SOME THOUGHTS CONCERNING THE MARKETING OF BRAZILIAN COFFEE IN THE UNITED STATES

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I - Introduction

This paper describes in analytical form certain conditions which affect the marketing of Brazilian coffee in the United States.

Some of the principal relationships discussed in this study are obtained from the interesting and valuable work of Antonio Delfim Neto and Carlos Alberto de Andrade Pinto as published in O Café do Brasil: Vinte Anos de Substituição no Mercado Internacional, Estudos Anpes Nº 3 (versão preliminar), Dec. 1965 - which hereafter is referred to as Anpes Nº 3. This present paper is not meant to provide a critique of the Anpes study but to offer some thoughts which in part, at least, were stimulated by that study.

First will be examined the conditions to be considered in maintaining Brazil's market share. Then is presented discussion of the desirability for Brazil to maintain a given market share and to form an independent marketing policy.

II - Maintaining Brazil's Market Share

We are not concerned now with what should be Brazil's market share but rather once the desired market share is determined how it can be maintained.

For simplification of analysis (and with only moderate divergence from reality), we shall consider that only three (basic) types of coffee are imported by the United States: Mild(1) (S), Brazilian (B), and African (A). According to the Anpes Nº 3 study, a certain mixture of Mild and African coffees provides an almost perfect substitute (in terms of quality) for Brazilian coffee. The relationship is: 1 unit of B = 0.7S + 0.3A.(2)

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(1) - Referred to in Latin America as "suave" coffee and exported principally by Colombia and the Central American republics.

(2) - This relationship is simplified from its more accurate expression: 1 B = 7SS + 25 A (Anpes Nº 3, p. 85).

If United States coffee roasters are motivated by profit then they must determine their coffee purchases (i.e. coffee imports) according to prices of available coffee inputs and corresponding revenues. Each combination of coffee inputs produces a certain coffee blend for which in turn there is a related demand schedule. Blends may be ranked according to consumer taste preference. The greater the consumer taste preference for a certain blend, the larger is the maximum sacrifice in other wealth which the consuming public is willing to forego collectively in order to obtain a given quantity of that blend of coffee. Thus the higher the consumer taste preference for a blend of coffee, the higher is the total revenue obtainable from sale of a given amount of coffee.

Because B can be duplicated by a specific mixture of S and A, this means that all possible blends can be composed of only S and/or A. Table I shows the range (based on steps of 1/10 change) of possible blends using S and A only (Column II) and the maximum possibility for substituting with B (Column III).(3) According to this table, blend Nº 4 of S and A can be completly substituted by B. Furthermore, it is seen that possible participation of B declines as the difference between the number of any other blend and Nº 4 increases, while moving along the range of blend numbers in one direction.

Column IV, of Table I presents the ordering of consumer taste preferences for the blends. This ordering was made arbitrarily for illustrative purposes and shows that blend Nº 11 has the lowest consumer taste preference number (therefore the lowest total revenue potential for a given quantity) while blend Nº 6 has the highest consumer taste preference number (therefore the highest total revenue potential for a given quantity). According to this set of preference numbers, consumers are indifferent between blends 5 and 7 and between blends 3 and 8. Correspondingly, total revenue obtainable from sale of a given amount of blend Nº 5 or blend Nº 7 should be equal and the same condition holds for blends 3 and 8.

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(3) - Substitution is based on the formula 1 B = 0.7S + 0.3 A.

TABLE I

POSSIBLE BLEND COMPOSITIONS USING COFFEE INPUTS S, A, and B

I Blend Number	II Blend Composition Without B		III Blend Composition With Maximum B	IV Number for Taste Preference
1	1 S	=	(no B)	3
2	9/10 S + 1/10 A	=	1/3 B + 2/3 S	5
3	4/5 S + 1/5 A	=	2/3 B + 1/3 S	6
4	7/10 S + 3/10 A	=	1 B	7
5	3/5 S + 2/5 A	=	6/7 B + 1/7 A	8
6	1/2 S + 1/2 A	=	5/7 B + 2/7 A	9
7	2/5 S + 3/5 A	=	4/7 B + 3/7 A	8
8	3/10 S + 7/10 A	=	3/7 B + 4/7 A	6
9	1/5 S + 4/5 A	=	2/7 B + 5/7 A	4
10	1/10 S + 9/10 A	=	1/7 B + 6/7 A	2
11	1 A	=	(no B)	1

Now let us turn to Figure I which portrays a possible situation for United States coffee roasters collectively. (4) Along the vertical axis of this figure are measured total cost and total revenue, while along the horizontal axis is measured the total quantity of the coffee roasted.

To begin our analysis, we assume that under existing conditions blend Nº 5 is the most profitable blend for roasters and is the one currently being produced at output rate OQ_2. Of course actually there is a variety of blends being produced simultaneously in the United States. Our simplifying assumption here that only one blend is produced at any one time does not condition the outcome of the analysis. Curve TR_5 is the total revenue curve with sale of blend Nº 5 coffee. Curve $(S + A)_1$ is the supply curve for blend Nº 5 when only coffee inputs S and A are used (i.e. according to the combination shown in Column II, Table I for blend 5). Curve $(B + A)_1$ is the supply curve for blend Nº 5 when the only coffee inputs used are B and A, e which are combined in the appropriate ratio shown in Column III of Table I.

As seen in Figure I, at small output rates only coffee imput combination S and A is used, i.e. when all points on curve $(S + A)_1$ are lower than the lowest point on curve $(B + A)_1$. For output rates in excess of OQ_1 ⌊ i.e. that output rate where the related point (F) on curve $(S + A)_1$ equals the minimum point on curve $(B + A)_1$ |, it is cheaper to obtain the part of production additional to OQ_1 through exclusive use of imput combination B and A ___ while the slope of curve $(B + A)_1$ remains flatter than the slope of curve $(S + A)_1$ (past point F). EFG is the minimum total cost curve which is formed by sliding curve $(B + A)_1$ horizontally until the lower and of that curve touches point F on curve $(S + A)_1$.

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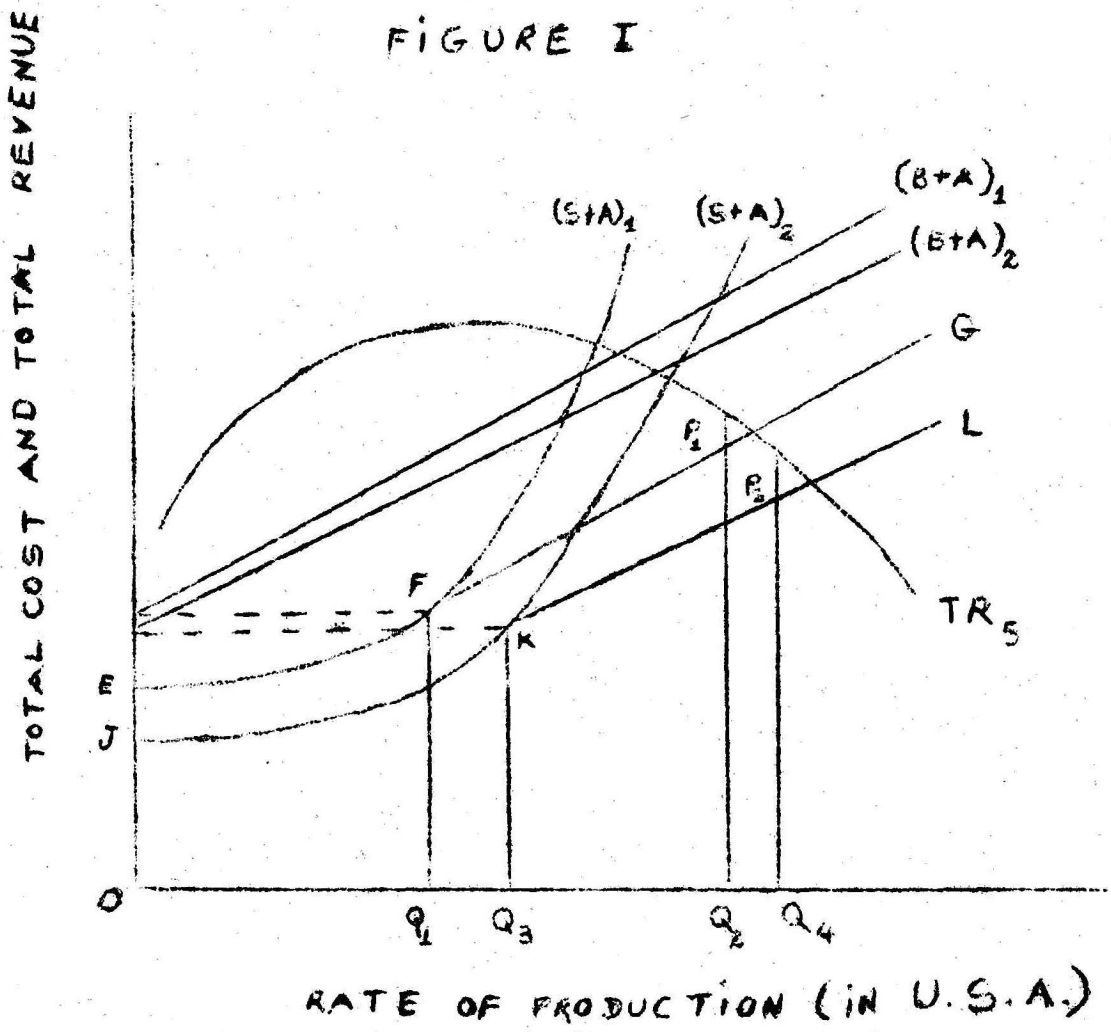
(4) - Figure I was drawn in accordance with the description (of the United States market) provided in Anpes Nº 3 - i.e. Brazil is the residual supplier, and the total United States demand for coffee is relatively inelastic with respect to price.

FIGURE I


TOTAL COST AND TOTAL REVENUE
(S+A)1
(S+A)2
(B+A)1
(B+A)2
G
L
TR5
P1
P2
F
K
E
J
O
Q1
Q3
Q2
Q4
RATE OF PRODUCTION (IN U.S.A.)

Thus according to curve EFG we find that at output rate OQ_2 the combination of coffee inputs to minimize costs should be: OQ_1 (3/5 S + 2/5 A) + Q_1Q_2 (6/7 B + 1/7 A). In other words, that part of the output which equals OQ_1 is provided by the blend 5 combination of S and A (i.e. 3/5 S + 2/5 A) while the remainder of the output, Q_1 Q_2 is provided by the blend 5 combination of B and A (i.e. 6/7B + 1/7A). In summary, the quantitative participation of each coffee input is: S = 3/5 OQ_1, B = 6/7 Q_1 Q_2, and A = 2/5 OQ_1 + 1/7 OQ_2. Import quantities would equal these amounts plus the respective weight decreases which occur from processing in the United States.

Next let us imagine that, because of an increase in supply of A, the price of A declines. With respect to producing blend 5, the input supply curves will shift to their new positions of $(S + A)_2$ and $(B + A)_2$. The new minimum total cost curve now becomes JKL. The rate of output is increased from OQ_2 to OQ_4 and the collective profit has changed from P_1 to P_2. As costs fall proportionally, output will increase if roasters continue to follow the same profit objective, e.g.: maximization of individual profit, or maximization of sales with a profit constraint, or allowing the maximum profit which still discourages entry of new suppliers, etc.

However, as illustrated in Figure I, the supply curve for combination S and A declines more (actually for blend 5 by 2.8 times - see Table II) than the supply curve for combination B and A, with a given fall in price of A. This unequal decline in supply curves results because the participation of A is larger in the combination with S than in the other combination with B. Thus there is a shift to using more of combination S and A relative to combination B and A (although use may increase absolutely for both combinations S and A, and B and A). OQ_3 and Q_3 Q_4 represent the new participations of combinations S and A, and B and A, respectively. Because the ratio of the fixed combination B and A to total production has fallen, the ratio of B to total production also must have fallen.

This means that there is a decline in the market share of B.

If B is to maintain its former market share, the question is: how much must the price of B decrease in order to stimulate use of combination B and A sufficiently to achieve this objective (?).

TABLE II

DECLINES IN COSTS OF COMBINATIONS S AND A MEASURED AS MULTIPLES OF CORRESPONDING COST DECLINES OF COMBINATIONS B AND A - WHERE THESE DECLINES RESULT FROM A FALL IN PRICE OF A.

Blend numbers	Number of times greater are the cost declines of combinations S and A than combinations B and A
5	2 4/5
6	1 3/4
7	1 2/5
8	1 9/40
9	1 3/25
10	1 1/20

The larger the desired share of B and the relative increase in use of the other combination, the larger must be the fall in price of B. If under the situation being presently described the desired share is 40%, then the fall in price of B must be such that the overall increase in total output equals 1.467 times the increase in use of the other combination (i.e. S and A).

With reduction in price of B, the curve (B + A) falls so that the segment of the minimum total supply curve belonging to curve (S + A) is shortened while the rate of output is increased. In Figure I, this means that the point $_3$ (showing maximum participation of combination S and A) moves to the left while the point at $_4$ (showing rate of total output) moves to the right. Thus it can be seen that in addition to the factors already mentioned, the degree of change required for the price of B depends upon the slopes of curves $(S + A)_2$, TR_5, and the resulting (B + A) curve.

The immediate foregoing description has considered only production of blend 5 coffee. It appears likely that a significant fall in the price of one coffee input could cause (eventually) a change of blend in order to allow even greater use of that input. Referring to Table I, we note that as the price of A falls the tendency will be to move from blend Nº 5 to a higher numbered blend and that the higher the blend number (after 4), the smaller is the share of B which can be combined with A.

For example, starting with blend 5 and a fall in price of A it may become profitable for roasters to change their blend to Nº 6 or to Nº 7. Geometrically, a comparison of these two alternatives would be as follows. With blend 6, the total revenue curve is higher and the minimum total cost curve is lower than the corresponding curves for blend 5. With blend 7, the total revenue curve is the same as the total revenue curve for blend 5 (because the consumer preference numbers are identical), while the minimum total revenue curve is lower than the corresponding curve for blend 6. Thus, in chosing between blends 6 and 7, the one situation of lower cost and lower revenue (i.e. blend 7), must be weighed against the other situation of higher cost and higher revenue (i.e. blend 6).

In actual practice, with a fall in price of A, the decision of the roasters will not be limited to chosing between only blends 6 and 7 but will depend upon the revenues and resulting changes in costs of all blends numbered 5 and above. Similarly a rise in the price of A will open for consideration use of all blends

numbered 5 or less.

The preceding discussion provides a possible explanation of the manner by which there has occurred a decline in Brazil's participation as a supplier of coffee to the United States. As the price of African coffee has fallen, and assuming that the initial blend corresponded to our number 4 or higher, there has been a decrease in Brazil's share for two reasons:

1) - within each blend it has become relatively cheaper to use more of combination S and A than combination B and A - because with decline of the price of A, the resulting fall for each blend is greater for cost curve (S + A) than for cost curve (B + A) (see Table II); and
2) - the incentive is to switch to higher numbered blends - in order to substitute with the African coffee, which thereby reduces opportunity for use of Brazilian coffee.

We can see now that the problem with respect to participation of B then becomes: with which blend are we to maintain the market share (?). For any given change in the price (s) of other coffee inputs, the corresponding price policy for B would differ for the blend (s) under consideration. For example, with a given fall in price of A the necessary change in price of B required to provide B with a fixed percentage of the market will vary according to:

1) - the blend which would result without the change in price of B and
2) the blend in which the desired share of B is to be maintained (for it certainly can be in Brazil's interest to encourage a change in blends).

The necessary adjustment in price of B depends upon determination of these blends and, as we have seen, upon the related cost and revenue schedules.(5)

III - Desirability for Brazil to Maintain a Market Share

First let up accept as fact that the United States elasticity of demand with respect to price for coffee has the

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(5) - It therefore seems that one specific formula with predetermined weights (such as is provided in the Anpes Nº 3 study) cannot always (and most likely, might only occasionally) maintain a given market share for Brazil without including changes in supply and revenue schedules according to blend changes.

numerical value of – 0.4 (Anpes Nº 3, p.82). Under this situation if all coffee imported is homogeneous and export supply schedules of competitors are fixed. Brazil should supply 40% of United States coffee imports in order for Brazil to maximize its total gross revenue from exporting coffee to that market. If the unit cost of exportation equals the unit cost of storage in Brazil – and coffee must be either stored or exported – then maximization of total net export revenue is acheved with maximization of total gross export revenue. When the unit cost of exportation is greater (less) than that of storage, the market share realizing Brazil's maximum net revenue will be correspondingly smaller (larger) than 40% (6) (7)

In the preceding paragraph and in Part II of this paper we employed the expressions "market share" and "participation" without (purposely) defining their relevant meaning(s). We have been referring to Brazil maintaining a certain percentage of the United States coffee market – but this percentage might refer to either physical quantity or total revenue. Only if all coffee is homogeneous (or at least accepted in the market as such) can we assume that the percentage Brazil supplies of total United States coffee imports equals the percentage Brazil receives of total United States expenditures for coffee imports. Obviously U.S. coffee imports are not homogenous, as indicated by the fact that coffee is classified by type, for each of which there is a certain (and often separate) price.

Brazil exports coffee in order to obtain foreign exchange revenue. The possibilities of maximizing this revenue (in net form) should determine Brazil's export policy with respect to coffee.

Probably under most conditions, if Brazil is maximizing revenue from exporting coffee to the United States, Brazil's share of total expenditure on coffee imports by the U.S. would not equal Brazil's share of total physical quantity of U.S. coffee imports.

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(6) - The Anpes Nº 3 study employs 39% as Brazil's optimal market share (p.124) but the derivation of this percentage is not specifically explained.

(7) - Under the condition of given coffee stocks and where this coffee if not exported must be stored then net revenue from coffee exports to the United States is maximized when gross marginal export revenue equals the net marginal cost of exportation (i.e. the difference between storage and export costs). When cost of storage exceeds that of exportation the net marginal cost of exportation is negative so that at rates of exportation above 40% the resulting loss of gross revenue may be more than offset by the resulting decrease in total cost. In this case, Brazil's optimal market size would be larger than 40%.

Once Brazil's optimal share of total expenditure is established for a given set of market conditions, then it is this share which should be maintained - not (as indicated by the Anpes study) the quantitative share. Of course there is some quantitative share which is related to the desired revenue share. With changes in market conditions - particularly with blend variations - it seems unlikely that the former quantitative share could yield the same revenue share - even if the relevant price elasticity does not change.

Next let us turn to examine briefly the significance of the elasticity assumption, i.e. United States total demand for coffee has a -0.4 elasticity with respect to price. One of three conditions can be defined by this assumption.

1. Constant point elasticities. For every total quantity supplied, the price elasticity of demand is the same; or geometrically, every point along the United States demand curve represents an elasticity equal to -0.4. This does not mean, however, that total revenue is the same at each point. Rather, as the total quantity of coffee being supplied is reduced, total revenue is increased. Carrying the assumption of this constant point elasticity to its illogical extreme would mean that maximum total revenue is derived collectively by coffee exporters when the United States imports only one unit of coffee. Obviously such a result is unrealistic - leading us to assume that the United States price elasticity of demand varies (eventually) with changes in quantities supplied, i.e. elasticity rises (falls) as the total quantity decreases (increases).

However, maybe because of pressures from coffee roasters and/or consumers, competitive conditions among coffee exporters, and possibly institutional arrangements peculiar to the coffee industry; coffee is imported into the United States only in quantities corresponding to the range of U.S. demand having constant point elasticities - and that these equal - 0.4.

In this case, Brazil can increase its total foreign exchange revenue from exporting coffee to the United States by:

a) - Applying some persuasion so that there is a reduction in the total supply of coffee going to the U.S. while Brazil retains a 40% share of the market (i.e. 40% of total U.S. expenditure for coffee imports); or

b) - If other suppliers are only willing to reduce their coffee exports to the U.S. relatively less than Brazil's it can still be advantageous for Brazil to accept less than 40% of the market.

2. Arc elasticity. The range of price variation resulting from a given change in physical quantity may represent an arc elasticity of demand equal to - 0.4. For such an arc the point elasticity at the upper end (representing the higher price and smaller quantity) is larger numerically than the point elasticity at the lower end of the arc. Therefore, with an arc elasticity - 0.4 the optimal market shares for Brazil will differ according to the total quantities supplied and the reactions of competing suppliers to changes in the quantity supplied by Brazil.

Given only the arc elasticity between two points on the U.S. demand curve for coffee, we cannot say which point along that arc might represent maximum total revenue for all suppliers collectively or which point is best for Brazil.

3. Single point elasticity. It may be that for only one specific rate of total supply is the U.S. elasticity of demand equal to - 0.4 Although 40% (or some other fixed share) might represent the optimal share for Brazil under this particular situation, a reduction in Brazil's share could increase Brazil's total revenue. Total revenue for all suppliers collectively is maximized when the elasticity of demand is unitary. By reducing its exports, Brazil can decrease total supply to the U.S. and thereby increase total revenue until unitary elasticity is reached. It pays Brazil to force such a move if reaction from competitors does not eliminate Brazil's gain. For example, Brazil's coffee export revenue (from the U.S.) is higher with 33% of the market where the price elasticity of demand equals 1 than with 40% of the market where the price elasticity of demand equals - 0.4. In this example, it means that for Brazil to be successful from a unilateral reduction in its exports, other coffee exporters can only obtain 7% more of the market in response to the price rise occasioned by Brazil's action.

From the foregoing discussion it appears that Brazil's policy for exporting coffee to the United States should not be limited only to the assumption of one numerical value for the price elasticity of U.S. demand for coffee and possibly therefore to the maintenance of a specific market share - which might well cause Brazil to lose potential foreign exchange revenue.

IV - Plan for Forming Marketing Policy

The crux of the problem in forming an appropriate marketing policy for Brazil concerns predicting and influencing actions of competing suppliers. Inablity of suppliers to agree upon, and particularily to adhere to, a unified system of coffee exportation has prevented full exploitation of the United States market. Full exploitation here means obtainment of the maximum amount of coffee revenue within the limits which might be imposed by adverse reaction from the U.S. Government and consumers.

Past experience has shown the unreliability of international cooperation in such a venture. For this reason it seems that Brazil should adopt an independent strategy for marketing coffee in the United States. Any such strategy will be influenced by the country's time preference - as decided by the responsible officials. This time preference will determine whether certain short-run gains in export revenue should be achieved at the expense of later losses of potential revenue, etc.

The Anpes study stresses maintenance of the market share through competitive price adjustments. This goal may imply a longer time preference (i.e. a lower discount rate) than was desired by the officials who formed the marketing policies, which are criticized in the Anpes study. If this is the case, then the criticism might better have been directed against the choice of time preference rather than against the policies chosen

According to some of the thoughts presented in this paper, it seems that reliance solely upon price competition will not yield a satisfactory solution for Brazil. One serious problem, described in Part II, is the coffee input composition of blends. We saw in our example how the nature of available and competing input compositions works to Brazil's disadvantage when the price of African coffee is reduced. In order to overcome this disadvantage, it is suggested that Brazil try to modify the quality of its coffee.

Depending upon related cost and revenue conditions, Brazil should consider providing (or at least, threatening to sell) large quantities of coffee equal to blend combinations other than 7/10 S + 3/10 A (our blend Nº 4). This means that Brazil would compete through the possible simultaneous changing of both prices and input combinations.

For example, it may be advantageous for Brazil to counter a price reduction of A by placing in the market another quality of Brazilian coffee (e.g. equal to 4/5 S + 1/5 A) which offsets (and more) the increased advantage of using A. By providing such a coffee with the proper price incentive to roasters - or by only threataning to do so -, Brazil might restrict entry of A and force the suppliers of A to adhere to a certain marketing policy.

It is realized that Brazilian coffee is not homogeneous and that some blends of S and A can presently be duplicated with different types of Brazilian coffee. What is advocated here is that a detailed study be made of the full range of substitutability possible with Brazilian coffee - in terms of total quantity available now and in the future with related costs. Such a study would include possibilities for producing Mild and African types of coffee in Brazil. The costs of production (or maybe only the additional costs over the present use of the related resources) could be compared with the revenues to be derived from different tactics of marketing Brazilian coffee and different responses which Brazil could make to price changes of A and S coffees.

Brazil should be armed with a complete plan of strategy and the full capabilities for carrying out rapidly any part of that plan. The plan would aim at the closest possible attainment of Brazil's overall marketing objective(s) - which might be: maximizing the present value of net revenue from coffee exports to the Unites States (according to the accepted time preference). Because of the pre-determined plan and available stocks of relevant types of coffee, Brazil could react swiftly through price and blend changes to new situations in the market and thereby counteract adverse forces from other suppliers.

Brazil's position in international bargaining is strengthened once it becomes known that Brazil will react automatically (according to the plan) to undesired actions by other coffee suppliers. Threat of strong and swift reaction by Brazil will help enforce international agreements. It should be realized that Brazil's responses are not aimed at saving any particular international marketing agreement but are aimed solely at safeguarding Brazilian interests. Therefore, if competing suppliers violate an agreement, Brazil's reaction would not be restricted by the conditions of that agreement.