a consumer adopts a new processed food is positively correlated to the information communicated by other consumers.

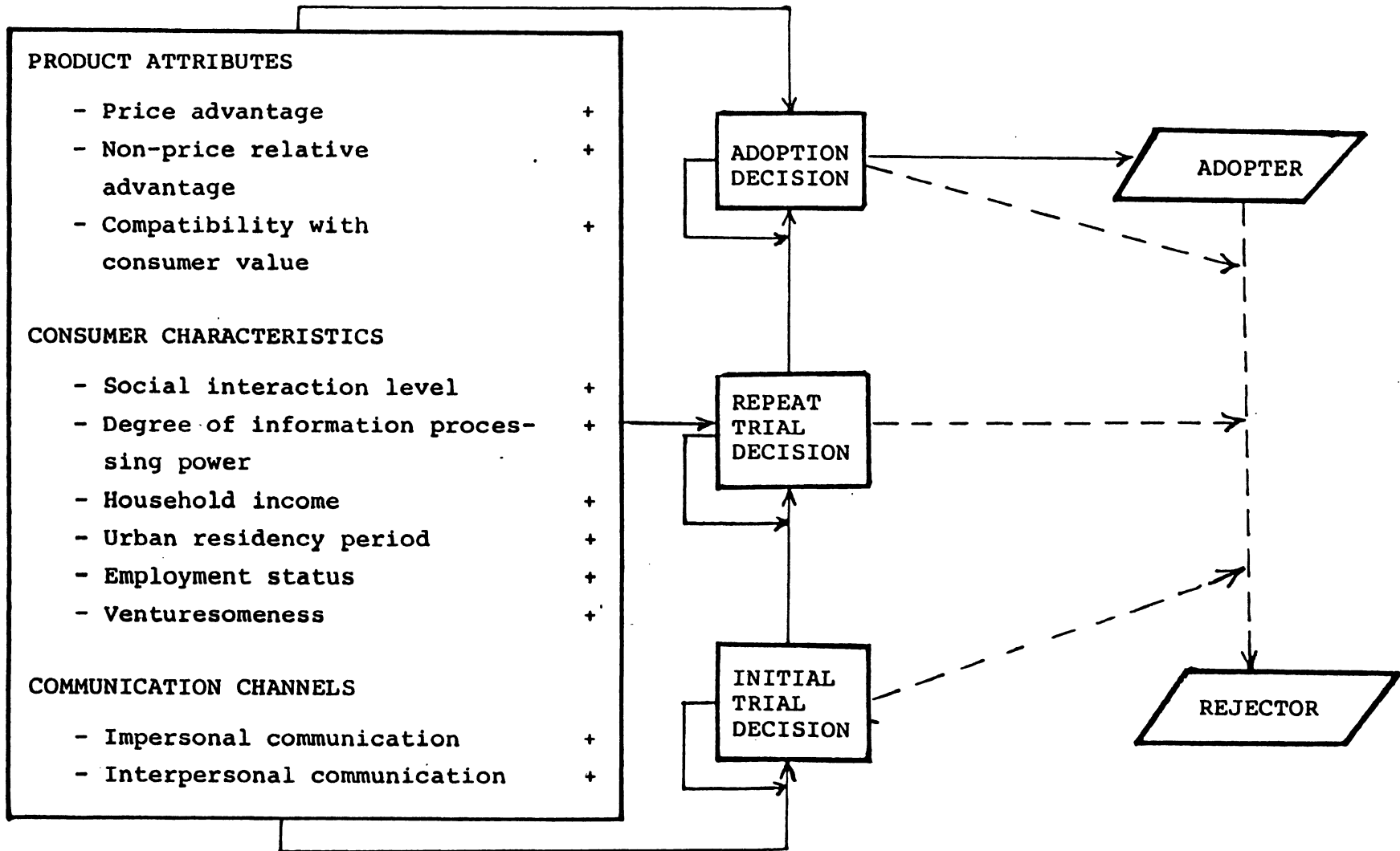
Most of the variables presented here have been extensively discussed in the literature on the adoption process (Kouassi, 1983). In this study, nevertheless, some variables are redefined as follows:

A) Information processing power is the basic knowledge acquired by the decision maker through formal education, through usage experience with similar products, and through professional experience, which enables him or her to understand information about the product. This study considers only the educational component of the consumer's information processing power (CIPP). In fact, for the product and the country selected, almost all decision makers would fall in the same category as far as professional and usage experiences are concerned. It is relevant to note that the food decision maker's educational level may not be correlated to the household income, since the food decision makers are not necessarily the head of the household.

The concept of CIPP is very important in considering the objectives of educating consumers about and promoting the new product. It puts the adoption decision on an efficient path in Paretian sense, whereas none of the parties involved is worse off. Well-informed consumers would make better choices. Producers may use the CIPP concept to reduce dissonance in the adoption process.

FIGURE 3.1

Model of New Food Product Adoption Decision



B) Social interaction refers to vicarious and verbal communication between consumers. A consumer who interacts with others would have more of a chance to learn about the new product, be influenced in the adoption decision, or influence other consumers than the consumer who does not communicate with others.

The impact of social interaction on the adoption decision is enhanced when dealing with sociability and social status products. In this research, a sociability product is defined as the one which is often used in social occasions or parties, such as lamb, chicken, and champagne in Ivory Coast urban areas. A social status product is defined as a product which gives the impression that the user belongs to a particular social group.

In this research four levels of social interaction are defined. These nominal levels are determined by the personal sources of information.

<u>Level</u>	<u>Sources</u>
1	Nobody
2	Salesperson
3	Friend or relative
4	Salesperson and Friend/Relative

C) The importance of the venturesomeness trait is its potential use in designing promotional programs for Third World countries. The positive relationship between venturesomeness, self-perception, and adoption would mean that the persuasion objective of the promotion program should be to encourage the consumer to repeat the use of the new product rather than to try it. In cases where no relationship exists, promotion programs which lure the consumer to try a new product are as important as coaxing the consumer into continuous use.

Research Methodology

Product Selection

The processed food product that is considered in the present study is Argentinean frozen beef. Initially distributed to the Ivory Coast urban market by two state-owned corporations (Agripac and Distripac), the frozen beef was subsequently distributed solely by Agripac following the merger of

these corporations two years after its introduction. At the marketplace this Argentinean frozen beef was called Agripac or Distripac beef. Although treated as a generic product by the distributor, consumers attached a brand name to the Argentinean beef, differentiating it from the local beef. After thawing, the Argentinean frozen beef was delivered to salespersons in the market.

The Argentinean beef exuded fluids. This phenomenon, generally attributable to the freezing/thawing process,¹ is called drip. The Argentinean beef contained more fat than the local beef. At the marketplace, Agripac salespersons sold the Argentinean beef exclusively. The Agripac beef was delivered to the salesperson wrapped in a material similar to bandages. The official price of the Agripac beef was lower than that of African beef. As reported by John Staatz (1980), the CIF price (cost, insurance and freight) of the Argentinean beef was much below the CIF price of the locally slaughtered beef. Most consumers were aware that Agripac beef was imported.

From discussions with Agripac officers, it became evident that consumers were not aware that the Argentinean beef was frozen for transport to the Ivory Coast. Information regarding the freezing process was not given to either the consumers or salespersons. Apparently, salespersons and consumers did not know that refreezing thawed meat may significantly increase its loss of flavor.²

Data Collection

The data used in this study were obtained from the personal interviews with 162 Ivory Coast households in the city of Abidjan as follows:

A) Some demographic data were obtained from a previous survey conducted by the statistical division of the Ivory Coast Ministry of Economics, Finance and Planning.

B) Additional demographic information and other data on new food product adoption were collected via a personal interview which utilized an open-ended questionnaire. A subset of 162 households was used for this purpose.

¹ M.G. Fenn, Marketing Livestock and Meat (Rome: FAO, 1977), p.59.

² M.G. Fenn, op.cit., p. 60.

The sampling method used consisted of selecting clusters of households around randomly selected points in the city. "Dwelling" was used as the household sample unit.³

The questionnaire was administered in the following way:

Two field enumerators called on each family approximately nine or ten times. The data from the first seven visits were used for another research project.⁴ During subsequent visits, open-ended questions were administered to the food decision maker regarding the adoption of Argentinean frozen beef. In order to encourage willing participation in the survey, respondents were occasionally offered small gifts such as glasses, cups, pens and pencils. In order to ensure the reliability of the data collected and to further encourage the respondents, the coordinator of the survey made personal visits to most households surveyed.

Data Analysis

In the data analysis, chi-square and rank order correlation methods are first applied; then logit functions of the new food product adoption decision are established, showing at each stage the weight or marginal contribution of each factor.

This logit analysis gives us the probability function of the adoption decision.

The basic concept of the logit approach is summarized as follows:

- Let P_i^j be the probability that a consumer i takes a decision j . Let Z_i^j be the consumer's utility for the decision j . Z_i^j is assumed to be a function of the new food product characteristics, the consumer's characteristics, and the communication channel used.

- Let $X_i = \{X_{ik}\}$ be the set of K characteristics affecting the consumer's decision, where the superscript has been omitted for reason of simplicity.

³"Dwelling unit" was used in order to take into account people who had a common budget and consumption but are not necessarily related. "Household" refers to all people living together and having a common budget.

⁴B. Kouassi, "Urban Consumption of Beef in the Ivory Coast," CRED Discussion Paper No. 109 (Ann Arbor: CRED, University of Michigan, 1984).

Then,

$$Z_i = a_0 + a_1x_1 + a_2x_2 = \dots + a_kx_k$$

For the logit method Z_i represents the logarithm of the odds, i.e.,

$$\text{Log} \left[\frac{P_i}{1-P_i} \right] = Z_i = a_0 + a_1x_1 + a_2x_2 + \dots + a_kx_k$$

or

$$P_i = \text{EXP} (Z_i) / [1 + \text{EXP} (Z_i)]$$

Using Z_i as dependent variable, the coefficients of the independent variables are estimated using the maximum likelihood procedure.

4. BIVARIATE ANALYSIS OF NEW FOOD PRODUCT ADOPTION DECISION

As previously discussed, consumers' decision to adopt new food products, follows three steps:

- the initial trial decision
- the repeat trial purchase decision
- the continued use decision

The aim of this section is to determine the variables that affect these decisions. Table 4.1 summarizes the results of the bivariate analysis.

Initial Trial Decision

One may state, as shown in Table 4.1, that only price and nutritiousness, among the hypothesized attributes, affect the consumers' decision to try the new foreign product. It is argued that the product's physical attributes were very similar to the existing ones (name, appearance, smell). The price advantage was cited by very few consumers as a major stimulus for their trial decision. The author contends that the product divisibility concurring to its low risk perception contributes greatly to that situation.

Neither income nor religion was accepted as an explanatory variable of the trial decision. The lack of explanatory power of income is attributable to the high divisibility of the product which lessened the nonperformance risk it bore and which allowed poor consumers to try it. Religion was not mentioned

TABLE 4.1 Summary of Bivariate Results

Hypothesis Number	Factors	Statistical Test Results					
		Initial Trial		Repeat Trial		Continued Trial	
		Sign	p-Values	Sign	p-Values	Sign	p-Values
1.	<u>Product Characteristics</u>						
	-Price	+	B	+	A	+	A
	-Nutritiousness	-	A	0	*	0	*
	-Taste			-	A	-	A
	-Appearance	0	*	0	*	0	*
	-Smell	0	*	0	*	0	*
2.	<u>Cultural Affiliations</u>						
	-Religion	0	N	0	N	0	N
	-Ethnic Group	0	N	0	N	0	N
3.	<u>Social Interaction</u>	+	C	0	N	0	N
4.	<u>CIPP</u>						
	-Education Level	+	A	0	N	+	B
	-Two Categories of Education	+	A	0	N	0	N
5.	<u>Urban Residency Length</u>	0	N	0	N	0	N
6.	<u>Employment Status</u>	+	B	0	N	+	B

TABLE 4.1 Summary of Bivariate Results (continued)

Hypothesis Number	Factors	Statistical Test Results					
		Initial Trial		Repeat Trial		Continued Trial	
		Sign	p-Values	Sign	p-Values	Sign	p-Values
7.	<u>Income</u>						
	-Total Income	0	N	0	N	0	N
	-Income per Capita	0	N	-	C	0	N
8.	<u>Venturesome</u>						
	-Venturesomeness	+	A	+	C	-	B
	-Novelty	+	A	+	A	0	*
9.	<u>Communication</u>						
	-Interpersonal Influence	-	A	0	*	0	*

Comments:

+ Positive Relationship
 - Negative Relationship
 0 No Relationship
 * Too few Cases

A: $P \leq 0.01$
 B: $0.01 < P \leq 0.05$
 C: $0.05 < P \leq 0.10$
 N: $P > 0.10$

at all. Seemingly, consumers found the Argentinean beef compatible with their religious beliefs because they trusted the importers (well-known enterprises) and the salespersons (mostly Moslem).

Finally, information processing power, social interaction, employment status, word-of-mouth message (evaluation), and venturesome nature of decision makers, were the only acceptable consumer-characteristic variables. Information processing power (CIPP) was found positively related to the trial decision. As said earlier, it helps the consumer to evaluate the new product objectively since the consumer is able to comprehend the information available. A word-of-mouth message is generally significant and the most influential factor. This may be due to the low risk involved at the trial decision. The gain or loss for a trial size is very small. The loss for nonperformance of the product is at most 20 percent of the daily food budget. Furthermore, a convenient substitute, such as sardines or fried fish, can be found no further from the trier's residence. Annual gains more than offset any anticipated nonperformance losses. It is, then, not surprising that most consumers tried the Argentinean beef, with the exception of those who were influenced by unfavorable experiences communicated by other persons.

The time factor, proxied by employment status, was found negatively related to the trial decision. It is argued that the educational factor of CIPP combined with the availability and communication of information at the outside workplace made consumers working outside the household more prone to try the new product. It is further argued that there may not be any important difference between both employment status categories of consumers, vis-à-vis shopping time resources. Additionally, as people working outside of the household do not have enough shopping time, they ordered the product without being able to see it before purchasing it. The unemployed buyers, however, having more shopping time, bargained in the open air market. They might have gotten a better deal on the West African beef than the posted price, offsetting the price differential between the Argentinean beef and the local beef. This bargaining technique was attempted during the price survey. The results indicated that the local beef, supposedly more expensive than Argentinean beef, was sometimes the cheaper item.

Interpersonal influence was confirmed to be more powerful than media. Point-of-sales sources (POSS) and consumers' word-of-mouth (CWOM) were the

most frequently used channels of awareness. Interpersonal communicated experience or CWOM did incite consumers to try or not to try the Argentinean beef.

Repeat Trial Purchase Decision

The statistical tests indicate, on the one hand, no significant difference between the Agripac Argentinean beef and the African beef with respect to nutritiousness, appearance and smell, which would entice purchase or nonpurchase of the Agripac beef after an initial trial. In accordance with respondents' reactions, no major difference regarding smell and appearance was noticed when both products were put side by side, except that the thawed Argentinean beef had more fat and looked more watery than the African beef. This slight difference in appearance, however, affected very few consumers (3% of respondents at this stage).

On the other hand, a major difference between the imported Agripac beef and the local beef with respect to the effect of their taste, nutritional value, and price on consumers' choice was found. The Agripac beef price was perceived advantageous enough to stimulate repeat trial purchases. Its taste, however, enticed about 50% of triers to reject it after one trial usage.

No relationship was found between the repeat trial purchases decision and the following socioeconomic variables: religion, social communication level, CIPP, length or urban residency period, employment status and income. There was no statistically significant interpersonal or impersonal influence on the repeat trial purchase decision. Nobody claimed to have been affected by the media. A small number of respondents were influenced by other consumers, but no further investigation of this matter was possible because the conditions for a statistical test were not met (expected cell frequency was too small). Venturesome-natured decision makers were found to be inclined to the trial purchase decision. As a matter of fact, the product novelty was a major stimulus for repeat trial purchases.

In accordance with findings regarding price and taste, the following is asserted. Even though unsatisfied with the taste of the Agripac beef, some consumers remain in the market for solely economic reasons. They wanted to benefit from the price advantage in the long run, believing that they could adjust to the taste of Agripac beef and that it could be improved by seeking ways of preparing it to enhance its flavor.

Commitment Decision

The commitment decision has been found positively related to the new product taste and price advantages. Price advantage was cited as the major stimulus for the commitment decision. Taste was cited as the main reason for rejection. When price and taste advantages follow opposite directions, the commitment decision is a trade-off between them. There was no perceptible difference between the Argentinean beef and the African beef regarding smell, appearance and nutritiousness which would affect the continued use decision. The rank order correlation coefficient between commitment decision and education level (grade) was significant for $\alpha = 0.05$. There was, however, no difference between decision makers who attended high school and those who did not. Furthermore, cultural affiliations, social interaction, length of urban residency and income were not found related to the commitment decision.

The lack of correlation between commitment decision and most demographic variables is explained by the low risks involved with this decision. In fact, no religious taboo forbids consumption of the Argentinean beef in the Ivory Coast. Furthermore, it is not a social product. Consequently, it bears no social risk. Agripac, the distributor, being a well known enterprise, enhanced consumers' trust regarding the impact of the new food consumption on their health. Obviously, users of its products perceived no physical (health) risk. Due to the divisibility of the Agripac beef, the perceptible financial loss that the users would incur in case of nonperformance (spoilage or bad taste) is small. Consequently, there was no need to follow the leaders, request information from an expert, or voluntarily teach friends what the product is about. There was no need to be hesitant about continuing to use it, once the physical characteristics of the new product have been perceived satisfactory. Even if the household income is low, the long-range financial gain could be substantial if the product is adopted. Venturesome consumers exhibited a slight tendency to withdraw from the market. A statistical inference of this result, however, is not advised since the required size of expected cell frequency set for this study was not met. Only a small number of respondents (9 out of 75) who made a decision on the continued use of the new product did not fall in the category of venturesome consumers. Product novelty was never mentioned as a stimulus for the continued use decision. Apparently there were no new substitutes in the market to draw venturesome consumers.

Consumers who were influenced by other consumers in early stages of the adoption process showed a statistically significant tendency to withdraw from the market. This situation was explained again by the poor performance of the product due mainly to its taste which did not improve since it was introduced.

Consumers employed outside the household were more prone to decide on continued use than others. It was argued that shopping time was not a major constraint to the continued use of the new product by employed decision makers, since they may purchase the new product through relatives, friends, or servants, contrary to what was anticipated. Moreover, working buyers may have been unable to bargain for a discount on the fresh meat price because of their limited grocery shopping time.

The positive correlation between educational level and commitment decision confirms the importance of CIPP in the adoption decision as discussed above. It is relevant to recall that grouping educational levels into two categories alters the results. Therefore, caution is suggested when analyzing adoption decision based solely on grouped educational data.

Summary of Findings and Discussions

In summary, considering the fact that the probability of new food product adoption at its introduction (conditional probability) is a function of all potential decisions involved in the adoption process, one may conclude that the likelihood of consumer adoption of a new food product at its launch is positively correlated to:

- its relative advantage of price, nutritiousness, and taste perceptions
- the level of the prospective adopters' social interaction
- the prospective adopters' information processing power
- their outside employment status
- the product novelty perception
- consumers' word-of-mouth evaluation

Taste and nutritiousness affected negatively the adoption of the Argentinean beef, since this beef was perceived as being inferior to the local beef with respect to taste and nutritional value. Smell and appearance did not affect consumers' decisions because the product used for this analysis was very similar to its substitute in these aspects. The distribution channels

used nullified the potential effect of culture and urban residency length. The high divisibility of the product allowed all income classes to try the new food product.

However, income per capita was found negatively correlated to the repeat purchase decision at $\alpha = 0.10$ for the following reason. In general, the new product taste was not approved, low per capita consumers may have been more inclined to consider its price advantage than others. No measurable media effect was found because there was no advertising. Meanwhile, word-of-mouth evaluations by either salespersons or consumers were delivered daily.

5. MULTIVARIATE MODEL FOR PROCESSED FOOD PRODUCT ADOPTION DECISION

This chapter is aimed at presenting the multivariate model for processed food product adoption decision including three steps: initial trial, repeat trial and continued use. To construct this model, logit functions are investigated for the explanatory and predictive validity of variables determined above. The stepwise logit method is used for the preliminary selection of predictors.

Initial Trial Decision

The stepwise logit analysis summarized in Table 5.1 suggests that the best-fitting model (model D1A) of initial trial decision is a function of the consumer's information processing power (CIPP), perception of the new product novelty (NOVEL) and nutritiousness (NUTR). Figure 5.1 indicates a good fit for the model. In fact, scatter plots of observed proportions against the predicted probabilities lies almost entirely on the 45-degree line. The 45-degree line represents the equality between the predicted and the observed probabilities.

The MLE (Maximum Likelihood Estimation) logit function of this model is presented as follows:

MODEL D1A:

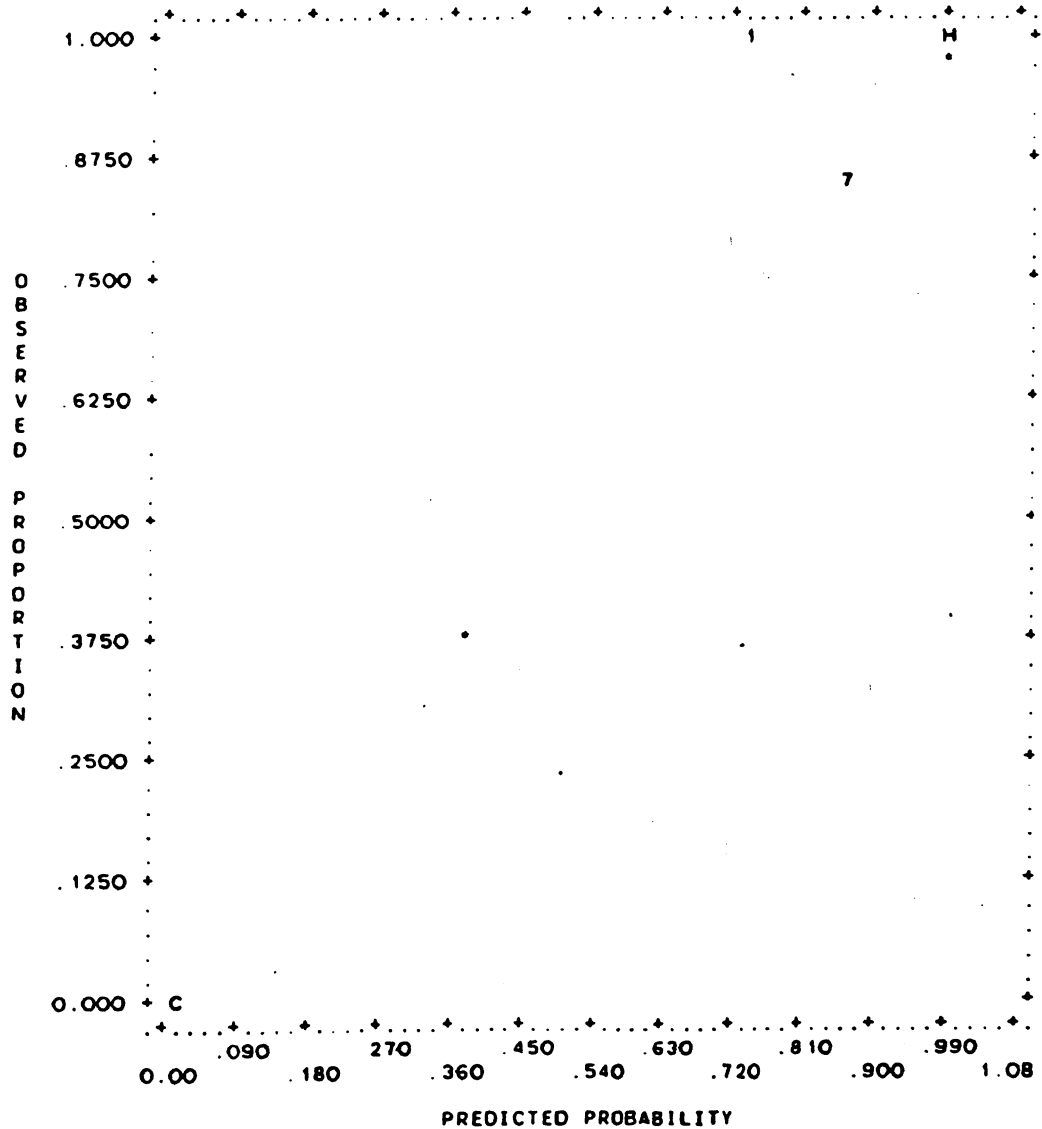
$$Z_1^1 = 1.42 - 1.638 \text{ NUTR} + 1.172 \text{ CIPP} + 2.418 \text{ NOVEL}$$

(1.47)	(-2.08)	(2.01)	(2.31)
[91.48]	[74.02]	[10.98]	[6.48]

FIGURE 5.1

Scatter Plots of the Initial Trial Probabilities:
CIPP, Novelty and Nutritiousness

EMPIRICAL PROBABILITY PLOT - CELL FREQUENCIES ARE PLOTTED (A=10,B=11...)
CELLS ARE FORMED BY ALL POSSIBLE COMBINATIONS OF VALUES OF VARIABLES
IN THE MODEL.



Below the equation, the figures within brackets represent the overall chi-square improvement and the figures within parentheses the t-ratios.

TABLE 5.1					
LOGIT ANALYSIS OF INITIAL TRIAL DECISION					
(n = 148)					
Model D1A Terms	Improvement			Coefficient	t-Ratio
	Chi-Square	df	p-Value		
Constant				1.42	1.47
Novelty	74.02	1	0.000	2.41	4.30
Nutritiousness	10.98	1	0.001	-1.63	-2.07
CIPP	6.48	1	0.011	1.17	2.09

Minimum expected cell frequency: 0.02
Number of expected cell frequency less than five: 6

In summary, novelty, information processing power, and nutritiousness provided best-fitting model of the initial decision. Price effect was dropped because its contribution to the chi-square improvement of the multivariate model was insignificant for a level $\alpha = 0.10$. This is attributable to high divisibility of the new product which allowed most households to make an initial trial. Interpersonal influence (CWOM or CWOMM) and outside employment status are not included in the multivariate function selected for the simple reason that they are highly correlated with other variables which yield higher explanatory and predictive power than they do. In addition, the sample size is too small to consider more variables than the ones suggested above.

Repeat Trial Purchase Decision

The stepwise analysis, summarized by Table 5.2, indicates that taste (TASTE), price (PRICE) and novelty (NOVEL) provide the best-fitted model (Model D2A). As shown by the t-ratios, the coefficients of taste, price and novelty are significant for $\alpha = 0.05$. The intercept is also statistically significant of $\alpha = 0.01$.

TABLE 5.2
LOGIT ANALYSIS OF REPEAT TRIAL DECISION
(n = 101)

Model D2A Terms	Improvement			Coefficient	t-Ratio
	Chi-Square	df	p-Value		
Constant				2.55	3.31
Taste	43.18	1	0.00	-0.97	-1.98
Novelty	4.09	1	0.04	1.72	2.65
Price	6.34	1	0.01	1.39	2.25
Minimum expected cell frequency: 0.01 Number of expected values less than five: 1.					
Model D2B Terms	Improvement			Coefficient	t-ratio
	Chi-Square	df	p-Value		
Constant				0.89	2.71
Taste	49.15	1	0.00	-1.91	-5.78
Minimum expected cell frequency: 4.00 Number of expected cell frequency less than five: 1					

FIGURE 5.2

Scatter Plots of the Repeat Trial Probabilities:
Price, Taste and Novelty

EMPIRICAL PROBABILITY PLOT - CELL FREQUENCIES ARE PLOTTED (A=10, B=11, ...) CELLS ARE FORMED BY ALL POSSIBLE COMBINATIONS OF VALUES OF VARIABLES IN THE MODEL.

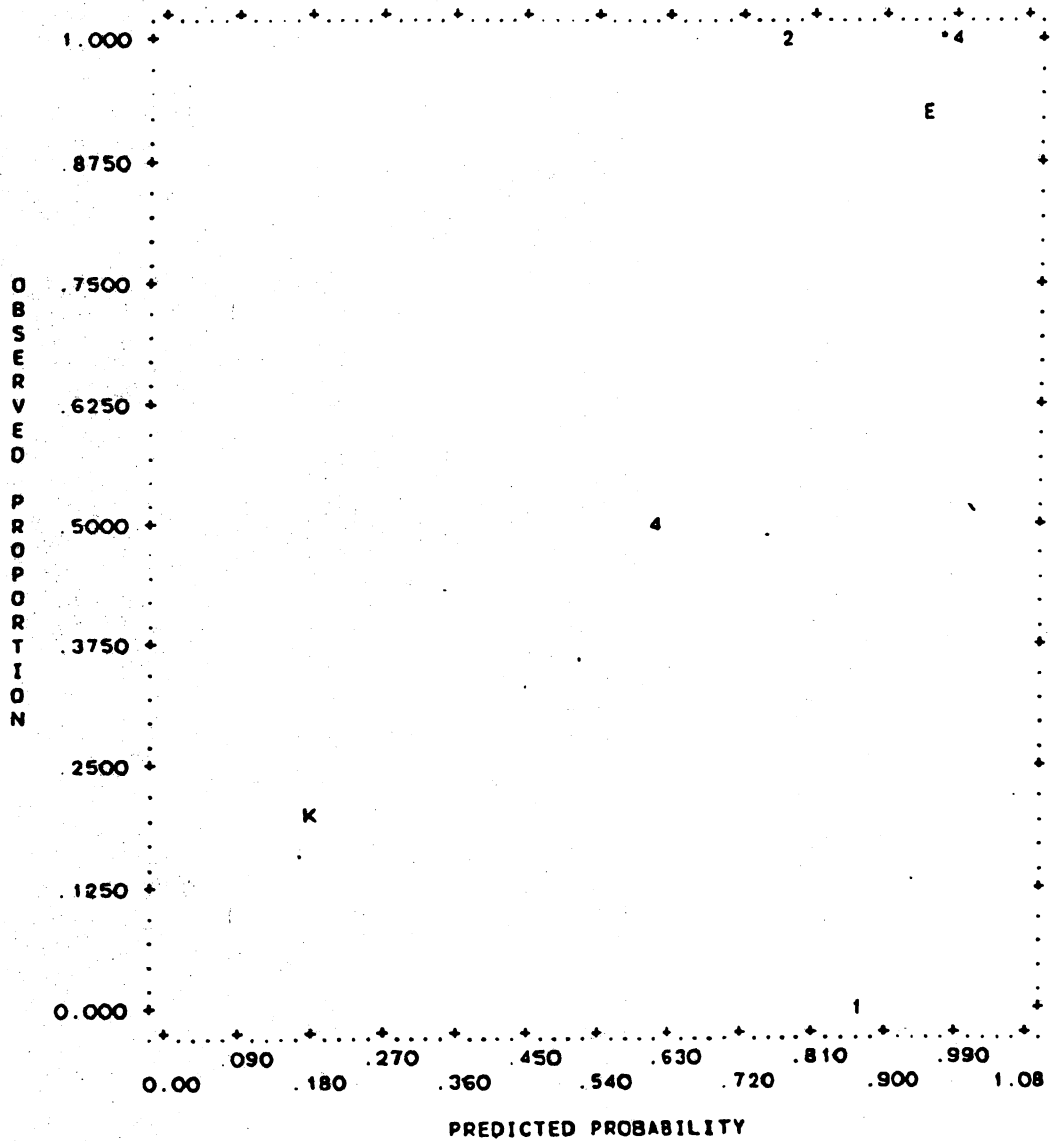
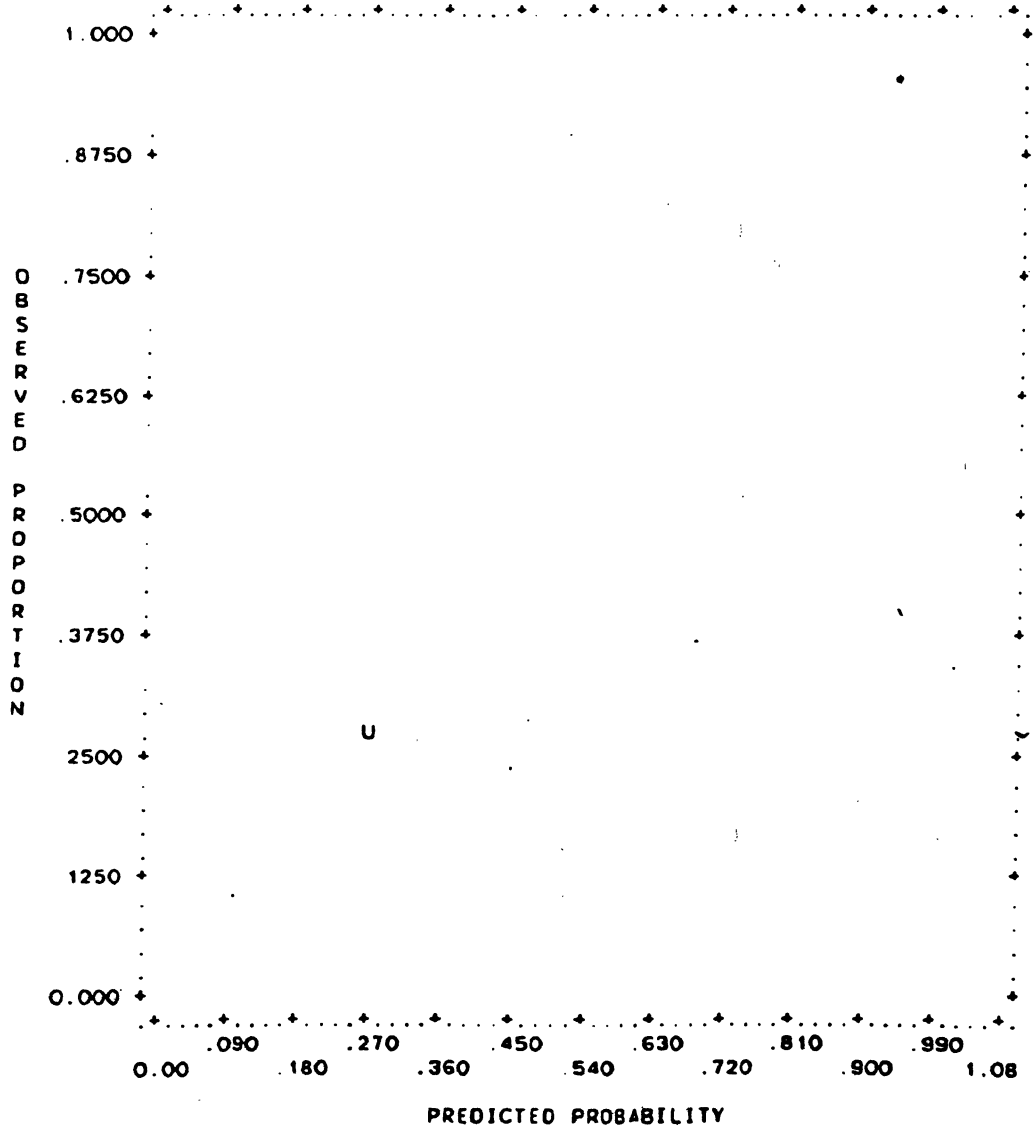


FIGURE 5.3

Scatter Plot of the Repeat Trial Probabilities:
Taste

EMPIRICAL PROBABILITY PLOT - CELL FREQUENCIES ARE PLOTTED (A=10, B=11, ...) CELLS ARE FORMED BY ALL POSSIBLE COMBINATIONS OF VALUES OF VARIABLES



It is important to note, however, that the number of cells whose expected values are less than five is quite a large number (11 out of 21). This implies that the sample size may be too small for a logit analysis including all three variables. A larger sample is needed for a meaningful investigation of the combined effect of taste, novelty and price on the repeat purchase decision. Moreover, taste alone contributes to 80 percent of the chi-square improvement (43/53). Price adds 11 percent (6/53).

Taking into consideration the statistical problems mentioned above, one may consider taste indifference as sufficient for explanation and prediction of the repeat trial purchase decision, though price and novelty considerations provide a statistically significant improvement of the model for $\alpha = 0.10$ ($X^2 = 10.4$, $df = 2$). As shown in Table 5.2, the intercept and the coefficient of the model (Model D2B) including only taste affect as predictor, are significant at a level $\alpha = 0.001$. This implies that consumers who were indifferent to the taste of the new food product had a tendency to purchase it on a trial basis.

Figure 5.2 represents the scatter plot of the first model, including novelty, price and taste as predictors. It appears that only very few points of the relational function between predicted probabilities and observed proportions do not fall on the equality (45-degree) line. Figure 5.3 shows the scatter plot of the model including only taste as explanatory variable. Here, only two points are observed, one of which falls on the 45-degree line, the other deviates slightly. Interestingly, in both cases, all points fall either on or very close to the equality line, confirming that both models provide a good fit of the data and that, as mentioned above, taste perception alone can provide a good prediction of the repeat trial decision. In fact, no combinations of independent variables other than the two cases above yield a better-fitting model than the one with taste alone.

The following are the mathematical expressions of both models:

MODEL D2A:

$$Z_1^2 = 2.55 + 1.72 \text{ NOVEL} - 0.975 \text{ TASTE} + 1.39 \text{ PRICE}$$

(3.31)	(2.65)	(-1.98)	(2.25)
[53.61]	[4.09]	[43.18]	[6.34]

MODEL D2B:

$$z_1^2 = 0.896 - 1.907 \text{ TASTE}$$

(2.71)	(-5.78)
[49.15]	[49.15]

In summary, apparently the best-fitting model of repeat trial decision included novelty, price and taste affects of the new food product. It was determined, however, that taste alone could be a good predictor of the repeat trial decision and the Model D2A bears statistical problems which require further investigation on a larger sample. The impacts of novelty ($X^2 = 4$) and price ($X^2 = 6$) on the model were relatively small.

Clearly, a consumer who was indifferent to the taste after an initial trial, would most likely make a repeat trial purchase based on either its price advantage or its novelty.

Income per capita is not included in multivariate model of repeat trial purchase decision for two reasons. Initially, it has a low marginal contribution to the chi-square improvement. Secondly, it is correlated to taste ($\alpha = 0.01$) which has a much greater explanatory power (chi-square improvement). Once taste is selected as a predictor, contribution of income to the model improvement became statistically insignificant for $\alpha = 0.10$.

The stepwise logit approach suggests that the best model includes only price effect as a predictor variable of the continued use decision. In fact, once price is in the model, no other variable yields a significant improvement of the chi-square goodness of fit.

Continued Use Decision

The odds function of the likelihood of continued use by a consumer, i , can be expressed as follows:

$$z_1^3 = -0.722 + 2.542 \text{ PRICE ADVANTAGE}$$

(-1.51)	(5.34)
[54.38]	[54.38]

TABLE 5.2
LOGIT ANALYSIS OF REPEAT TRIAL DECISION
(n = 101)

Model D2A Terms	Improvement			Coefficient	t-Ratio
	Chi-Square	df	p-Value		
Constant				2.55	3.31
Taste	43.18	1	0.00	-0.97	-1.98
Novelty	4.09	1	0.04	1.72	2.65
Price	6.34	1	0.01	1.39	2.25
Minimum expected cell frequency: 0.01 Number of expected values less than five: 1.					
Model D2B Terms	Improvement			Coefficient	t-ratio
	Chi-Square	df	p-Value		
Constant				0.89	2.71
Taste	49.15	1	0.00	-1.91	-5.78
Minimum expected cell frequency: 4.00 Number of expected cell frequency less than five: 1					

In summary, price alone explained and predicted the continued-use decision. Other variables which in the bivariate analysis were found significantly (for $\alpha = 0.10$) related to the continued use decision did not contribute significantly to the chi-square improvement once price was included in the multivariate model. In fact, there were two major determinants of the continued use decision. Price, on the one hand, stimulated favorably 90% of the continued use decisions. Taste, on the other hand, brought about two-thirds of rejections after repeat trial purchases. Obviously, consumers who did not object to the taste of the new food product would have a tendency to continue using it. Conversely, those consumers who were indifferent to the price advantage, had a tendency to reject it. In other words, the present case is a trade-off between taste and price.

Summary

Considering the above discussions, the likelihood that consumers decide to adopt a processed food product can be validly explained and predicted by their:

- perception of the product novelty
- perception of the product nutritiousness
- perception of the product taste
- perception of the product price
- level of information processing power.

The mathematical expression of the overall model of adoption decision is provided below. First, let P_i^1 , P_i^2 and P_i^3 be the probabilities that a consumer i makes respectively, an initial trial decision, a repeat trial decision and a continued use decision. Second, let A_i be the likelihood that i adopts the new product at its introduction. A_i can be expressed as follows:

$$A_i = P_i^1 \times P_i^2 \times P_i^3 = \prod_{j=1}^3 P_i^j \quad (\Pi \text{ is the multiplicative symbol})$$

As presented above,

$$P_i^j = \text{EXP}(Z_i^j) / [1 + \text{EXP}(Z_i^j)]$$

$$A_i = \prod_{j=1}^3 \left\{ \text{EXP}(Z_i^j) / [1 + \text{EXP}(Z_i^j)] \right\}$$

A_1 is obtained by simply applying to the functions Z_1^j the suggested results of the logit analysis summarized as follows:

$$Z_1^1 = 1.42 + 1.638 \text{ ANUTR} + 1.172 \text{ CIPP} + 2.418 \text{ NOVEL}$$

$$Z_1^2 = 0.896 + 1.907 \text{ ATASTE}$$

$$Z_1^3 = -0.722 + 2.542 \text{ APRICE}$$

Where ANUTR, ATASTE and APRICE represent the advantages of nutritiousness, taste and price.

These findings can be very useful to policymakers involved with marketing activities. It is advised, however, that great caution be exercised with respect to the sample size. When applying the logit approach to the early prediction of new food adoption, marketers should consider a test market sufficiently large to minimize the risk of occurrence of zero cells, which are not adequately handled by this method, especially when more than three predictors are considered.

6. CONCLUSIONS

The multivariate analysis suggested that novelty, nutritiousness and information processing power be considered as best predictors of the initial trial decision. Taste alone was selected for the repeat trial purchase decision and price for the continued use decision. In other words, the likelihood that consumers adopt a processed food product at its introduction can be explained and predicted by their information processing power and their perception of the product's novelty, nutritiousness, taste, and price advantages. In the case of the Argentinian beef, there was a trade-off between the inferior evaluation of the new product's taste and nutritiousness on the one hand, and the advantage perception of its price and its novelty on the other hand.

Clearly a new food product which is judged at least as nutritious and as tasty as the old one, would be overwhelmingly adopted if it is less expensive than its substitute. Unfortunately, the limits of product characteristics

trade-offs cannot be determined in this research. They will be, however, considered for further study.

Social interaction outside employment, interpersonal influence, and income per capita were not selected for the multivariate model because either their contributions were slim or they were significantly correlated ($P < 0.01$) to other variables yielding higher explanatory power than they did (chi-square improvement). For instance, as employment status and formal education were interdependent and since education was the most powerful decision predictor, employment status was dropped from the general trial decision model; as a matter of fact, most of the decision makers, having achieved at least seventh grade education, were employed outside the household.

Implications for Marketing Management

Findings of this research indicate that urban consumers of developing nations are open to new ideas and to processed food products as long as they believe that the new food product will provide a way of improving their well-being. As a result, business and public policymakers can sell them new ideas regarding food consumption, provided that they focus on what really affects urban consumers. The following are some recommendations which may be drawn from this study.

Firstly, taste and nutritiousness should be considered as important physical attributes of the new food product. Some of the multinational food corporations which have been criticized in recent years have been also very successful in these two aspects. For instance, during our survey we noticed in the market that some of their products, which were actually less nutritious than their substitutes, were overwhelmingly adopted for two reasons. First, because these products were introduced through food experts, they were perceived as the most nutritious; second, since they contained the highest sugar dosage, they offered a desirable taste.

Secondly, consumers may not be price-sensitive at the initial trial and the repeat trial decisions, as long as the product is divisible. It is, however, important to keep in mind that since low income is one of the major characteristics of developing nations, consumers of these countries are in general "deal-prone". Thus, a strategy which consists of reducing the new food product's price a few months after its introduction may promote new food

product acceptance. Increasing the price, however, may either reduce the number of adopters or their usage rate. Interestingly, a large number of adopters of the Argentinean beef mixed is with local beef or other local meat for the fresh meat flavor.

Thirdly, the use of traditional distribution channels for new food product introduction presents several advantages that marketing practitioners should not overlook. First, the open-air market is often the place where most of the grocery buyers meet. Second, it is the place where the word-of-mouth message spreads most rapidly. The use of this channel, however, requires cautious estimation of the economic order quantity, when storage facilities are lacking. Otherwise it may increase cost in either transportation or spoilage or both.

Fourthly, the promotional program of the new food product can be designed as follows: first, the initial target market should be the high IPP decision maker group of all income categories. Second, the message should focus on the novelty aspect and the strong physical attributes (e.g. taste and nutritiousness). If all the physical attributes are relatively less advantageous than those of the existing product, one may use the price and perhaps the place (availability). It is important, however, to remember that nutritional value and taste can be affected even if the new product is perceived as inferior in these aspects. Third, pamphlets and newspapers could be used for a short period of time during the introduction. Word-of-mouth and salespersons would carry the message across each city. In other words, an advertising campaign geared to high information processing power consumers can be effective but cheap.

Fifthly, public policymakers should recognize that trust in the distributors and price advantage affect very much the consumer's decision to adopt new food products. A public policy that would make a new food product less expensive than the existing one would boost the adoption of the new one. If such a policy, however, results in a relative price increase of the new food product, it may either reduce the number of adopters or their usage rate (or both). In the case where the producer has no local toxicological research facilities, government approval or the use of well-known facilities, during the distribution process or the promotion (or both), would enhance consumers' trust in the new food product and thus reduce their potential risk perception.

Implications for Future Research

The results of this study suggest that more research on new product adoption is needed in several ways.

First, longitudinal studies would complement this work. In fact, such studies not only are less affected by respondents' ability to recall activities involved in the adoption process, but also they would allow the data on the adoption decisions to be related to the diffusion of the new product. A data collection started at the introduction of the new food product would be highly useful.

Second, the role of consumers' information processing power on the adoption decisions could bring additional light in the study of Third World consumers. A positive relationship between CIPP and new product adoption would imply that in developing nations, marketers should introduce new products through high IPP consumers and at the same time instruct all consumers for early acceptance and good use of the new product. Referring to the recent issues on baby food formula, food and drug marketing is one of the areas where research on CIPP is most useful, since such work would show whether or not it is worthwhile to spend resources on consumers' education and how to educate consumers if necessary or useful.

Third, this research indicates that insights can be gained by using statistical methods appropriate to consumer choices such as the logit and probit techniques. These techniques should complement fairly the usual discrimination methods, such as multiple discriminant analysis (MDA) and multiple classification analysis (MCA) for better understanding of the choice process involved in the adoption decision.

Fourth, it is highly advised that replication of this study be conducted with other products and other developing nations for its potential contribution to an integrated theory of adoptive behavior and to integrated policies with respect to the introduction of new food products in developing nations.

Finally, the limits of trade-offs between physical characteristics of new food products and the price advantage should be considered for further investigation. Consumers in developing countries may sacrifice taste and nutritiousness for the price advantage, but to what extent do they? In other words, how sensitive to price are consumers of nonindustrialized nations in their decisions to adopt new food products?

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