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GLOBAL MARKET SEGMENTATION FOR VALUE-ADDED AGRICULTURAL PRODUCTS

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HIGHLIGHTS

Although the United States exports large volumes of agricultural commodities, there is much faster growth in trade of value-added products. As markets for traditional agricultural commodity exports mature and world consumption and trade of value-added agricultural products increase, considerable interest in identifying growth markets for value-added agricultural products has developed. Most research on prospects for agricultural trade in value-added products has relied on using past growth to predict future growth for individual countries. However, comparisons across countries, rather than for individual countries over time, may be of greater value in marketing decisions. Past studies may, for example, understate the potential of a future customer if it is not currently a customer.

This report identifies global market segments for value-added agricultural products, by clustering countries with like characteristics. Twenty-six variables are selected as potentially affecting consumption and trade of value-added products. The variables include economic and trade variables such as gross domestic product, export, and imports, but also includes variables that affect total and value-added food consumption, such as calorie consumption, age distribution, media availability, and female labor force participation. The 26 variables are analyzed in a factor analysis and the resulting factor scores are used in a cluster analysis of 119 countries, using the latest year of complete data, 1989. Results for ten clusters are reported and discussed.

The ten clusters have practical considerations for trade in value-added agricultural products. Knowledge of these market segments can aid in developing market strategies for different clusters. Countries with little potential for growth in value-added product consumption can be targeted with commodities or intermediate-value goods. Countries that have the greatest potential for future growth in consumption of value-added trade can be targeted for further analysis. Development of a successful marketing strategy requires many additional considerations, including product formulation, global competition, choice of entry mode, logistics, and tariff and non tariff barriers.

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INTRODUCTION

Market segment identification is an essential component of international market development, particularly for value-added agricultural products. Market segments are defined as groups of consumers who are expected to have similar purchasing responses. Segment identification can assist in selecting markets to target, an effort that enhances the probability of success. Knowledge of segment characteristics can also guide decisions related to product form and distribution. A first step in identifying global market segments is to group the global market into countries with similar characteristics.

Although the United States exports large volumes of agricultural commodities, there is much faster growth in trade of value-added products. As markets for traditional agricultural commodity exports mature and world consumption and trade of value-added agricultural products increase, considerable interest in identifying growth markets for value-added agricultural products has developed. Many countries (e.g., Canada, Australia, the U.S., and the EC) have expanded exports of value-added agricultural products through a combination of public and private strategies.

Most research on prospects for agricultural trade in value-added products has relied on using past growth to predict future growth. The Foreign Agricultural Service (FAS), for example, estimates the best growth markets for total U.S. agricultural exports to individual countries based on eight trade and macroeconomic variables, such as past growth in total agricultural imports to that country, past growth in total agricultural imports from the U.S., and projected income growth and population change (FAS, 1991). Similarly Salvacruz and Reed (1993) predicted the growth rate of U.S. agricultural exports to individual countries based on nine trade and macroeconomic variables. Lee et al. (1991) provided an empirical comparison analysis of value-added wheat and beef product exports to middle-income developing countries.

Comparisons across countries, rather than for individual countries over time, may be of greater value in marketing decisions. The above studies may, for example, understate the potential of a future customer if it is not currently a customer. Most research (e.g., FAS, 1991; Salvacruz and Reed, 1993) also bases predictions on total agricultural imports without considering the commodity or the extent of processing. Markets for individual commodities or products may differ greatly, though.

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Marketing literature provides many examples of market segmentation research and numerous bases for segmentation have been proposed (Dickson and Ginter, 1987; Dillon and Mulani, 1989; Green and Krieger, 1991; Grover and Srinivasan, 1987; Kamakura and Russell, 1989). One technique commonly used in domestic market segmentation is cluster analysis. Cluster analysis groups objects by minimizing the within group differences and maximizing between group differences. Cluster analysis is often based on consumer attitude towards the products, perceived benefits, purchase propensities, lifestyle, or demographics (Punj and Stewart, 1983; Wind, 1978).

There are few examples of market segmentation for food products in the literature. One example is provided by Funk and Phillips (1990). They evaluated the usefulness of consumer profiles in aiding advertisers develop promotional strategies for eggs. Several examples, developed by consumer information and market research companies, are provided by Asp (1992) who discusses schemes for segmenting the United States. Although there has been limited attention to market segmentation specifically for food products in the literature, agribusinesses use segmentation to develop marketing strategies for domestic consumers. Two such examples are Pillsbury's "What's Cookin" lifestyle segmentation that divides the U.S. population into five segments based on eating behavior and Coca-Cola's segmentation of food shoppers into six groups (Asp, 1992).

Only a few cluster analyses of global markets have been done (e.g., Berlage and Terweduwe, 1988; Day et al., 1988; Huszagh et al., 1986; Sethi, 1971; Sriram and Gopalakrishna, 1991). Day et al. (1988) segmented the global market for industrial goods, which they identified as the first attempt to identify global industrial market segments, clustering 96 nations, based on 18 economic, demographic, and trade variables. Berlage and Terweduwe (1988) did a cluster analysis of 102 countries, using 20 variables on income, growth, structure of production, health, and financial flows, to determine the rigor of various organizations' (e.g., World Bank, United Nations) classification of nations in development stages. Sriram and Gopalakrishna (1991) segmented 40 countries to identify groups of similar countries that could be targeted with standardized advertising.

The purpose of this paper is to identify global market segments for value-added agricultural products. This paper follows earlier research in clustering countries based on economic and trade variables such as gross domestic product, exports, imports, etc. However, this research is distinguished from earlier research by including variables that affect total and value-added food consumption, such as calorie consumption, age distribution, media availability, and female labor force participation. Twenty-six variables, selected as potentially affecting consumption and trade of value-added products are analyzed in a factor analysis. The resulting factor scores are used in a cluster analysis of 119 countries, using the latest year of complete data, 1989. Results for ten clusters are reported and discussed.

METHOD OF CLUSTER AND FACTOR ANALYSIS

Cluster Analysis

Cluster analysis groups objects, as defined by selected variables, such that the within group variance is minimized and the between group variance is maximized.[1] Cluster analysis can be used to comprehend data more clearly or to aid in subsequent analysis (Kruskal, 1977). For example, once clusters with similar characteristics are identified, separate analysis may be performed on each cluster.

Most clustering methods are based on a hierarchical clustering procedure where each observation begins in a cluster by itself. Then, the two closest clusters are merged to form a new cluster and so on. Clustering methods differ in how the distance between two clusters is computed. For example, the group average linkage method joins a member to a cluster if it has an average level of similarity with all cluster members while the single linkage method joins a member to a cluster if it has a given level of similarity with at least one cluster member. Ward's minimum variance method joins members to clusters in such a way as to minimize the within cluster variance (Punj and Stewart, 1983).

Milligan (1980) evaluated 15 clustering methods under six types of error perturbation, including data sets with outliers, random noise, and standardizing of the variables. These are of particular interest in this research as first, data for this study must be standardized due to the different units and absolute values of the variables; second, it would not be unusual for a data set of this type to have outliers; and third, as the variable selection must necessarily be based on the researchers' best judgment, selecting a variable that does not contribute to the final cluster solution is possible, thereby introducing random noise. Factor analysis, which is discussed below, greatly reduces the possibility of a non contributing variable contributing to random noise.

Milligan (1980) found that the four best methods were the group average method, the weighted average, the beta flexible average, and Ward's minimum variance method. All of these did well in all error perturbations except the outlier condition. The single link, centroid, and median method were virtually unaffected by the outlier method, but were greatly affected by the other error perturbations. Ward's minimum variance method was selected for this study because of its performance in the error perturbation tests discussed above. The sensitivity of algorithms to outliers can be reduced by standardizing the data, identifying and removing outliers and/or using a stopping rule to stop clustering short of including all observations (Punj and Stewart, 1983).

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[1]For a general discussion of cluster analysis and factor analysis see Bernstein and Kaufman and Rousseeuw.

In most cluster analyses the researcher must select the number of clusters in the final solution (Milligan and Cooper, 1985). The severity of forming too few or too many clusters depends on the problem being analyzed. While having a statistical means by which to determine the optimal number of clusters in the fields of medicine or taxonomy is important, this is less important in marketing applications.

Factor Analysis

Factor analysis is a set of models for transforming a group of variables into a more useful form. Linear combinations are formed from the original variables and these linear combinations are used to predict the original variables (Bernstein, 1988). This step, although not done prior to many cluster analyses, is a potentially crucial step when there is limited a priori information. Variables that do not contribute to the clustering (i.e, random noise) can seriously alter the final solutions. By prior factor analysis, these variables can be located and deleted. In addition, prior factoring will reduce the impact of redundant variables.

DATA

Twenty-six variables were selected as potentially affecting food consumption and trade of value-added agricultural products. Variables were selected to measure standard of living, the economic welfare of the nation, propensity to trade, propensity to consume, media availability, and degree of urbanization.

Variables selected to measure the standard of living and general welfare of the population include gross domestic product per capita (GDPCAP), inflation (INFLATE), years of life expectancy (LIFEEXP), fertility rate measured as births per woman (FERTILITY), population density measured by persons per square kilometer (POPDENS), and the population growth rate (POPGR). Variables selected to measure the economic welfare of the nation include GDPCAP and INFLATE, gross domestic savings (GDS), gross domestic investment (GDI), net foreign investment (NFI), and the percent of land in agriculture (AGLAND). GDS, GDI, and NFI are expressed as a percent of gross domestic product.

Variables selected to measure the propensity to trade include exports expressed as a percent of gross domestic product (EXPORTS), imports expressed as a percent of gross domestic product (IMPORTS), money supply per capita (MONEY), international reserves per capita (RESERVES), and cereal imports in metric tonnes per capita (CEREALIM). It is often suggested that urbanization is an important factor in consumption and trade (Day et al., 1988; Huszagh et al., 1986; Sethi, 1971); for example, more highly urbanized countries may be easier to penetrate with new products. Thus, the percentage of the population living in an urban environment (URBAN) and the urban growth rate (URBANGR) were included.

Variables selected to measure the propensity to consume include GDPCAP and MONEY, calories per day per capita (CALORIE), protein per day per capita in kilograms (PROTEIN), and energy consumption per capita per year expressed in kilograms of oil equivalent (ENERGY). In food consumption analyses it has been shown that demographic factors such as the age composition of the population, female participation in the labor force, and education affect food choice (e.g., Gould et al., 1991; Kinsey, 1983; Redman, 1980). Thus, the percentage of the population age 0 to 14 years (POPDIST), the percentage of females participating in the paid labor force (FLABOR), the percentage enrollment in primary school (PRIMARY), and the percentage enrollment in secondary school (SECONDARY) were selected.

Following Sriram and Gopalakrishna (1991), media availability, as proxied by the number of televisions per 1,000 persons (TV) and the number of radios per 1,000 persons (RADIO), was included. Several possible ways to measure media availability were considered such as the numbers of newspapers in circulation. However, data for these variables were not current or complete enough to consider.

Variable definitions and descriptions are presented in Table 1. The latest year that a complete data set existed, 1989, was used. All monetary values are expressed in U.S. dollars. Variables are converted to per capita terms or percents where necessary to provide equivalent measures among countries. Exports, imports, savings, and investment are expressed as a percent of gross domestic product.

With the exception of televisions and radios, data for all variables were taken from the World Tables and Social Indicators of Development data sets (IBRD, 1991; IBRD, 1991-92). The World Tables data set includes a total of 146 countries. As every country must have an observation on each variable in the data set to be included in the cluster analysis, efforts were made to construct as complete a data set as possible. Information missing in World Tables or Social Indicators was sourced in the United Nations Statistical Yearbook (1993), the 1991 Yearbook of Labour, International Financial Statistics, 1993, and the World Factbook, 1991. Data for televisions and radios were taken from the United Nations Statistical Yearbook (1993).

Table 1: Description of Variables Used in the Factor Analysis

Variable	Description
GDPCAP	Gross domestic product per capita in U.S. dollars
MONEY	Money supply in U.S. dollars per capita
CALORIES	Calories per day per capita
PROTEIN	Protein in kg per capita per day
ENERGY	Energy consumption per capita per annum in kg of oil equivalent
TV	Televisions per 1000 people
RADIO	Radios per 1000 people
URBAN	Percent urbanization
URBANGR	Annual growth rate of urban population
LIFEEXP	Years of life expectancy at birth
FERTILITY	Fertility measured as births per woman
POPGR	Annual growth rate of population
POPDIST	Percent of population 0 to 14 years old
POPDENS	Population per square kilometer
RESERVES	International reserves in U.S. dollars per capita
EXPORTS	Exports in U.S. dollars, fob, expressed as a percent of GDP
IMPORTS	Imports in U.S dollars, cif, expressed as a percent of GDP
GDS	Gross domestic savings, expressed as a percent of GDP
GDI	Gross domestic investment, expressed as a percent of GDP
NFI	Net foreign investment, expressed as a percent of GDP
AGLAND	Percent of land in agriculture
FLABOR	Female labor force participation rate
INFLATE	Annual rate of inflation

Note: Three variables were included in a preliminary factor analysis but were not retained in the factor analysis from which the clusters were created: Cereal imports in metric tons per capita (CEREALIM), percentage of population enrolled in primary school (PRIMARY), and percentage of population enrolled in secondary school (SECONDARY).

RESULTS OF THE FACTOR AND CLUSTER ANALYSIS

Factor Analysis Results

The 26 variables were first factored using principal components. Three variables included in the preliminary factor analyses were excluded from the final factoring used to create the clusters: cereal imports in MT/capita, percentage enrollment in primary school, and percentage enrollment in secondary school. Cereal imports did not have a high loading on any factor and, thus, only contributed random noise to the analysis. Primary and secondary school did have high loadings, but only on Factor 1, which had high loadings on several other variables. Including the education variables added less than one percent to the explanatory power of the factors combined. As the education variables have many missing values, which would require deleting those countries from the data set, they were not included.

The factor analysis was repeated with the remaining 23 variables. The data set included 119 countries. These countries have a combined population of 3.3 billion (1989 estimate) or approximately 66% of the worlds estimated population of 5 billion (IBRD, 1991). Data on other countries were not sufficient for their inclusion. Among those countries excluded were the former Soviet Union, several Asian countries (e.g., Afghanistan, Cambodia, Mongolia, and Vietnam) and most Caribbean and Pacific island nations.

The results of the factor analysis are presented in Table 2. Using the minimum eigenvalue criterion of one, five factors, explaining 74% of the variance of the data set, are retained. These five factors represent the standard of living, the level of trade, the level of domestic and foreign investment, the participation of women in the labor force and the rate of inflation, and the level of domestic savings and investment.

Factor 1, which represents standard of living, has high positive factor loadings for the variables gross domestic product, money, international reserves, gross domestic savings, calorie and protein consumption, energy consumption, life expectancy, urbanization, and televisions and radios (Table 2). The variables fertility, population distribution, population growth rate, and urban growth rate have high negative factor loadings.

Factor 2, which represents the level of trade, has high positive factor loadings for the variables exports, imports, international reserves, and population density. Factor 3, which represents domestic and foreign investment, has a high positive factor loading for net foreign investment and high negative factor loadings for gross domestic investment and percent of land in agriculture.

Factor 4, which represents the participation of women in the labor force and the rate of inflation, has a high positive factor loading for female labor force participation and a high negative factor loading for inflation. Factor 5, which represents domestic investment and savings, has high positive factor loadings for gross domestic investment and gross domestic savings and a high negative factor loading for the percent of land in agriculture.

Table 2. Factor Loadings

Variable	Standard of Living Factor 1	Trade Factor 2	Domestic and Foreign Investment Factor 3	Female Labor and Inflation Factor 4	Domestic Investment and Savings Factor 5
GDPCAP	0.86				
MONEY	0.76				
CALORIE	0.87				
PROTEIN	0.87				
ENERGY	0.82				
TV	0.87				
RADIO	0.80				
URBAN	0.81				
URBANGR	-0.74				
LIFEEXP	0.88				
FERTILITY	-0.88				
POPGR	-0.78				
POPDIST	-0.94				
POPDENS		0.75			
RESERVES	0.60	0.63			
EXPORTS		0.81			
IMPORTS		0.84			
GDS	0.58				0.42
GDI			-0.46		0.44
NFI			0.44		
AGLAND			-0.43		-0.49
FLABOR				0.74	
INFLATE				-0.44	

Note: Only values with high factor loadings (> $|0.40|$) are reported.

Cluster Analysis Results

The cluster analysis was done using the five factors estimated above. Each country was given a score for each of the five factors. In the cluster analysis countries are grouped according to the similarities in factor scores. Ward's minimum variance clustering method was used. Inspection of the clustering solutions suggests that a ten cluster solution is a reasonable stopping point. The results of ten clusters are reported in Table 3. The average factor scores for each cluster are reported in Table 4. Average values for the 23 variables used to create the factors are reported for each cluster in Table 5.

Cluster 1, with 36 members, and Cluster 2, with 17 members, contain the world's poorest countries. This is reflected in the large average negative values for Factor 1, standard of living, (-0.70 and -0.99, respectively). These clusters contain most African nations and several of the poorer Asian and Latin American countries. The average gross domestic product per capita (GDPCAP) is only $825 and $370 for Clusters 1 and 2, respectively (Table 5). Calorie and protein consumption, along with energy consumption and media availability, are lower than for any cluster while fertility rates, population growth rates, and percentage of population less than age 14 are among the highest of any cluster. These two clusters combined have a total population of 1.7 billion, 52 percent of this sample.

The world's richest countries are in Clusters 3 and 4. These have the highest average values for Factor 1, standard of living, at 1.38 and 1.85, respectively. Cluster 4 contains the eight wealthiest nations, including the U.S., Canada, the Nordic countries, Japan, and Switzerland, with an average GDPCAP of $22,418 and a total population of 423 million. Every country in this cluster has a GDPCAP in excess of $20,000. As expected, these clusters have the highest calorie and protein consumption, the largest media availability and among the lowest fertility and population growth rates.

Cluster 3 has 15 members, including 11 of the EC-12, Malta, Australia, New Zealand, and Uruguay, with a total population of 363 million. These countries have an average GDPCAP of $12,839 although the range is greater than for other clusters, including Uruguay on the low end at $2,540 and Denmark on the high end at $20,685. Considering only GDPCAP, Uruguay does not appear to fit this group. However, it shares more common characteristics with this more developed group than with less developed countries of a similar income level. For example, while the average GDPCAP of Clusters 5 and 6 are $2,701 and $2,772, respectively, their population distributions are much younger with 39% and 32% between the age of 0 and 14, respectively, compared to Uruguay's 25%. Clusters 5 and 6 also have more rapid population growth rates and lower life expectancies than Uruguay.

Clusters 5 and 6 make an interesting comparison. Cluster 5, with 15 members, contains eight Latin American countries including Brazil, Chile, Columbia, Ecuador, Paraguay, and Venezuela, and seven African and Middle Eastern countries including Algeria, Egypt, Israel, Jordan, and Saudi Arabia. Cluster 6, with 14 members is more regionally diverse, containing the Eastern European countries of Czechoslovakia, Hungary, and Romania; the Asian countries of Korea, Malaysia, and Thailand; along with three Latin American countries (Barbados, Guyana, and Jamaica); three African countries (Botswana, Lesotho, and Swaziland); Cyprus; and Portugal.

Table 3. Clustering Solution

Clusters									
One	Two	Three	Four	Five	Six	Seven	Eight	Nine	Ten
Bangladesh	Benin	Australia	Canada	Algeria	Barbados	China	Kuwait	Argentina	Singapore
Bolivia	Burundi	Austria	Finland	Brazil	Botswana	Gabon	Oman	Peru	
Cameroon	Cape Verde	Belgium-Luxembourg	Iceland	Chile	Cyprus	Indonesia	United Arab Emirate		
Chad	Central African Republic	Denmark	Japan	Columbia	Czecho-slovakia	Madagascar			
Comoros	Gambia	France	Norway	Congo	Guyana	Mexico			
Costa Rica	Kenya	Germany	Sweden	Ecuador	Hungary	Poland			
Dominican Rep.	Laos	Greece	Switzerland	Egypt	Jamaica	Turkey			
El Salvador	Malawi	Ireland	USA	Iran	Korea	Yugoslavia			
Ethiopia	Nepal	Italy		Israel	Lesotho				
Fiji	Niger	Malta		Jordan	Malaysia				
Ghana	Papua New Guinea	Netherlands		Paraguay	Portugal				
Guatemala	Rwanda	New Zealand		Saudi Arabia	Romania				
Haiti	Somalia	Spain		Suriname	Swaziland				
Honduras	Tanzania	United Kingdom		Trinidad and Tobago	Thailand				
India	Togo	Uruguay		Venezuela					
Ivory Coast	Burkina								
Mali	Vanuatu								
Mauritania									
Morocco									
Nigeria									
Pakistan									
Panama									
Philippines									
Senegal									
Seychelles									
Sierra Leone									
South Africa									
Sri Lanka									
Sudan									
Syria									
Tunisia									
Uganda									
Yemen									
Zaire									
Zambia									
Zimbabwe									

Table 4. Average Factor Scores for Clusters

Cluster	No. Obs.	Standard of Living Factor 1	Trade Factor 2	Domestic and Foreign Investment Factor 3	Female Labor and Inflation Factor 4	Domestic Investment and Savings Factor 5
One	36	-0.70	-0.10	0.27	-0.18	-0.56
Two	17	-0.99	0.11	0.30	0.94	0.43
Three	15	1.38	-0.41	-0.11	0.28	-0.89
Four	8	1.85	-0.52	1.58	0.56	0.96
Five	15	-0.08	-0.04	0.14	-1.09	0.19
Six	14	0.29	0.52	-1.00	0.88	-0.06
Seven	8	-0.05	-0.40	-1.85	-0.22	1.99
Eight	3	0.55	1.00	1.87	-1.85	1.33
Nine	2	0.07	-1.36	-1.88	-3.25	-1.15
Ten	1	2.20	8.25	-0.82	-0.49	-1.10

Although their average GDPCAPs are nearly equal at $2,701 and $2,772, Clusters 5 and 6 are very different in other ways. Cluster 6 has imports as a percent of GDP that are more than twice that of Cluster 5 (56% vs. 22%) and an export percent that is nearly double (40% vs. 25%). International reserves per capita are $499 in Cluster 6 compared to $240 in Cluster 5. Cluster 6 has a small positive value of 0.29 for Factor 1, standard of living, compared to -0.08 for Cluster 5. This reflects higher calorie and protein consumptions, higher life expectancy, lower fertility rates, lower population growth rates, and a smaller percentage of the population age 0 to 14. Cluster 6 has a large negative value for Factor 3 while Cluster 5 has a small positive value representing the difference in percent of land in agriculture (49% vs. 26%) and the amount of net foreign investment (-0.9% vs. -9.0%). Cluster 5 has a large negative value for Factor 4 due to a high inflation rate of 112% and a low female labor force participation rate of 15%, whereas Cluster 6, with an inflation rate of 29% and a female labor force participation rate of 36%, has a moderately large positive value. Clusters 5 and 6 have populations of 381 million and 183 million, respectively.

Table 5. Variable Averages by Cluster

Variable	Cluster									
	One	Two	Three	Four	Five	Six	Seven	Eight	Nine	Ten
Variables with a high loading on Factor 1:										
GDPCAP	825	370	12839	22418	2701	2772	1767	11673	1623	9768
MONEY	309	172	9728	19122	2577	1543	899	7259	119	12315
CALORIE	2325	2248	3433	3353	2818	2947	2920	3027	2650	3198
PROTEIN	57	58	102	105	72	81	75	91	79	89
ENERGY	363	84	3308	6588	1647	1551	1212	6120	1054	5784
TV	42	4	425	488	140	155	116	384	157	372
RADIO	197	104	781	1044	322	399	218	435	462	306
URBAN	37	21	79	75	63	44	50	61	78	100
URBANGR	4.2	5.9	0.5	0.8	3.7	3.6	5.6	5.0	2.4	2.2
LIFEEXP	57	51	76	77	66	68	64	70	67	74
FERTILITY	5.3	6.5	1.7	1.8	4.4	3.1	3.6	5.1	3.4	1.9
POPGR	2.6	3.0	0.4	0.7	2.5	1.3	1.8	4.1	1.7	1.9
POPDIST	43.1	45.6	20.4	20.0	39.1	31.9	33.7	37.6	34.1	23.7
Variables with a high loading on Factor 2:										
POPDENS	101	63	201	71	49	145	70	47	14	4761
RESERVES	40	48	1034	1513	240	499	62	1770	42	6892
EXPORTS	17.3	15.0	28.4	21.3	25.3	39.5	18.5	50.0	14.0	154.7
IMPORTS	23.1	28.4	31.9	21.3	21.6	55.5	16.3	29.6	7.9	172.0
Variables with a high loading on Factors 3 and/or 5:										
GDS	10.2	5.3	21.7	25.0	20.6	21.0	32.7	32.2	19.3	44.4
GDI	15.7	21.7	21.5	24.4	19.9	29.6	31.3	19.5	14.8	34.5
NFI	-300.5	-497.0	-284.9	-23.9	-900.8	-85.5	-5468.0	2.5	-2120.0	0.4
AGLAND	44.1	35.3	59.2	19.7	26.1	48.7	44.5	5.2	44.2	1.6
Variables with a high loading on Factor 4:										
FLABOR	20.1	38.7	29.8	41.4	15.2	36.4	34.1	9.1	17.5	31.7
INFLATE	20.9	18.9	10.1	6.7	112.1	28.5	201.7	3.4	3239.2	2.4

Note: Refer to Table 1 for a description of variables.
RESERVES and GDS also had high loadings on Factor 1.

Eight countries including China, Indonesia, Mexico, Poland, and Turkey, with a total population of 1.5 billion, are in Cluster 7.[2] This cluster has a large negative average factor value for Factor 3 (-1.85) and a large positive factor value for Factor 5 (1.99). Factor 3 reflects the large degree of net foreign investment (-55%) and the large percent of land in agriculture (45%). Factor 5 reflects the large values of gross domestic savings and gross domestic investment. Cluster 7 has small negative values for the remaining factors. Cluster 7 has a high inflation rate of 202%, reflected in Factor 4. Factor 1, standard of living, reflects the low GDPCAP of $1,767; and Factor 2, trade, reflects the low export and import percents (18.5% and 16.3%, respectively).

Three Middle Eastern countries, Oman, Kuwait, and the United Arab Republic, with a combined population of 5.1 million, comprise Cluster 8. This cluster has a moderately high positive value for Factor 1, standard of living, reflecting a GDPCAP of $11,673. The magnitude of the value for Factor 1 is moderated by this cluster's very high fertility rate of 5.1%. This fertility rate is exceeded only by Clusters 1 and 2, the poorest clusters. Cluster 8 has a high positive value for Factor 2, representing trade, and high positive values for Factors 3 and 5, representing its high level of domestic savings (33%), small positive levels of net foreign investment (2.5%), and low percent of land in agriculture (5.2%). This cluster has the second highest exports as a percent of GDP (50%), second only to Singapore. International reserves are also second only to Singapore. This cluster has a large negative value for Factor 4. In this case, this reflects the very low participation of females in the labor force; at only 9.1%, this is the lowest of any cluster.

Cluster 9, comprised of two members, Argentina and Peru, is distinguished by its average inflation rate of 3239%, reflected in the large value for Factor 4. This cluster also has large negative values for Factors 2, 3, and 5. Factor 2 characterizes the low percent of exports and imports and the low level of international reserves. Factor 3 and Factor 5 reflect the high percent of land in agriculture, the high level of net foreign investment, and low levels of gross domestic savings and gross domestic investment. The total population in the cluster is 53.1 million.

Singapore is the only country in Cluster 10. Singapore, with a population of 3 million, is unique with a moderately high GDPCAP of $9,768, the highest population density, 100% urbanization, and the low amount of land in agriculture (1.6%). Most notable, though, is that Singapore has exports and imports as a percent of GDP greater than 100%, reflecting Singapore's role as an trade center for Asia. This is captured by the very large value of 8.25 for Factor 2 in Table 4.

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[2]Using data for 1989, the former Yugoslavia would have been grouped with this cluster. However, as is the case with all countries in the cluster analysis, significant changes in the variables used to create the factors and the clusters may change the cluster memberships.

SUMMARY AND CONCLUSIONS

Segmenting the global market for value-added agricultural products is a necessary first step in targeting markets for future trade. In the past, most research predicting growth markets for agricultural products used past growth rates for individual countries to predict their future growth rates. However, using past growth rates to predict future consumption may understate a country's potential if it is not currently a customer. This research avoids many of the difficulties in past research on agricultural marketing by clustering countries with like characteristics. While previous research has clustered the global market using economic and trade variables, this research also included variables affecting total and value-added food consumption, such as calorie consumption, age distribution, media availability, and female labor force participation. Using the latest year of complete data, 1989, 119 countries were clustered into ten clusters.

These ten clusters have practical considerations for trade in value-added agricultural products. Clusters 1 and 2, with the world's poorest countries, are dominated by their low standard of living and are unlikely candidates for considerable growth in consumption of value-added products in the near future. However, these markets may be candidates for commodities or intermediate processed goods. Clusters 3 and 4, with the world's 23 richest countries, Cluster 8, with Kuwait, Oman, and the United Arab Emirates; and Cluster 10, Singapore, are excellent candidates for current and future consumption of value-added products. In fact, within these clusters there is intense competition for the value-added market. Issues of primary concern in these clusters are product development, logistics, policy, and tariff and non tariff barriers.

The nations of the most interest for potential future consumption of value-added agricultural goods are in Clusters 5, 6, and 7. Of these three clusters, the 14 members of Cluster 6 (Korea, Malaysia, Thailand, and Portugal, among others) are better positioned to enter into trade in value-added agricultural products in the near future. Cluster 5, with 15 members, including eight Latin American members and six Middle Eastern and North African members, has an income nearly equal to Cluster 6. However, Cluster 6 has higher export and import percents, higher levels of international reserves, higher calorie and protein consumptions, and a higher female labor force participation rate. Cluster 7 with eight members (Mexico, China, and Indonesia, among others), has few indicators of rapid consumption growth in the near future, but it does have indicators of becoming a consumer of value-added goods in the longer run. These indicators include the high level of net foreign investment along with relatively high levels of gross domestic savings and investment.

Identifying segments of the global market is a necessary first step for successful international marketing. Development of a successful marketing strategy requires many additional considerations, including product formulation, global competition, choice of entry mode, logistics, and tariff and non tariff barriers. Knowledge of market segments can aid in developing market strategies for different clusters. Countries with little potential for growth in value-added product consumption can be targeted with commodities or intermediate value goods. Countries that have the greatest potential for future growth in consumption of value-added trade can be targeted for further market analysis.

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