SOME STRUCTURAL CORRELATES OF THE INTERNATIONAL MIGRATION OF HIGH-LEVEL MANPOWER

By

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The reduced volume of recent international migration is viewed as a result of restrictive barriers and regulations imposed by current immigration policies. Richment (1969: 236) characterizes recent world migratory movements as having the following distinguishing features: (a) smaller in scale and subject to political control; (b) planned and governed by "welfare state" considerations; (c) a two-way or multi-directional movement; (d) mainly inter-urban rather than rural-urban; and (e) educationally and occupationally highly selective. What has become a critical issue is the fifth enumerated feature, namely, the migration of high-qualified people. The movement of skilled persons is regarded as a controversial as well as a complicated issue in world affairs. It became a subject of discussion in the United Nations General Assembly which ended with Resolution No. 2417 (United Nation 1969). As a result, several published reports by some U.N. agencies have discussed and made preliminary evaluations of the problem. [Henderson (1970), UNITAR (1971), McKnight (1971)]. Extensive research has been done on what has been referred to as "the brain drain" — a term used to characterize the voluntary out-migration of highly-trained personnel from the developing to the more developed nations.

A more concrete definition of this phenomenon was proposed by Adams (1969: 1) which states that:

> . . . the term itself is a loaded pejorative, suggestive of loss of a vital resource, without compensation. This interpretation is sup-

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ported by illustrations that seem to show that human capital, as a strategic resource, is flowing out of economies where it can make the greatest contribution to human welfare, and into economies already well supplied with trained, capable, scientific and administrative personnel.

It is also correct to argue that the characterized phenomenon can likewise be labelled as "brain gain" when seen from the standpoint of economically advanced countries as well as from the standpoint of benefits and contributions gained from this redistribution of human resources [Grubel & Scott (1966, 1968), Johnson (1969), Aitken (1968), Thomas (1967), Weierneir (1970), Psacharapolus, (1971)]. The question of "drain" or "gain" has been discussed lengthily by experts from different fields of orientation and it has yet to be resolved.

The study is an attempt at assessing the migration of high-level manpower and its primary concern is to evaluate how certain factors are related to this type of migratory movement. High-level manpower migration is more commonly regarded as brought about by conditions emanating from receiving countries, more specifically, by current immigration policies which are noted to favor and facilitate the entry and admission of professionally-skilled migrants. The argument proposed by the study is that the phenomenon under question can likewise be explained by factors emanating from the sending countries. Studying factors related to migration is a useful and purposeful analytical framework in acquiring knowledge contributive to migration theory, or at least in establishing empirically-sound propositions concerning this demographic phenomenon. Treatises on migration can be traced back to Ravenstein's seven "laws" (1885, 1889) which are still considered, by present standards, as the basis for quantitative verification. Lee's (1966) theoretical model enumerates several factors in influencing the individual's decision to move and these are categorized as follows: (a) factors associated with the area of origin; (b) factors associated with the area of destination; (c) intervening obstacles; and (d) personal factors. This model makes a distinction between positive and negative factors also characterized in "push" and "pull" factors. This mode of conceptualization is useful in studying migration. It provides a broader framework by allowing diverse dimensions to be incorporated. This may involve the inclusion and interplay of economic, social, educational, psychological, political and other factors. One difficulty which will have to be resolved is the valid choice of criteria in designating some of these as "push" factors and others as "pull" factors.

A growing emphasis is being given to structural factors. The act of migrating is seen as a response to a definite set of objective determinants which are structural in nature and which emanate from both areas of origin and destination. The bulk of research employing this type of analytical framework is mentioned and discussed in the United Nations publication, "The Determinants and Consequences of Population Trends" (1973). These studies have analyzed social, economic, and political conditions existing in countries of emigration and immigration which have affected the volume and direction of migratory movements.

Analytical Framework

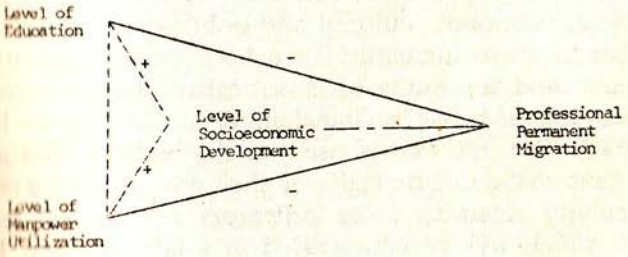
Among the present world features are the disparate realities fashioned by differing social and economic conditions. About two-thirds of the total world population live in areas commonly characterized as "underdeveloped." The countries concerned are experiencing a complexity of problems all of which are interwoven to characterize under-achievement. From the economic standpoint, this disparity is concretely measured by indices like the Gross National Product (GNP), per capita, and a number of other related indices.

Our analytical framework considers high-level manpower migration as a demographic phenomenon occurring under present world conditions. Ideas and findings derived from previous research are useful in clarifying relationships and determining relevant factors. However, research has failed to consider the applicability and appropriateness of the demographic framework.

One way of introducing our paradigm is to examine the variables shown in Figure 1 and their specified interrelationships. Three struc-

Figure 1

A HYPOTHETICAL MODEL OF PERMANENT MIGRATION
OF PROFESSIONALS AND SELECTED STRUCTURAL CORRELATES



tural correlates are considered, namely; level of education, level of manpower utilization, and level of socioeconomic development. These variables reflect certain organizational and institutional features of contemporary societies and will be assessed in terms of "levels" — a comparative device designed to measure the degree of attainment with no implication of an ideal or a maximal state of achievement. The term "socioeconomic development" is preferred because development does not simply mean progress in terms of increased productivity, income expansion, diversification of the factors of production, etc. Advancement has an important social dimension as well and is ultimately geared at improving human conditions and promoting man's welfare. This expanded viewpoint of development is now being adopted by economists and other social scientists. This is merely an expository model. Establishing causality is still a remote goal on account of the existing gap between theory and measurement in this type of research. Our main aim is to discern possible relationships between the structural correlates and the migration of the professionally skilled, and to determine the correlates that best explain this migratory movement. The three variables in the left-hand side of the model, namely, level of education, level of manpower utilization, and level of socioeconomic development are considered the main independent variables.

The hypothetical model is designed to clarify certain relationships, mainly those among the structural correlates and migration. This is also a highly-simplified model. The interrelationships among the structural correlates are still unestablished. For this reason, broken lines are drawn linking each of these variables. Our analysis will not be concerned with clarifying their interconnections.

The variables selected for the three structural correlates are referred to as "indicators." The use of indicators in empirical research has introduced significant improvements in quantifying and measuring various facets of human conditions reflecting set value standards and goals [Sheldons and Freeman (1970), Wilcox and Brooks (1970), Biderman (1968), Andrews (1973), Land (1971)]. These indicators may be social, economic, cultural and political in nature. A significant number of these indicators have been devised and utilized in other research and the mode of classification used in these studies will also be adopted here [McGranahan, *et al.* (1972) and Harbison, *et al.* (1964)]. The rest were chosen on the basis of their ability to depict relevant characteristic traits of their corresponding correlates. This particularly refers to those indicators of "level of manpower utilization" which will be enumerated in a later section. The basic

criterion used in selecting these indicators is the capacity of the work force to attain set standards of sectoral and occupational manpower requirements oriented towards the goal of national development.

A total of thirty-seven indicators were selected — eleven indicators for level of education, eight indicators for level of manpower utilization and eighteen indicators for level of socio-economic development (see Table 1).

Also part of our strategy has been to adopt a more workable concept of high-level manpower migration, namely, "professional permanent migration." This is based on the following criteria: (1) it refers to a more definite state in the migration process by considering only those migrants who have declared their intention to establish permanent residence in the receiving country; and (2) it provides a way of comparing distinct migrant groups, mainly those classified under the "professional classification."

TABLE 1

Selected Indicators for the Three Structural Correlates

Indicator	
	Level of Education
1	Higher education (3rd level) enrollment per 1,000 aged 20-29, 1969.
2	Higher education enrollment as per cent of total enrollment, 1970.
3	Number of students in higher education per 100,000 population, 1969.
4	Number of graduates per 10,000 aged 20-29, 1969.
5	Scientists and engineers per 10,000 population, 1970.
6	Technicians per 10,000 population, 1970.
7	Scientists and Engineers engaged in research and development per 10,000 population, 1970.
8	Technicians engaged in research and development per 10,000 population, 1970.
9	Per cent of higher education enrollment in scientific and technical faculties, 1970.
10	Per cent of higher education enrollment in the Humanities, Fine Arts and Law, 1970.
11	Per cent of graduates in scientific and technical faculties, 1969.
	Level of Manpower Utilization
1	Economically active population as per cent of total population, 1970.
2	Salaried and wage earners as per cent of economically active population, 1970.
3	Per cent of the economically active population in the non-agricultural sector, 1970.
4	Per cent of the economically active population in manufacturing, 1970.
5	Professional, technical and kindred workers as per cent of the economically active population, 1970.
6	Salaried professional, technical and kindred workers as per cent of all salaried workers in the economically active population, 1970.
7	Salaried professional, technical and kindred workers as per cent of the economically active population, 1970.
8	Salaried professional, technical and kindred workers as per cent of total professional, technical and kindred workers in the economically active population, 1970.
	Level of Socioeconomic Development
1	Expectation of life at birth.
2	Per cent of population in localities of 20,000 or more.
3	Consumption of animal protein, per capita, per day.
4	Combined primary and secondary enrollment as per cent of age group 5-19.
5	Vocational enrollment ratio.
6	Average number of persons per room.
7	Newspaper circulation per 1,000 population.
8	Telephones per 100,000 population.
9	Radio receivers per 1,000 population.
10	Per cent of the economically active population in electricity, gas, water, sanitary, transport, storage and communication.
11	Agricultural productivity per male agricultural worker (the index of Agricultural Productivity per capita was used since the data are more readily obtainable).
12	Adult male labor in agriculture as per cent of total male labor force.
13	Electricity consumption kwh., per capita.
14	Steel consumption kw., per capita.
15	Energy consumption kg. of coal equivalent, per capita.
16	GDP derived from manufacturing as per cent of total GDP.
17	Foreign trade (sum of imports and exports), per capita, in US dollars.
18	Salaried and wage earners as per cent of total economically active population.

The analysis will concentrate on only one country of immigration, namely, the United States, which still ranks as one of the more prominent receiving countries.[1] Its net civilian immigration is estimated to be about 400,000 persons per year. Immigration accounted for one-fifth of the total population growth in 1970, or 22 per cent. This has been on the increase since the fifties when it accounted for only 11 per cent at that time and 16 per cent during the sixties [Taeuber (1972)]. Permanent migration during a ten-year period, 1963-1972, was assessed. This time period was subdivided into two 5-year periods in the hope of discriminating volume of permanent migration in reference to a U.S. immigration policy, the Immigration and Nationality Act of 1965. The Act is, in some respects, a breakthrough in U.S. immigration legislation. Among its major revisions were the abolition of the national origins clause and the quota system; these were deliberately altered due to their discriminatory undertones. Under the present act, any person or alien can apply to become an immigrant and admission is based on the seven prescribed preference clauses. It has likewise been noted that the current immigration legislation has encouraged and facilitated the immigration of professionally skilled workers [Fortney (1972), Keely (1972, 1974 & 1975)]. In fact, two of the preference clauses, the third and sixth preferences, refer to the admission of skilled labor, particularly that which meets the labor requirements prescribed by the United States' Department of Labor. What is clear in the current legislation is its permissive attitude regarding the indiscriminate admission of aliens of any nationality, and the provision of opportunities for extending temporary stay or applying for permanent residence. Highly skilled migration from twenty-one sending countries is being evaluated, more specifically, from six European countries, eight Asian countries, six North American countries and one from Oceania. Three permanent migration rates were estimated for each country,[2] and these rates are shown in Table 2. Data for the indicators and the permanent migration rates were drawn from several United Nations statistical yearbooks, and the published

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[1] A comparative scheme involving several countries of immigration would definitely be more meaningful with the type of analysis adopted but these are major limitations in data comparability with respect to immigration statistics and systems of classification even for countries with more elaborate and highly improved statistical record-keeping services.

[2] The formula used in estimating the professional permanent migration rate (PMR_p) is

$$PMR_p = \frac{I_p}{EA_p} \times 1{,}020$$

TABLE 2

Estimated Rates For Professional Permanent Migration

Region	Country	Professional Permanent Migration 10 Years	1st 5 Years	2nd 5 Years
Europe	France	2.1	0.9	1.2
	Greece	29.9	11.2	18.7
	Hungary	6.2	2.8	3.4
	Spain	8.2	3.9	4.3
	United Kingdom	14.3	8.8	5.5
	Yugoslavia	5.7	1.9	3.8
Asia	Hong Kong	25.2	10.2	15.0
	India	7.4	1.2	6.2
	Israel	23.7	8.1	15.6
	Japan	1.3	0.5	0.9
	Korea	48.7	7.4	41.3
	Philippines	85.1	9.6	75.6
	Thailand	—	—	10.3
	Turkey	8.0	4.0	4.0
Oceania	Australia	5.5	1.9	3.6
North America	Canada	33.2	21.6	11.6
	Mexico	8.9	4.5	4.3
	Barbados	—	—	165.1
	Dominican Republic	101.1	51.5	43.0
	El Salvador	32.0	18.5	13.5
	Panama	39.1	18.5	20.6

Source: To estimate these rates, the pertinent statistical data were drawn from the following sources: U.S., Immigration and Naturalization Service, *Annual Report* (1963-1972), Table 8, ILO. *Year Book of Labour Statistics* (1970, 1973).

annual reports of the U.S. Immigration and Naturalization Service (see references, pages 83 & 84).

Methodology

The two main preoccupations in our analysis are: (1) to reduce the indicators of each structural correlate into fewer factors or components; (2) to assess the strength and direction of association between the components, the refined independent variables, and professional permanent migration, our dependent variable; and (3) to select and isolate those components that best explain the dependent variables. Two modes of analysis were used in the study, namely, factor analysis and regression analysis. Our method of reducing the number of independent variables to a more meaningful and manageable amount is through factor analysis. Components have been derived and indices based on these components have been constructed. These indices are used as refined variables. Regression

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where I_p is the number of immigrant professionals from a sending country admitted to the U.S. during the specified time period, and EA_p is the number of professionals in the economically active population of a sending country as estimated for the mid-period, 1967.

analysis has been applied to account for observed variation and to determine which components best explain professional permanent migration.

The Factor Analysis Results

In researches which involve numerous independent variables, like the thirty-seven indicators used in the study, factor analysis serves as a useful statistical tool to: (a) reduce these indicators to fewer and more meaningful factors; and (b) construct indices from these factors and later use these as new variables in the analysis.[3] The indicators for the three structural correlates have been subjected to factor analysis using the "principal factoring with iteration" method and the VARIMAX orthogonal rotation [Nie, *et al.* (1975: 218-224)]. The results are in two tabular presentations for each structural correlate. The first table contains the derived factors with their corresponding indicators and their rotated factor loadings. The second table will present the unrotated factor matrix, the communalities (h^2) eigenvalues, the per cent (%) of total variance (PTV), and the per cent (%) of common variance (PCV).

Three factors were extracted from the eleven indicators of level of education (see Table 3). The first and second factors labelled as the Human Resource Component (X_1) and the Scientific and Technical Manpower Component (X_2) each contain four significant indicators. The third factor, Higher Education Orientation Component (X_3), accounts for the three remaining indicators.

A total of 77.4 per cent of the total variance is accounted for by the three components which contain all the indicators for level of education.

Table 4 shows the estimated eigenvalue, PTVs and PCVs for the three components. The first factor accounts for 42.4 per cent of the total variance, thus, representing the largest underlying pattern of relationship. The second and third components explain 22.7 per cent and 12.4 per cent of the total variation respectively. The estimated

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[3] Factor analysis is a technique used in assessing possible relationships among variables. It factors out patterns of relationships while still containing the original information. For a more elaborate discussion and application of this statistical technique, see R.J. Rummel (1967: 444-480) and D. Child (1970) and J.H.F. Schildernick (1969).

percentages of common variance for three factors are 57.1 per cent, 28.2 per cent and 14.7 per cent respectively, all of which would add up to 100 per cent. These are adjusted values since these merely account for the variation of three factors.

TABLE 3

The Three Components For Level of Education And Their Corresponding Indicators And Rotated Factor Loadings

Component	Name of Component and Indicator	Rotated Factor Loadings
X_1	**Human Resources Component**	
	Higher education enrollment per 1,000 aged 20-29	.85
	Higher education enrollment as per cent of total enrollment	.80
	Number of students in higher education per 100,000 population	.99
	Number of graduates per 10,000 aged 20-29	.72
X_2	**Scientific and Technical Manpower Component**	
	Scientists and engineers per 10,000 population	.78
	Technicians per 10,000 population	.59
	Scientists and engineers engaged in research and development per 10,000 population	.75
	Technicians engaged in research and development per 10,000 population	.93
X_3	**Higher Education Orientation Component**	
	Per cent of higher education enrollment in scientific and technical faculties	.91
	Per cent of higher education enrollment in the Humanities, Fine Arts, and Law	.58
	Per cent of graduates in scientific and technical faculties	.72

TABLE 4

Factor Analysis of Level of Education Indicators

	Unrotated Factor Matrix			
Indicator*	Factor 1	Factor 2	Factor 3	h^2
1	.69	.51	.15	.77
2	.76	.38	.06	.73
3	.81	.48	.32	.91
4	.72	.18	.20	.59
5	.78	−.24	−.28	.74
6	.64	−.18	−.18	.47
7	.83	−.32	−.14	.81
8	.59	−.42	−.58	.86
9	.22	−.66	.59	.83
10	.09	.62	−.15	.42
11	.26	−.56	.35	.51
PTV	42.4	22.7	12.4	77.4
PCV	57.1	28.2	14.7	
EIGENVALUES	4.41	2.18	1.13	

*For a detailed listing of these indicators see Table 1.

The results presented on Tables 5 and 6 indicate three distinct patterns of relationship when factor analysis was applied on the data for the eight indicators of Level of Manpower Utilization. The three factors explain about 88.4 per cent of the total variance. The Industrial Manpower Component (X_4) accounts for 54.8 per cent of the total variation when all patterns are considered, and 66.8 per cent of the common variance when only the three patterns are considered. The other two components, the Professional Manpower Component (X_5) and the Compositional Participation Component (X_6), are of less relative importance. From these results one can safely state that the three indicators comprising this component are the most significant indicators of Level of Manpower Utilization.

When applying factor analysis to the eighteen core indicators of socioeconomic development, three distinctive patterns can be noted (see Tables 7 and 8). All three patterns explain 70.9 per cent of total variation, and the remaining 29.1 per cent is left unaccounted for. One of these indicators, electricity consumption kwh., per capita, was deleted from the list. It was found to be highly correlated with another indicator, namely, energy consumption kg. of coal equivalent, per capita, with an r = .995. This brought about the problem of multicollinearity [J. Johnston (1972: 159-168)]. The decision to eliminate the former is based on the contention that although both are indices of energy consumption, the latter tends to be more all-inclusive and would account for other aspects of the use of energy in different settings. The problem of multicollinearity must be avoided when doing factor analysis. If left unresolved, gross inaccuracies will

TABLE 5

The Three Components For Level of Manpower Utilization And Their Corresponding Indicators And Rotated Factor Loadings

Component	Name of Component and Indicators	Rotated Factor Loadings
X_4	**Industrial Manpower Component**	
	Salaried and wage earners as per cent of economically active population (E.A.P.)	.91
	Per cent of the E.A.P. in the non-agricultural sector	.91
	Per cent of the E.A.P. in manufacturing	.84
X_5	**Professional Manpower Component**	
	Professional, technical, and kindred workers as per cent of the E.A.P.	.86
	Salaried professional, technical, and kindred workers as per cent of all salaried workers in the E.A.P.	.76
	Salaried professional, technical, and kindred workers as per cent of E.A.P.	.79
X_6	**Compositional Participation Component**	
	E.A.P. as per cent of total population	.69
	Salaried professional, technical, and kindred workers as per cent of total professional, technical, and kindred workers in the E.A.P.	.69

be expected from the estimated coefficients, factor loadings, and other related statistics. Another indicator, agricultural productivity per male agricultural worker, failed to be included in any of the derived factors because of its relatively low factor loading. Unlike the results of factor analysis done on indicators of the other two structural correlates, the obtained findings indicate that sixteen out of the original eighteen core indicators have been classified and accounted for by the three derived factors or components.

The three components and their respective indicators are listed in Table 7. The "*organizational* component" (X_7) accounts for 55.2 per cent of the total variance while the other two components, namely, the "*consumption* component" (X_8) and the "*developmental* component" (X_9) account for 9.4 per cent and 6.3 per cent respectively. In the same order, their estimated percentages of common variance are 82.3 per cent, 11.6 per cent, and 6.0 per cent respectively. It is important to note that the derived components have identified clusters of indicators which conform to the distinction made by the UNRISD study [McGranahan, *et al.* (1972)]. An added refinement has been made in our analysis by categorizing the cluster of indicators concerned with the structural features of production as belonging to the "consumption" aspect of development. The other two components mirror the distinction given to the indicators used in the UNRISD study. The "*organizational* component" is composed of structural indicators. Four out of the five indicators comprising the "*developmental* component" are developmental indicators except for GDP derived from manufacturing as per cent of total GDP.

TABLE 6

Factor Analysis of Level of Manpower Utilization Indicators

Indicators**	Unrotated Factor Matrix Factor 1	Factor 2	Factor 3	h^2
1	−.45	−.10	.55	.52
2	−.78	.48	−.11	.85
3	−.85	.42	−.09	.90
4	−.76	.45	.20	.82
5	−.92	−.26	−.35	1.04*
6	−.42	−.70	−.09	.67
7	−.88	−.29	−.19	.89
8	−.58	−.41	.41	.66
PTV	54.8	20.8	12.8	88.4
PCV	66.6	22.5	10.9	
EIGENVALUES	4.28	1.43	0.70	

*Factor analysis for these variables was performed on the correlation matrices, implying that the diagonal elements of the matrix subject to factor analysis were each unity. The asterisked (*) entry denotes a "Heywood case". In our factor analysis solution, the communality estimate of 1.04 implies that the disturbance variance for the model was implicitly estimated as −.04. Since variances are by definition non-negative, an improper solution has been obtained. We can safely ignore this peculiar entry, however, because −.04 is negligibly different from zero.

**For a detailed listing of these indicators refer to Table 1.

TABLE 7

The Three Components For Level Of Socioeconomic Development And Their Corresponding Indicators And Rotated Factor Loadings

Component	Name of Component and Indicator	Rotated Factor Loadings
X_7	**Organizational Component**	
	Per cent of population in localities of 20,000 or more	.74
	Average number of persons per room	.57
	Per cent of the E.A.P. in electricity, gas, water, sanitary service, transport, storage and communication	.49
	Adult male labor in agriculture as per cent of total male labor force	.75
	Foreign trade, per capita, in U.S. dollars	.62
	Salaried and wage earners as per cent of total E.A.P.	.56
X_8	**Consumption Component**	
	Consumption of animal protein, per capita, per day	.57
	Telephones per 100,000 population	.68
	Radio receivers per 1,000 population	.69
	Steel consumption kw., per capita	.75
	Energy consumption kg. of coal equivalent, per capita	.86
X_9	**Developmental Component**	
	Expectation of life at birth	.51
	Combined primary and secondary enrollment as per cent of age group, 5-19	.45
	Vocational enrollment ratio	.93
	Newspaper circulation per 1,000 population	.54
	GDP derived from manufacturing as per cent of total GDP	.64

TABLE 8

Factor Analysis of Level of Socioeconomic Development Indicators

Indicators*	Unrotated Factor Matrix Factor 1	Factor 2	Factor 3	h^2
1	−.86	−.02	.08	.74
2	−.55	.45	.26	.57
3	−.81	−.17	−.07	.69
4	−.69	−.09	.04	.48
5	−.61	−.74	−.17	.96
6	.86	−.10	−.04	.75
7	−.74	−.04	.23	.60
8	−.84	.12	.21	.76
9	−.73	.16	.32	.65
10	−.39	.33	.07	.27
11	−.36	−.19	.22	.31
12	−.86	−.30	−.11	.84
13	−.87	−.19	−.25	.85
14	−.85	−.09	−.50	.91
15	−.66	−.29	.19	.55
16	−.73	.23	.12	.59
17	−.77	.13	.09	.62
PTV	−5.2	9.4	6.3	70.9
PCV	82.3	11.6	6.0	
EIGENVALUES	9.09	1.28	0.67	

*For a detailed listing of these indicators refer to Table 1.

It is also interesting to note that the large number of indicators designated for a particular structural correlate does not necessarily account for greater magnitude in total explained variation. Instead, the findings tend to confirm the contrasting observation. The structural correlate having the least number of indicators, Level of Manpower Utilization, has the highest estimated H (total explained variation of all patterns), which is 88.4 per cent, as compared to that for Level of Education (77.4 per cent) and Level of Socioeconomic Development (70.9 per cent).

A correlation matrix of the nine components is shown in Table 9. Intragroup correlations are negligibly different from zero, with one exception. The intergroup correlations are generally small, but several associations are significantly different from zero. Most of these associations are positive, with the exception of two. This finding somehow confirms the hypothetical interrelationship of the three structural correlates (see Figure 1). It is not our task in this study to investigate further the observed interrelationships.

The Regression Analysis Results

A second diagram is presented in Figure 2 which includes the refinements based on the factor analysis results. The revised migration model basically includes the variables contained in the earlier model. A synopsis of working hypothesis is expressed in this model. The hypothetical relationships can be summarized in the following verbal descriptions:

TABLE 9

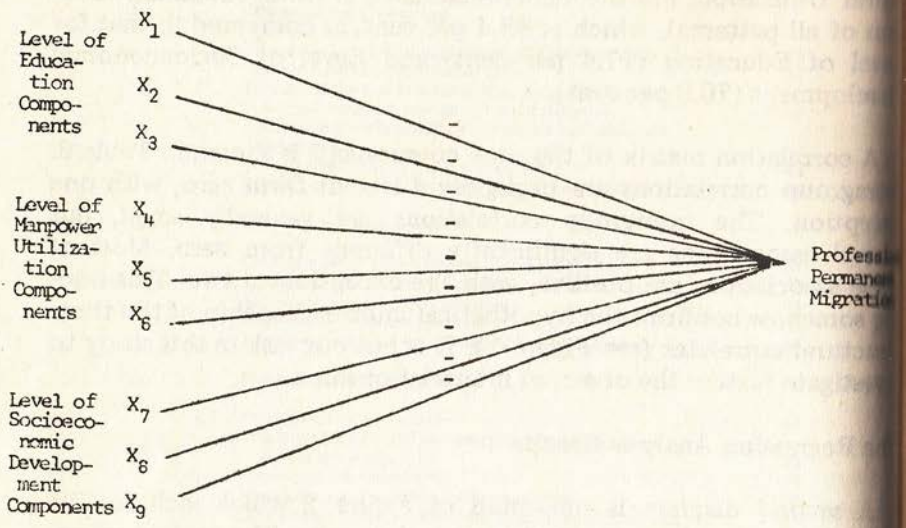
Correlation Matrix of the Nine Components by Factor Analysis (N = 41)

Components	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9
X_1	1.00								
X_2	−.11	1.00							
X_3	−.13	.08	1.00						
X_4	.21*	.29**	.15	1.00					
X_5	.32***	.11	−.34***	.11	1.00				
X_6	.14	.38***	.34***	−.04	−.30**	1.00			
X_7	.10	.14	.06	.70***	.12	−.27**	1.00		
X_8	.56***	.32***	−.08	.41***	.30**	.20	.04	1.00	
X_9	.27**	.29**	.08	.29**	.11	.38***	−.18	.06	1.00

Note: The asterisked (*) simple correlation coefficients (r) are significantly different from zero at the following levels of significance: (1) r* = significant at the .2 level; (2) r** = significant at the .1 level; and (3) r*** = significant at the .05 level. The nine components are: X_1 = the human resource component; X_2 = the scientific and technical manpower component; X_3 = the higher education orientation component; X_4 = the industrial manpower component; X_5 = the professional manpower component; X_6 = the compositional participation component; X_7 = the organizational component; X_8 = the consumption component; and X_9 = the developmental component.

Figure 2

A REVISED HYPOTHETICAL MODEL OF PROFESSIONAL PERMANENT MIGRATION AS BASED ON THE RESULTS DERIVED BY FACTOR ANALYSIS



(1) There will generally be inverse relationships between the nine structural components and the migration rates for each time period;

(2) All level of socioeconomic development components will be strongly (and negatively) associated with professional permanent migration for all time period considered;

(3) One or more level of education components and one or more level of manpower utilization components will be strongly (and negatively) associated with professional permanent migration for all time periods considered.

Two approaches for model selection, mainly the full regression approach and the "best-fitting model" approach cannot be directly applied to our analysis due to complex (and undetermined) inter correlation of the independent variables. Because of this difficulty we combined features of both approaches in the interest of determining sets of variables significantly accounting for professional permanent migration.[4]

[4]Four categories for determining the variables are arbitrarily defined, and these are:

(1) Variables which are significantly related to the dependent variable in both the full regression model and the best-fitting regression model;

(2) Variables not included in the best-fitting model but which are nevertheless significant in the full regression model;

(3) Variables which are included in the best-fitting model but which by virtue of intercorrelations with the excluded independent variables fail to achieve significance in the full regression model (these are considered spurious associations in the best-fitting model);

(4) Variables which are not included in the best-fitting model and which are not significant in the full regression model.

While the above classification may seem arbitrary, it does permit us to select those variables which are most meaningful for the present analysis. It combines advantages of both regression strategies. The categories (1) through (4) shall interpret them in this manner. Since variables in category (1) will appear in any regression and account for a considerable portion of observed variation, they are deemed most worthy of explanation. Indeed, the magnitude of standardized regression coefficients in category (1) do not change appreciably in the full regression model as compared with the best-fitting model. Variables in categories (1) and (2) are those which would require discussion if only the full regression were used. Due to problems of interpretation, and other problems, we do not attribute the same degree of importance to those variables which are members of category (2). The variables contained in both categories (1) and (3), are those which would deserve mention if only a best-fitting model were used. We choose to relegate the "spurious" variables of category (3) to a position of substantive importance second to the variables of category (2). With category (4) there is no ambiguity, since no regression strategy would result in explaining this association. A more sophisticated approach to the analysis of the relationships between migration and the nine components would require causal assumptions concerning the relations among the independent variables and thereby avoiding our analytic techniques. We are not in this research prepared to make these assumptions.

As a screening device for use in the determination of statistical significance of standardized regression coefficients we choose the critical F value of 1.71, with a significance level of $\alpha = .20$. An $\alpha = .20$ has been chosen for the following reason:

> If we are just exploring a set of interrelations for the purpose of developing hypotheses to be tested in another study, a larger error rate may tend to yield more hypotheses, any of which may be subsequently validated. Therefore, in this exploratory stage perhaps the .10 or .20 level would be sufficient [S. Labovitz, (1970: 126)].

The partial F statistic of each coefficient had to exceed 1.71 in order for that particular variable to be judged "significantly different from zero."

The result for the full regression model and the stepwise model for professional permanent migration during the 10-year period and for the two 5-year periods are presented in Table 10. The full regression model for the 10-year period is shown in Figure 3. This model indicates the association of four components with the dependent variable. Two education components, the human resource com-

ponent (X_1) and the scientific and technical component (X_2) showed positive associations with professional permanent migration. One of these components, the human resource component, was included in the stepwise model and remained significant in the full regression model. These relationships, however, contradict one of our working hypotheses which predicts inverse relationships between these components and professional permanent migration. These particular results also contradict the third working hypothesis since the inclusion of these components in the full regression model does not conform to what was predicted, i.e., that one or more education components will be strongly (and negatively) related with the dependent variable. One manpower utilization component, the compositional participation component (X_6) and one socioeconomic development component, the developmental component (X_9), were also found to be negatively associated with professional permanent migration. These associations are in conformity with those predicted by our working hypotheses. The impact of the developmental component as a push factor partly confirms our second hypothesis. However, no association was noted between the other two socioeconomic development components and professional permanent migration in the full regression model. The relationship between the compositional participation component with the dependent variable conforms to what was predicted by our third hypothesis. On the whole, the full regression model for the 10-year period is quite different from our hypothetical model.

TABLE 10

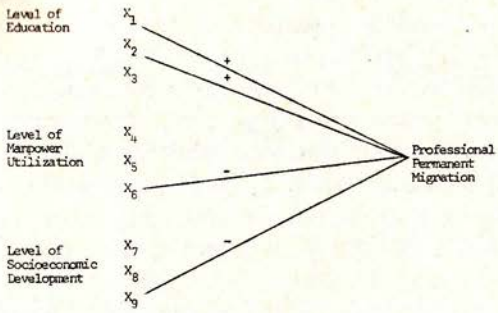
Full Regression Results And Stepwise Solutions For Professional Permanent Migration
(N = 19)

Components	Full Regression Results						Stepwise Solutions					
	10 Yrs.		1st 5 Yrs.		2nd 5 Yrs.		10 Yrs.		1st 5 Yrs.		2nd 5 Yrs.	
	b_i	F	b_i	F	b_i	F	b_i	F	b_i	F	b_i	F
X_1	.59*	3.20	.28	0.59	.67*	3.79	.54	5.45	.29	2.34	.35	4.28
X_2	.36*	2.45	.52*	4.10	.16	0.45						
X_3	.10	0.20			.16	0.39						
X_4	−.65	0.77	−.29	0.11	−.75	0.87					−1.34	19.98
X_5			−.20	0.39	.13	0.17						
X_6	−.28*	1.74	−.39*	1.71	−.14	0.26						
X_7	.41	0.39	.21	0.08	.44	0.39					1.02	11.88
X_8	−.45	0.93	−.16	0.08	−.54	1.07	−.66	8.00				
X_9	−.51*	1.82	−.51	1.18	−.39	0.67	−.68	14.56	−.67	12.57		
R^2	.67		.58		.68		.55		.45		.59	

Note: The regression results presented are the standardized regression coefficients (b_i), their corresponding F values (F), and the explained variance (R^2). The asterisked (*) b_i have obtained F values = 1.71.

Figure 3

A FULL REGRESSION MODEL OF PROFESSIONAL PERMANENT MIGRATION FOR THE 10-YEAR PERIOD



Note: The nine components are: X_1=the human resource comp.; X_2=the scientific and technical manpower comp.; X_3=the higher education orientation comp.; X_4=the industrial manpower comp.; X_5=the professional manpower comp.; X_6=the compositional participation comp.; X_7=the organizational comp.; X_8=the consumption comp.; and X_9=the developmental comp.

The regression results for the two 5-year periods, also found in Table 10, indicate the components that have made an impact during the two time periods. During the first time period, the scientific and technical manpower component (X_2) and the compositional participation component (X_6) were associated with professional permanent migration. The former is seen to be strongly related with the dependent variable. Only one component, the human resource component (X_1) accounts for professional permanent migration during the second time period. All these components are included in the full regression model for the whole time span. The differential impact noted for the two 5-year periods suggests that some undetermined factor(s) might explain these differences.

A more comprehensive discussion of the regression results is based on a chart listing down all those components found to be associated in one way or another with professional permanent migration during each specific time period (see Table 11). Three kinds of associations are distinguished: (1) primary associations; (2) secondary associations; and (3) spurious associations. The rationale for these distinctions is based on our combined method of regression analysis mentioned earlier. Significant relationships noted in the full regression model and in the best-fitting model are considered "primary associa-

TABLE 11

The Strength And Direction Of Association Of Significant Components With Professional Permanent Migration Based On The Comparison Of Results Of The Full Regression Model And The "Best-Fitting" Model

Time Period	Primary Association		Spurious Association (3)	Secon Associ (4)
	Strong (1)	Weak (2)		
10-year period		X_9 (−)		X_3 (
		X_1 (+)	X_8 (−)	X_6 (
1st 5-year period	X_2 (+)		X_9 (−)	X_6 (
2nd 5-year period		X_1 (+)	X_7 (+)	
			X_4 (−)	

Note: The symbols X_1 to X_9 correspond to the nine components, see note on Table 9.

tions." Two kinds of associations are distinguished in this classifica tion: (1) "strong" and (2) "weak" associations. If an association becomes more significant from the best-fitting model to the full regression model, i.e., if the significant F value ($F \geq 1.71$) of component is noted to increase one regression model to the other, then this association is assessed as being "strong." If an association becomes less significant from the best-fitting model to the overall model, using the above-mentioned criteria, then this association is assessed as being "weak." Columns (1) and (2) list those compo nents whose association with the particular dependent variable is assessed as "strong" or "weak." Significant relationships noted in the full regression model but not in the best-fitting model are characte ized as "secondary associations." Column (4) lists those component that are assessed to have this kind of association with the particular dependent variable. "Spurious associations" are those noted as signif icant in the best-fitting model but not in the full regression model. Those components listed in column (3) are assessed as spuriously associated with the particular dependent variable. Some general observations and comparisons can be made from the results pre sented in Table 11, and these are: (1) the full regression models explaining professional permanent migration during these time periods [see columns (1), (2) and (4) in Table 10] show slight resem blance with each other and with the hypothetical model presented earlier (see Figure 2). This lack of resemblance suggests that each time period is accounted for by a set of components which are regarded as "push" factors, each of these having a distinct impact on

each category of permanent migration. Our hypothetical model predicted inverse relationships between the nine components and the dependent variable, and our results show that not all the nine components are negatively related with professional permanent migration. Also, not all significant relationships predicted turned out to be so. (2) Two levels of education components (X_1) and (X_2) have significant positive associations and two levels of socioeconomic development components have significant negative association with skilled migration. Most of these associations are either weak primary and secondary associations. Only X_1 shows a strong primary association during the first 5-year period. (3) More components are associated with professional permanent migration during the ten-year period as compared to the other 5-year periods. This seems logical because significant components for the two 5-year periods are all accounted for in the 10-year period. These findings would suggest that skilled migration can be more adequately accounted for by level of education components. As "push" factors, these can be assessed in the following manner: (1) structural factors are capable of explaining the migration of the professionally skilled, more specifically, the level of education and the level of socioeconomic development of the sending countries. It is interesting and plausible to note that countries having higher levels of education in terms of stock of human resources, particularly in the scientific and technical fields, are likewise characterized by highly skilled migration. Low levels of socioeconomic development is likewise a "push" factor for skilled migration. This can indicate a situation wherein the professionally skilled cannot be adequately absorbed and utilized in countries lacking in the organizational and development-generating features and inputs in the socioeconomic development process.

It has been noted that a set of structural factors explain the permanent migration of the professionally skilled. It can suggest that educational prerogatives should be geared more at meeting the requisites of the sending countries' economies. An oversupply of high-trained manpower in a labor market whose absorptive capacity is greatly impeded by an inadequate industrial and technological base can generate conditions of underutilization and, possibly, unemployment. The latter features, although unestablished by our findings, can very well serve as contributive factors of the out-migration of the professionally skilled. What education policies and strategies can be designed to complement human resource utilization? This has somehow become a moot question. Education is one among basic human needs and rights. Policy and program orientation have aimed for the optimum, particularly when various sectors of society, sometimes

constituting a majority, manifest such inadequacy. Curtailment i pursuing or delineating priorities for higher education with referenc to national development plans can be inoperative in regulating th outflow of skilled manpower. Most, if not all, of the world's societie are not characterized by a closed population. Interest in highe education can be dictated by international labor marker demands a is empirically supported by the findings of this study. What can b done about these structural factors in the realm of policy? Th manner in which these factors are associated with this type of migra tion and the different associations noted over time can create di ficulties in formulating and implementing policies. By "policies" w do not simply refer to emigration policies but more to national plan ning policies. Structural factors reflect areas and concerns that can b better handled by this kind of policy. It is suggested that emigratio be an item considered and incorporated in national planning. Th prospects of formulating emigration policies in many of these send ing countries are not foreseeable. Emigration, nonetheless, is an issu of vital importance, particularly the out-migration of highly-skille people. One solution, perhaps, is to regulate it in accordance with th educational, manpower and socioeconomic needs of these countries.

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