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AIR TRANSPORTATION IN DEVELOPING COUNTRIES

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I. INTRODUCTION

In the United States, as in most other economically advanced nations, the novelty of aviation has worn off. No longer do people go out to the local airport to watch the "big birds" take off and land. Indeed, when the air transportation industry is discussed, the focus is upon the problems that the industry causes rather than upon the benefits that the industry provides. These problems, such as noise, pollution, ground and air congestion, are in part due to the rapid expansion of air as a transportation mode and in part due to the lack of attention paid by the air transportation industry to the environmental impact of its actions. There is a possibility that the current emphasis on the problems of aviation will cause people to lose sight of the unique capabilities of the air transportation system.

In the United States the overall transportation system has evolved gradually. Initially, the main transportation mode was water - the Erie and the rest of the canals. Water was followed by two ground modes : first railroads, and ultimately today's highways. Each mode has in turn been superseded because its successor offered its services at less cost. The supplanted modes still retain a relatively large share of the market because of

their special characteristics and because of constantly growing demand on all modes of transportation. Air transport has to date evolved into a high-speed transportation mode for people and perishable or emergency cargo. Jumbo jets, in a freighter configuration, hold out the promise of competitive cargo service.

Yet it may be that the greatest promise of air transportation - promise as far as optimum utilization of scarce resources is concerned - lies not in its use in the advanced, but rather in the developing countries of the world. Arguments to this point have been made before, even before aviation technology had provided the highly efficient vehicles of today. As early as 1943, for example, the airplane was seen as a possible method for uniting Latin America:

> Prior to the advent of the airplane the South American continent was accessible only by sea. Its western coast, cut off from the rest of the continent by the 4,000-mile chain of the Andes, and from the Atlantic by the Isthmus of Panama, was for centuries one of the most remote inhabited areas of the world. The building of the Canal relieved its isolation but, far from integrating it with the rest of the continent, actually brought it closer to the United States or even Europe than to the east coast countries. Freight shipped from Lima to Iquitos, Peru (600 air-miles apart), for example, was often sent from Callao to Southampton,

England, where it was transshipped to another steamer to recross the Atlantic and voyage up the Amazon, a total trip of some 13,000 miles.[1]

Similar statements are often made based on nothing more than faith in aviation. There appears to be no comprehensive treatment of the possibilities and problems of air transportation in developing countries. The purpose of this study, then, is to provide the beginning of such an overview.

Air transportation is a subset of two larger systems: transportation and aviation. To provide a proper perspective for air transportation, a brief look is first taken at the development of transportation systems, followed by a delineation of aviation classes. A general description is then provided of underdeveloped areas, and the implications that the characteristics of these areas have for aircraft selection are noted.

To begin a more detailed view, the various concepts that are commonly held about the role of air transportation in developing countries are discussed. Cases taken from the history of airlines of the third world are presented. The examples are chosen to note the commonalities and differences of these airlines in such matters as evolution, policy, organizational structure, and problem areas.

The help or hindrance that advanced nations are providing for improving the aviation systems of the developing countries is examined in chapter VII. Aviation technology is considered as an example of technology transfer. The focus is primarily upon the

United States and the International Civil Aviation Organization. Finally, some conclusions about the future of air transportation in developing countries are drawn.

The study is intended to be descriptive rather than analytical; it is hoped that it will provide a starting point for more analytical and detailed work in the future. Although the study clearly cannot be all inclusive, it is hoped that most of the major problems will be touched upon, even if no ready solutions are proposed.

II. TRANSPORTATION SYSTEM DEVELOPMENT

Transportation, the movement of people and goods from one place to another, constitutes a large portion of national expenditures. For example, in the United States the transportation industry accounts for about 20% of the Gross National Product. Consequently, transportation deserves careful analysis, for a large r.turn on investment may be obtained by means of rational and economic planning of the transportation system.

As far as industry is concerned, its location is determined by many factors. Some of the factors are easily quantifiable and some appear to be the result of sheer chance. The principal location factors are usually considered to be the availability of raw materials, markets, power, labor, and transportation. The primary determinant in the location of industrial concerns is the relative cost of transporting raw materials and finished goods. In general, industries choose to locate nearer the source of the raw materials rather than nearer the market if the raw materials lose weight in the conversion to finished products. A complimentary determinant is the rate charged for transporting raw materials vis a vis manufactured goods. Clearly mobility of the factors of production would diminish their relative importance in locating many industrial undertakings, so that transportation, or its lack,

may be considered the major factor which determines location of industry.[2]

Transportation can reduce the overall cost of goods not only by allowing the location of industry close to the source of raw materials and moving the finished products, but additionally can allow the location of production to be chosen independently by transporting the commodities. In general, transportation which is low in cost encourages producers to take advantage of any available economies of scale.

To the degree that lower costs are reflected in reduced prices, low cost transportation can bring lower prices to the consumer. It increases competition by allowing distant producers to compete effectively against the market area producer. Low cost transportation also allows the traditional theory of comparative advantage to work by allowing geographical division of labor.

Finally, the availability of fast and economical transportation allows manufacturers to consider the concept of total distribution costs. Usually producers have considered each link in the distribution chain as a separate entity and as such have assigned a given cost to it. The attempts to reduce the cost of one link in the chain not infrequently resulted in increasing the cost in another. The total distribution cost concept, on the other hand,

asks the producer to consider each link in the chain in terms of the overall cost. Then it can be seen that fast and cheap transportation yields (among others) the following advantages:

(a) Reduction of inventory, warehousing, tax and insurance costs;

(b) Freeing of capital which is normally tied up in large inventories (or goods in slow transit) - capital which then presumably can be used to advantage elsewhere.

Assuming for the moment that investment in transportation is an appropriate policy for a country to follow, there still remains the problem of what constituent parts to choose for the system. Ideally, many factors should have a bearing on this decision. They should include:

(a) relative capital costs of alternative modes

(b) relative operating and maintenance costs of alternative modes

(c) volume of freight and passenger traffic to be carried

(d) nature of the commodities to be transported

(e) distance that the commodities will be transported

(f) relative demands of the alternative modes on the supply of foreign exchange available in country.[3]

However, a rational choice based upon the above criteria is not always (and in practice, almost never) possible. The difficulties are many. Few countries are fortunate enough to do their transportation system planning without the presence of an extant

infrastructure (no matter how rudimentary), so that the first problem encountered is that of the vested interests who depend upon the existence and continued expansion of the current system.

Another difficulty, common to both developed and developing nations, is that of the lack of adequate data on which to base investment decisions. This lack of data extends from the inability to determine the true costs of alternative systems in developed countries (plagued by such problems as joint costs of passenger and cargo service), to an absolute lack of data on true maintenance costs in some developing countries.

In developing countries, generally, lip service is paid to the efficacy of systems analysis as a tool in transportation planning. However, the apparent lack of adequate data allows many national planners to give up on the rational and economic decision-making that is implied by systems analysis and to rely more on trational procedures; i.e., following the established government policy and not attempting to innovate. A lack of rigor in transportation planning is also justified occasionally by the allegation that the economic principles which govern transportation are creations of developed countries and, consequently, do not apply in developing countries.

Some additional problems encountered in planning national transportation systems, for both developed and developing countries

follow. One problem is similar to that of not considering total distribution costs. Government officials go about drawing up plans for various modes of a transportation system without thinking about the effect of one mode upon the other, or any of the modes upon a country's economic development.

One reason for this neglect is the difficulty of quantifying the effect of investment in transportation upon economic growth. As transportation benefits more than one activity, the usual input-output analysis cannot be applied. Although economists, and transportation planners, know that the existence of a transportation is a necessary ingredient for a country's development; and that lack of it can slow development down greatly; the magnitude of investment required and the consequent economic benefits are in general unknown.[4]

Aside from transportation's nebulous and unquantifiable effect on economic development, it is useful to discuss some other possible caveats for investment in transportation. It has been generalized that if the system (or some component modes) is inefficient there will be a net loss to society, as the savings due to reduced production costs (through use of the comparative advantage principle) will be lost due to the greater expenses incurred in transportation. "No gain comes from carrying a thing from one place to another unless

it can be produced at the first place so much more cheaply that it can afford the cost of carriage to the second. Ability to stand the transportation charge is the test of the utility of the carriage."[5]

It is also useful to distinguish between the meaning of economic and fast transportation to the individual and to the nation. To an individual, transportation cost (of goods or persons) is reflected in the price he pays; yet this price does not necessarily reflect the cost of the system. If a country chooses to support the transportation system by subsidies, disguised costs and general taxation (in other words, indirectly), then a system which appears to be very cheap to the user may turn out to be very expensive for the nation as a whole. When the user does not pay for the service, the importance of data reflecting true system costs becomes highly important to planners who are seeking to evaluate alternative transportation modes.

Although an investment in transportation will clearly result in increased mobility of goods and persons, there are subsidiary effects which may arise and which must be taken into account. The first is that increased mobility of labor may lead to unplanned urbanization of the country's population: it may be that cheap transportation, instead of encouraging geographical dispersion of

industry to rural areas (according to territorial specialization) will instead allow the rural population to shift to urban centers, with the possible concomitant calamities. Also, if transportation is cheap enough, from a user's point of view, not enough attention may be paid to geographical advantages by industry, resulting in inefficient use of the country's resources. Another side effect may be the substitution of transport-intensive consumption goods, such as pleasure travel, for other, perhaps more economical, goods and services.

Finally, it is not altogether clear that transportation, in and of itself, will cause industrial growth: "Where a nation is deficient in the factors conducive to growth, no amount of transport investment will create the economic dynamism that is so ardently desired."[6] Transportation investment here becomes similar to fiscal or monetary measures undertaken by governments (such as lower interest rates) which, in isolation, cannot accomplish economic development.

III. AVIATION SYSTEMS

A nation's aviation system can be categorized in many ways. One rather standard procedure makes two broad subdivisions: (1) the airlines, i.e., those air carriers that transport people and goods for a consideration, and (2) general aviation, essentially everything else that flies. In the United States by these criteria, airlines account for only 2% of the total aircraft fleet, 29% of the airmiles flown and 50% of intercity travel. However, high personal income combined with a sound aviation infrastructure in the United States cause general aviation to have a disproportionate share of the system, when compared to other countries. Problems related to general aviation will at some time in the future afflict the developing countries, but that topic will not be addressed in this study.

A slightly different classification of the aviation system has been adopted recently by the US Aviation Advisory Commission.[7] It appears to be far more useful for discussing the needs and requirements of aviation in developing countries, and will be briefly described here.

Instead of dividing aviation into what at first glance appears to be commercial and non-commercial classes, as above, the Commission chose two other broad classes of aviation, to wit:

(1) Transportation, and (2) Special Uses.

Transportation is defined as the movement of people and goods from one point to another by air vehicles. This is of course simply the broad definition of transportation, as in Chapter II, with the qualification that the carriage is to take place by air vehicles. The Special Uses class includes 1) Training, 2) Security, 3) Industrial, and 4) Recreation and Sport. Transportation is subdivided into four major areas. They are (1) Public Air Service, (2) Corporate/Executive, (3) Personal, and (4) Government.

Public Air Service consists of (1) scheduled carriers and (2) charters. The difference between these two groups is that scheduled carriers operate on published schedules and over specific routes, while charters are those operations (by scheduled as well as other air carriers) which are performed on an "on-demand" basis.

The Corporate/Executive class includes aircraft operation by any properly constituted commercial enterprise, ranging from corporations to individuals, incidental to the conduct of that business. These aircraft are not, therefore, operated for compensation or hire by persons outside the business enterprise.

Personal air transportation is a slight variation on the above. The corporate class of aircraft is normally flown by a

professional crew; the personal type is flown by an individual for either business or personal use. It is also not operated for compensation or hire.

Government air transportation is again quite similar to the corporate class, except that the entity owning or operating the aircraft is a government organization. The use of the air vehicles is restricted to transporting government employees or property.

In the Special Uses category, training is the use of any aircraft for the purpose of formal flight instruction. This includes civil flight training as well as military flight training. Civil includes instruction given by private organizations, commercial pilot school operators or by the airlines. Military is instruction of military personnel in the operation of all types of military aircraft.

The Security classification includes the use of aircraft for national defense or protection of people and property. The military use of aircraft for security purposes includes all organized armed services which operate aircraft; the civil security uses include police use, firefighting, disaster relief, and airborne ambulance operations.

The two remaining classifications of Special Uses are industrial and recreation and sport. The only one of immediate

concern to developing countries is the industrial class, as it encompasses such activities as aerial photography, mapping and surveying performed by non-government organizations; aerial applications, which include the use of aircraft for agricultural, environmental or animal control purposes; and flight testing, which includes experimental or production testing of flight vehicles.

For the purposes of this study, air transportation will be assumed to fall basically into the transportation class, and more specifically most of the following discussion will deal primarily with public air service. The other classifications were described at some length to highlight the many other useful functions that can be performed by various classes of aviation, and that consequently should be considered by the responsible aviation authorities, civil and military, in a developing country.

IV. CHARACTERISTICS OF UNDERDEVELOPED AREAS

At the outset it is worth noting that the term "underdeveloped" is applied to a wide variety of situations; indeed, there does not exist an "average" underdeveloped area. Various types of socio-economic, geographical, and cultural conditions are present in areas designated as underdeveloped. However, it is possible to discover common characteristics among these areas. For example, and of primary importance to this study, there is the absence of adequate transportation.

An underdeveloped area is marked by the presence of either (or both) of two handicaps.[8] These are difficulties associated with: (1) the geography of a country, i.e., aspects of topography, climate, and vegetation; and (2) the economic state of a country, i.e., density of population, availability of capital, and size of per capita gross national product.

The combination of harsh geographical conditions, low population density, and high per capita GNP can exist in a nation, as in northern Canada and Australia, so that these areas can be considered as underdeveloped, in one sense. In general, however, "underdeveloped area" is synonymous with developing country. The combination of geography and economy is one of a severe physical

state - plus low per capita GNP, lack of capital resources, and either high density of population (Indonesia, India) or low density of population (Sudan).

From a geographical point of view, some of the underdeveloped countries provide unusual environments for aircraft operations. The state of West Irian in Indonesia is a not untypical example.[9] West Irian covers the western half of the island of New Guinea; the eastern half is administered by Australia. The territory is densely forested and is divided by a range of mountains, east to west. There are innumerable rivers and swamps. These conditions, including a heavy undergrowth, make much of the region almost impassable. There are population pockets in the central highlands (about half of West Irian's population of about one million lives here in highly primitive conditions) as well as coastal towns. The grand total of about 500 miles of roads is essentially all built up in these coastal centers.

The need for communication with the highlands thus necessitates the use of aircraft. West Irian presents an interesting operational problem.

> The weather generally follows a pattern: Early morning fog prevails daily, usually clearing between 0800 and 0830 hours and the uplifted fog turning into

> broken clouds; thereafter, the cloud cover progressively builds up and by about 1400 heavy precipitation begins along the mountain range, passes are closed and the flying into the area becomes extremely hazardous.[10]

The continent of Africa presents a great variety of geographical difficulties for aircraft use. Here high temperature becomes an important factor and is combined with adverse terrain, especially in the South and East. In Ethiopia, the conditions have been described as follows:

> The majority of Ethiopian airfields consist of a single landing strip reclaimed from the surrounding countryside; the length is generally rather short (averaging 2620 to 3950 ft) when taking into account altitude (mostly from 5000 to 8900 ft) and the temperature (...95°F at least for the period May-June). Landing strips established in wooded countries are cleared for a narrow width only (130 to 160 ft). Those in the plains are sometimes identifiable only by wheel-marks made during previous landings...
>
> Runways in the mountainous sector of the country can be used more or less normally 2 hours after the rains... Airstrips on the plains must be closed during the rainy season.[11]

A look at a relief map of the earth indicates that a dominant feature of many developing countries is the presence of large numbers of mountains and plateaus, as noted in the examples given above.

Thus aircraft must not only operate from high altitude airfields, (whatever condition they may be in), but must then fly at yet higher altitudes (10,000 to 20,000 feet) in order to reach their destination, which is located beyond the mountain range. Thus a primary requirement for aviation imposed by the physical environment of developing countries is seen to be the capability to take off (without excessive loss of payload) from high, unprepared, short, and usually hot airfields.[12]

There are other climatic difficulties which recur often enough to note here. Humidity can range from extreme dryness and dust storms in desert regions, as in North and Central Africa, to extremely high humidity in jungle regions, such as Brazil. Rain, thunderstorms, and floods can (and do) follow the dry seasons in many countries, and aircraft must be suitable for use in these climatological extremes.

The airplanes must also be useful for more than one mission. The luxury of designing an aircraft primarily for passengers or cargo is not allowed the engineer who is attempting to meet the needs of underdeveloped areas. Given the fact that there is generally little competition, or help, from other transportation modes such as rail, highway, or ship, the range of missions that these aircraft must perform is very wide. Goods transported

include low-value bulk items (including livestock), and it is not unusual to find cargo and passengers in the same cabin.[13]

When the aircraft configuration is found wanting, the operator improvises. An owner of an airline in the Australian Outback discusses the situation:

> We have been successful in making a QC (Quick Change) aircraft out of the Twin Bonanza - with an air stairs door at the back, as well as a front door which enables us to handle any combination of freight and passengers. This is the one great disadvantage of the Heron - the lack of a front door. We have also developed our own special stack-a-by chairs for the Twin Bonanzas so that we can get maximum cubic capacity for freight when not carrying passengers. The chairs can be removed and stacked in the rear locker, leaving plenty of space there for freight.[14]

It must be recognized that aircraft used on internal routes of a developing country are likely to have low utilization rates. The DC-3 fleet of Ethiopian Airlines (consisting currently of nine DC-3s) averaged 2 hours per day, and Ethiopian Airlines was considered to be an efficient airline.[15] The low utilization is due to a number of factors, which should also influence aircraft selection in developing countries: (a) lack of adequate navigational aids, both en route and at airports, limiting flights to daylight hours and high visibility conditions; (b) low demand, due

to low population density and/or high cost of air transportation; and (c) short route segments.

Critics who think short haul air fares in the US are high might be heartened by fares in Zaire (formerly The Congo). The price of a one-way economy ticket on Air Zaire between Kinshasa and Gemena, a town 600 miles north near the Congo River, is $86. This rate of 14 cents a mile is representative of the rate throughout Zaire. The fare for a comparable trip in the US is $55.[16]

The rationalization for these high fares is usually presented in this fashion. The demand for air transportation is said to be mainly generated by public or private business so that the traveller does not pay the fare himself. This demand is assumed to be relatively inelastic and growth of air travel is assumed to be strongly correlated with general economic activity. Acting on this assumption, airlines in developing countries do not reduce these high fare levels, believing that in so doing they would only reduce their revenues.[17] A more cynical observer might note that these routes are served by monopolistic airlines, while the traveller has essentially no alternative means of reaching his destination.

Among other factors influencing aircraft choice, it should be noted that there is in general little value attached to a

marginal increase in speed of the aircraft. Alternate modes are generally much slower (two days versus two hours is a common trade-off), when in fact they exist at all.

Finally, the aircraft must be designed realizing that maintenance facilities are likely to be poor (or non-existent), that spare parts will be difficult to obtain, and that ground personnel will be inefficient and poorly trained.

V. THE ROLE OF AIR TRANSPORTATION IN DEVELOPING COUNTRIES

There has been much misunderstanding of the unique capabilities of air transportation, and a consequent lack of vigor in promoting its use in the developing countries. There are many reasons for this, and this chapter will attempt to highlight a number of them.

One of the most important reasons is the fact that, viewed on a macroeconomic scale, air transportation volume is small compared to other transportation modes. Thus it tends to be more or less ignored by government planners. Prest, discussing transport in developing countries, states:

> The relative unimportance of internal air travel... discussing present transport facilities in these countries one is covering the great bulk by concentrating largely on road and rail.[18]

In Latin America a study undertaken by the Organization of American States (OAS) revealed that the bulk of transportation investment proposed in National Plans for Economic Development under the Alliance for Progress was allotted to highway transportation. During the investigation, analyses of proposed highway investment were made which indicated that the investment was aimed at the betterment and extension of crude roads in areas which were then economically served by air transportation. The study went on

to note that the overall economy would be improved if comparative costs of alternate means of transportation were taken into consideration when decisions were made on investment in transportation within the national development plans. The study recommended (or pleaded for) a greater and more dynamic participation by officials of Civil Aviation in national economic development planning.[19]

This hypothesized myopia regarding air transportation extends not only to government planners, but also to local scholars. A recently completed Harvard study on Colombia, utilizing systems analysis techniques, discussed air as follows:

> The share of total ton-kilometers carried by air is small...Air was not included because of storage limitations within the computer and (Ed. emphasis) because of the relatively small volume of traffic moving by air...As a practical matter, analysis of the trade-offs among all possible investment projects for all transport modes in Colombia is unnecessary...The main trade-offs are among alternative sets of intercity highway projects or...for extensions of the rail network... it can be assumed that investments in...airports...are exogenously determined and have no budgetory interdependence with highway and rail projects.[20]

The Harvard study ignores seemingly solid evidence that Colombia has been one developing country in which air transportation has made remarkable inroads. It is successful because in Colombia economic activity is dispersed among a half-dozen cities, which are separated by terrain obstacles that make other modes of transportion largely unacceptable.[21]

Other analysts tend to view air transportation as useful in one role only. The nature of the development of air service in the United States, or other advanced nations, and the existence of alternative transportation infrastructures may provide an unconscious bias as to the possible uses of air transportation in those economists and planners who have had a great deal of their experience in developed countries. This prejudice of Western oriented planners is exemplified by the following rhetorical question:

> Air transport flourished most in highly industrialized communities where the urban population was most marked (and) passenger traffic formed the chief source of revenue...How can air transport be important in under-developed areas where none of these conditions is fulfilled?[22]

Some government planners, at least those that do not have the blind sport about aviation, recognize that there are

multiple roles that air transportation can fulfill. In Latin America, a study for the Pan American Union recommended that air transportation be viewed as a possible tool for national development, aside from its more commonly accepted function in international commerce. The study noted that surface modes will be justified once the population density and traffic volume of an area increase. In areas of difficult terrain and low population densities air will remain most economical. The types of aircraft needed in these two distinct areas will be different, as high speed, modern aircraft will be required to compete with surface transportation in the high density area; whereas slower, smaller airplanes will suffice in the low density regions. A final requirement for aircraft will be to serve agricultural and highly underdeveloped areas. Here helicopters and general aviation aircraft can perform agricultural and exploratory roles.[23]

The above study goes on to state that in Latin America, air transportation has played an important role in economic development. The services which air is credited with include : (a) increasing national unity by linking scattered population centers; (b) offsetting the deficiencies (to some degree) of surface transportation; (c) opening up undeveloped areas, such as providing the primary

link to Brasilia; (d) connecting Latin America to world markets; and (e) providing the usual (Western) role of high speed domestic transportation.[24]

But it is one thing to note, in general, the service that air can provide, and another to put it into effect. As the OAS study says , where the construction of roads and highways has eaten into the air traffic demand, the growth of domestic air transportation has been reduced. Clearly the domestic airlines were not "opening up undeveloped areas" by extending their routes into new territory to make up for traffic lost to motor vehicles. The explanation, according to Heymann, is that:

> It is unlikely that a conventional airline would have the resources or would be willing to take the financial risks of experimenting vigorously with new routes that could be pioneered, isolated areas that could be opened up, and contacts with the hinterland that could be established. From the airline's point of view, although such activity would create important external economies for the nation, it would never pay for itself directly.[25]

This argument is probabily valid for those situations where the airline is privately owned or where there is competition on the main, presumably profit-making, routes of the airline. When the airline, even though private, enjoys monopolistic routes, it may adjust its fares and schedules on these routes for profit

maximization (as could be done by Air Zaire). Using this tactic the airline may obtain the internal capital to permit it to subsidize the operations over new routes, acting on the assumption that in the long run the new routes will grow and provide a healthy return on this investment.

The basic arguments discussed above explaining lack of future growth of air transportation, i.e. total neglect because of its small size, its alleged inappropriateness to underdeveloped areas, and lack of enthusiasm by airlines, are countered from the other side of the spectrum. But much past optimism may have been equally devastating to the further progress of air transportation.

An example of the most uncritical and optimistic view of air transportation goes as follows:

> Air transport is particularly adapted to serve as a means of international intercourse, with the result that those deepened contacts bring about an increased spirit of international good will and develop a feeling of brotherhood among the peoples of the world...
>
> From the point of view of international relations in the broadest sense, the more the peoples of the world are able to move around and see other ways of life, the more quickly shall we arrive at an age of peace and plenty.[26]

It is not altogether clear that greater intercourse among people will lead to improved relations among nations. G.B. Shaw once made an observation to this point, and suggested that the more people get to know each other...the

more likely they would be to kill one another. One need not accept this somewhat extreme notion, but to suggest that a transportation mode may accomplish something that generations of (mostly) well-meaning political leaders have failed to do is certainly extreme.

On a less grandiose, but still naive, scale there have been almost magical powers ascribed to air transportation:

> A common feature of these emerging nations is the lack of any kind of good ground transportation...But they are going to want their share of the world's trade and goods, without having to wait too long for it...Many countries can jump right into the jet age. There are large areas of Africa and Latin America where a few strategically placed airports could open up a new life for millions of people.[27]

It is certainly extremely unlikely, nor is there any evidence, that economic activity can be created solely by flying aircraft into previously isolated regions. In fact, the mere creation of a transportation link of any kind does not mean that it will necessarily be used. This argument applies to international routes as well as domestic, but other arguments are put forth as well for the desirability of an international airline:

> ...An international airline gives some kind of status or prestige to a country...The prestige concept to some extent really masks an irrational human feeling wherein a nation is personified and is considered to be entitled to an international airline as part of its "personality"...a LDC that accomplishes

> what may for it be the difficult task of founding an international airline may be encouraged...to try other difficult tasks.[28]

Two arguments are intermingled above. An international airline is alleged to enhance the national image and to aid in the development process. For internal development, the benefits of a regional air network are usually substantial. A regional service links the nation to its nearby neighbors and to a long haul system and is useful in attracting tourism, trade, investment and foreign aid. A long-haul carrier, on the other hand, must compete against other international airlines, and the benefits become less tangible. The image benefits of showing the flag must be weighed against the possibilities of extensive subsidies and foreign exchange losses.[29]

Considering only economic aspects, an international airline established by a developing country competing against long-time international carriers will suffer because:(1) it will not be able to attract as many customers because of its smaller network size, and (2) other carriers will have lower costs resulting from their large-scale operations. But the prevailing economic theory in many (almost all) developing countries is based upon the work of the

Argentine economist Raul Prebisch. This school of thought holds that industrialization is the only possible way to improve the low productivity and low per capita income existing in developing countries.

For government planners in these nations, the operation of an airline may fall within the meaning of industrialization. Since, following Prebisch, the founding of a new industry is favored even when the product can be imported at less cost, (if the result is a higher rate of return on capital shifted from a traditional use), it is not inconceivable that an international airline will be established even though there is little chance for it to compete on a straight, unsubsidized basis with larger competitors.[30]

Prebisch does have his critics, mostly in the developed countries, needless to say. In general they criticize his theories for having no statistical evidence to back them and for "general theoretical fuzziness". However, this appeal cannot be discounted. Two-thirds of the world accepts them as unquestioned truth, and ultimately that may be more important than logical rigor in determining whether they are to prevail.[31] Of course, one can still debate whether Prebisch's theories hold for international airline operations, in particular. Air transportation provides a service, not

a good, and import substitution rules do not necessarily apply.

Finally, a non-economic factor, but nonetheless real, is that governments in power in developing countries often operate in a highly unstable political environment. Thus they will, because of their own short term expectations, be more prone to undertake projects which also appear to be short term in nature. The purchase of new jet aircraft and the building of new jetports (aided and abetted by aircraft manufacturers) may appear to autocratic rulers to be a handy technique to display their power.[32] Thus air transportation can fulfill a final role of ego satisfaction for rulers of some developing countries.

VI. AIRLINES IN DEVELOPING COUNTRIES

The developing countries of Africa and Asia were, prior to the end of World War II, largely nonexistent. They were simply the colonies of Great Britian, France, etc., and were thought of only as areas that provided raw materials for the industries of the home country. To a large degree air transportation before the end of World War II was also underdeveloped: it was thought of as an expensive, adventuresome, high speed form of travel rather than a true transportation mode.

As a result of the considerable research and development which took place during the war, leading to improved safety and economy of operation of aircraft, it appeared possible for airlines to cover the cost of their operations. People had also become more air-minded during the war (of course, in more ways than one) and the demand appeared to be there.

Thus the post-war expansion in air transportation in the developed world coincided with the granting of independence to many African and Asian colonies. It often appeared that the first two acts of newly established nations were, 1) to apply to the United Nations and, 2) to found a national airline.

Latin America, although considered as one of the underdeveloped areas of the world, is a special situation. Most of the countries

in Latin America had been independent, at least politically, for over a hundred years. They had participated in the growth of aviation from the beginning; indeed, the first permanent airline in the Western Hemisphere was founded in 1919 in Colombia.

That is not to say that the colonies were without air service. Indeed, nations which had overseas possessions recognized quickly the value of a national airline as a means of rapid and private communication. In 1919 the Dutch East Indies government promised a prize for the first flight in less than two weeks between Amsterdam and Batavia. By 1929 Imperial Airways (now B.O.A.C) had a regularly scheduled route to India, gradually extending it eastward to Singapore, and finally, in 1934, to Australia - the 13,000 miles trip taking twelve days.

However, B.O.A.C. was not first nor fastest. A few months before B.O.A.C. reached Australia, the Dutch airline K.L.M. had flown three passengers in a newly bought Douglas DC-2 from England to Melbourne in less than four days. Thus it was a significant event in aviation history, for K.L.M. then promptly ordered fourteen DC-2s. This was the beginning of American equipment dominance in long haul air transportation.[33] By 1932 Imperial Airways was also servicing Capetown, including the rest of British Africa en route.

Belgium, with its vast colony in the Belgian Congo, had

SABENA providing regular service by 1935. SABENA had gradually built up a regional system in the Congo, which disappeared during the strife of 1960. Air Congo, now Air Zaire, was then formed in 1961 to take over the regional routes. Technical assistance came from SABENA, which initially also held a 30% interest in the company. Air Congo in 1968 signed a contract with Air Canada for technical and managerial assistance, thus presumably removing the last of Belgian influence.[34] France, through Air France, also linked up its colonies in South East Asia (Saigon) by 1931 and its possessions in Africa by 1933. Thornton notes that:

> All of these tremendous efforts to pioneer air services without hope of purely commercial profitability were clear evidence thatairlines were considered by the imperial powers to be important tools of empire. By World War II it was an accepted national objective of all colonial powers to tie their colonies to the homeland by air services. Since such a service could only be secure if it were under the control of the home government, national airlines were developed and became symbols of empire.[35]

Small wonder, then, that upon independence one of the first acts of a nation was to fly the new national flag on its own airline. Symbols will be symbols.

LATIN AMERICA

Latin America, during the 1920's and the 1930's, was the first

(and probably last) scene of attempted colonization by means of air transportation activity. Colonization is probably too strong a word: foreign countries attempted to obtain whatever power accrued to those who had a dominant influence over the high speed transportation mode of a nation.

The nations competing in this game were the United States (with Pan American Airways), Germany (with Lufthansa), and for a brief period of time, France. Until the early 1940's Brazilian air transportation, for example, remained in the hands of, or was influenced exclusively by, United States or German interests.[36] Such competitive penetration attempts are unlikely to recur in the civil aviation sphere, although some recent Russian activities in the Middle East have similar overtones. They are noted here primarily for their probable role in speeding up the development of the air transportation network in Latin America.

In Latin America Brazil is the predominant power in air transportation. For example, in 1963 its airlines flew slightly more than 50% of all passengers within Latin America; adding the passengers of Argentine and Colombian airlines, over 80% of the traffic is accounted for. In freight operations, Brazil and Colombia alone accounted for 80% of domestic air cargo.[37] A closer look will be taken at two giants of the Latin American scene: VARIG of Brazil and Avianca of Colombia; and at a relative dwarf, AVENSA of Venezuela.

Brazil is one of the few countries in the world that allows competition on its domestic routes - the other two notable examples being the United States and Australia. Brazil is big; it covers an area larger than the contiguous U.S., and is second only to the U.S. in the number of paved runways. In fact, it may be stretching the point somewhat to consider Brazil as developing, at least in the aviation sense. Airlines are mostly private and competition has been traditional, but controlled, as in the United States. Brazil also follows a policy of cross-subsidization in structuring its domestic routes, again similar to the Civil Aeronautics Board policy in the U.S. Routes are allocated to the airlines in two groups: (1) routes which are considered by the Brazilian Government as "pioneer" routes, and (2) routes which have previously been developed and are assumed to be immediately profitable. In this class, route rights are assigned to those airlines deemed most able to serve the public in a spirit of competition. Pioneer routes are generally assigned to individual airlines in proportion to their allocation of the developed (and profitable) routes.[38]

In Brazil, just as in the United States, many airlines have merged into a few (four as of 1972), and the largest to be created to date has been VARIG. VARIG (Empresa de Viacao Aerea Rio Grandense) -

the first airline in Brazil - was founded in 1927 to develop routes in the state of Rio Grande do Sol, and was initially partially (21%) owned by that state. VARIG used German equipment, although there was no German ownership of the airline. Flying Junkers F.13 landplanes VARIG established a modest network of feeder services inland from Porto Alegre and maintained this regional network through 1942. At this time five airlines of substance existed in Brazil. Their networks provided the country with a priceless communications system and every city and town of any importance (and many isolated communities) were provided with air service. Brazil, in the space of about ten years, was said to have become completely airminded.[39]

World War II did not affect Latin America in any physical way. The economies of the countries grew more rapidly than normal because of the demand for their products by the United States. Air transportation shared in this growth; indeed, during the 1940's, Mexico, Brazil, Argentina, and Colombia became some of the leading airline nations of the world. (World War II, of course, had decidedly stopped civil air transportation growth in Europe.) During this period airline mergers were favored by Latin American governments, and usually a government sponsored carrier was created out of a number of smaller lines, although in Brazil demand was strong enough to support a number of airlines.

In 1955 VARIG began service to the U.S. It had by this time become 85% owned by its employees, and was profitable and considered to be highly successful and efficient, perhaps in no small measure due to its ownership status. Other companies did not fare as well, and by 1960 the Brazilian government had become dissatisfied with internal airline competition. It indicated to the airlines that steps should be taken to eliminate needless and inefficient competition. In May, 1961 VARIG bought control of Aerovias Brazil, the international division of the REAL consortium, shortly following this acquisition by buying a majority shareholding in the whole REAL group. With these steps VARIG had become the largest airline in Latin America.[40]

Another big boost was received when Panair of Brazil went out of business in 1965, and VARIG took over its routes, becoming Brazil's main international carrier. It is ninth in the world (1969 data) in terms of unduplicated route mileage and twenty-fourth in terms of passengers carried. Equally important is that it competes successfully on its international routes with some of the world's giants. It is quite common to find American business travelers preferring VARIG to Pan American, while knowing full well that flight and maintenance crews are totally Brazilian.

Despite its overall success, VARIG faces certain special

problems due to the fact that it is an airline in a developing country. The continuing inflation of the cruzeiro is well known and is only slowly being brought under control. The government does not intend to take the more stringent financial measures which would halt inflation, as if feels that they would cause more harm than good. For VARIG,this means that domestic fares need raising quite often; and foreign exchange controls make rapid import of spares difficulty. Thus VARIG has become unusually self-reliant in the maintenance sphere, although a relatively high proportion of capital is tied up in a big spares inventory in Brazil.

In the VARIG domestic network, which serves over 70 points, the trunk and coastal routes show a profit, but certain interior "pioneer" routes produce losses. Once these routes were well-subsidized, but recent government policy, as noted previously, is one of internal subsidization. A major problem in domestic sales and marketing is the need for good, multilingual ground staff. Once VARIG personnel do acquire a good knowledge of English or German, they become liable to be lost to local industry. Finally, the work of staff is hindered by the poor quality of telephone and other ground communication links between major cities.[41]

In Colombia, Avianca (Aerovias Nacionales de Colombia SA) is

the oldest airline in the Americas. It was organized in 1940 as a result of a merger of SCADTA (Sociedad Colombo-Alemana de Transporte Aeros), which was founded in 1919 by five Colombians and three Germans, and another Colombian airline.[42] SCADTA, after its inaugural flight in 1920, was beset by financial problems. Revenues were low, in fact, only 12 passengers flew that first year. But two events took place which saved the company. First, a group of newspapers in Bogota offered a cash prize to the first person who could land his plane near the capital. SCADTA equipped one of its two seaplanes with the wheels of a Hudson automobile and won the prize. The second event was more plebeian. In 1922, SCADTA obtained an exclusive airmail contract with the Colombian government. As for so many other airlines around the world, the mails provided the foundation for the company. Confidence in the airline gradually grew, and in late 1922, the Colombian president became the first chief of state to use an airplane when he took one of SCADTA's flights.[43]

The airline prospered, and although it ranks third in Latin America (behind VARIG and Aerolineas Argentinas), the difficulties that face Avianca are of a somewhat different nature than those that face VARIG. Colombians are well aware that in 1968 Pope Paul VI chose Avianca to transport him on the first papal visit to the Western Hemisphere. In an interview, Avianca's president noted: "You must remember that it is a matter of proportions; we

are one of our country's most important industries; but Avianca has a spiritual importance as well as its physical one."

Thus, Colombians identify the airline as a visible symbol of their country in three continents. But the airline must overcome some problems in the near future if it is to remain viable. It faces increased competition on both domestic and international routes. New equipment and increased resources are needed and its reservation system must be computerized. Finally, it needs to balance its high business travel with more pleasure travel and increased freight revenues.[44]

AVENSA (Aerovias Venezolanas SA), in Venezuela, is a domestic carrier with a modest network of short haul routes facing increased competition from the motor vehicle. It is at the lower end of the air transportation spectrum. AVENSA dates back to 1943, and is 30% owned by Pan American. Its equipment comes basically from the United States, and, as the next paragraphs show, some of its problems are directly related to this fact. AVENSA thus demonstrates some other pitfalls facing airlines in developing countries.

A slowdown in Venezuela's economy at the beginning of the 1960's halted traffic expansion at a time that AVENSA had to pay for recently acquired, for hard currency, equipment. In 1967, just as passenger traffic was picking up again, inflation started spiralling in the United States. Inflation was also present in Venezuela, and although less serious, personnel costs began to

rise and overheads began to mount. AVENSA was able to obtain some relief from the Venezuelan Government on domestic fares but was powerless to do anything about rising overhaul and spares costs. Even if these increases were justified, AVENSA was rather bitter:

> "The US Government regulates fares through the CAB. Why cannot some US agency, say, of the Department of Commerce, examine the question of spares and overhaul prices? They have a serious effect on smaller companies. Inflation in the USA is choking Latin American airlines, which are basically very small with tight profit margins." [45]

Such are some of the troubles of a short haul airline in a country in which the economy is expanding and the living standard is going up. The country's development is viewed as a mixed blessing by the airline management, because the concomitant growth of ground transportation provides direct competition.

There still do occur incidents which make people leery of flying on airlines of developing nations. The discussion here has centered upon generally safe and efficient carriers. Some do not give that impression. Dominicana Airlines' authority to serve points in the United States was suspended in February, 1970, following the crash of the company's newest DC-9. The aircraft crashed shortly after take-off from Santo Domingo airport after

an apparent engine failure; all aboard were killed. Although accidents can happen to the most safety-concious airline, this incident did remind travellers of a similar occurrence only eight months previously, when a Dominicana Corvair was lost at Miami following engine failure on take-off. According to reports out of Santo Domingo, four mechanics employed by the airline were arrested following an initial investigation of the DC-9 crash.[46]

AFRICA

After the end of World War II, nothing immediately startling happened to the political map of Africa, unlike the more rapid developments in Asia. It was only in the middle 1950's that the first countries (Morocco, Tunisia, and the Sudan - all in 1956) gained their independence; this movement became widespread only during the 1960's. When the war ended there was a colonial rush into Africa, only this time for air routes rather than land, and as earlier the British gathered up most of the available goods.[47]

The British, using B.O.A.C., divided (logically enough) Africa into geographical groupings of air lines - East, West and Central African Airways: E.A.A.C. in 1945, C.A.A. in 1946, and W.A.A.C. also in 1946. In retrospect it appears that in Africa the British were reasonably foresighted, establishing - considerably ahead of the day of independence - airlines which could act as regional feeders to the international airline of the colonial power. In

this way they may have hoped to retain some economic influence in the new states, leading to some sort of aviation neocolonialism.[48] However, most of these regional groupings did not survive the coming of independence. The one that did, E.A.A., is one-third owned by Kenya, Tanzania, and Uganda, respectively, and has been considered a success.[49,50] But as a feeder airline and an agent of neocolonialism, it is a failure:

> Talks on a new United Kingdom-East Africa bilateral air service agreement will revolve around a series of exceedingly tough demands put to the Board of Trade by the East Africans in informal talks last March. The delegation from the East African Community (Tanzania, Kenya and Uganda) is expected to demand that British flights under the agreement be cut from the present 20 round trips a week to only eight, the number now operated by East African Airways...
>
> The Board of Trade last week declined to comment on its attitude to the demands. But it clearly cannot concede the demands, at least without very extensive watering down... There is also the danger that any weakness on the part of the British Government might be taken as a signal for other developing countries to press extreme demands on behalf of their flag carriers, perhaps without recognition of the part played by British carriers in developing the routes concerned.[51]

West African Airways (W.A.A.C.) was initially owned by the governments of Nigeria, the Gold Coast, Sierra Leone, and Gambia.

In 1958, with independence already granted to Ghana (ex-Gold Coast), and no prospect for political federation among the remaining member states, the airline was divided and W.A.A.C. became Nigeria Airways, while Ghana established an independent Ghana Airways.[52] Ghana, of course, became famous as the most noted example of developing nations' grandiose aviation plans gone awry. It ordered jets from not only Great Britain (the VC-10), but also from the U.S. (Boeing 707's) and Russia (Ilyushin Il-18s): in fact, Ghana ordered a fleet that would have been more than adequate for one of the advanced aviation nations of the world.[53]

Nigeria Airways was owned at its inception in 1958 by the government (51%), B.O.A.C. (16%), and a private investor. Possibly observing the catastrophic goings-on of its neighbor, Ghana, Nigeria Airways was content to improve its domestic network and expanded its fleet slowly. However, it was not without its problems, which demonstrated some of the cultural constraints that developing countries may impose on efficient expansion of air transportation.

In 1969, the Nigerian Government detailed, in a White Paper, the affairs of Nigeria Airways during the period 1961-1965. The tribunal of inquiry uncovered incompetency and corruption in both the management of the airline and in the Government departments

which had dealings with it, dating from 1961, i.e. the time at which the Nigerian Government nationalized the company by buying out the other two shareholders. Up to 1961 the airline had made a profit, but afterwards it began running at a loss. In 1963 the loss totalled more than half a million pounds. Corruption evidenced itself as fraud on the part of those airline officers which had been instrumental in the purchase of five Fokker F.27s in 1961. Among other matters related to the airline, the tribunal noted lack of financial control, the mismanagement of funds, and laxity in the recovery of debts, including large amounts owed by other international airlines. The Nigerian Government during this period is also criticised on many points, such as indiscriminate allocation of traffic rights to foreign airlines without obtaining anything in return for Nigeria Airways.[54]

An example of a non-regional airline that was set up by the British during this post-war period is Sudan Airways. Sudan Airways provides a good example of lack of a logical (or ever clear-cut) objective under which airlines of developing countries are sometimes forced to operate. It was founded in 1946 with the cooperation of Airwork Ltd., rather than the ubiquitous B.O.A.C.[55] The original idea behind Sudan Airways was that it would provide air taxi service to meet the needs of the local administration.

For this purpose four DeHavilland Doves were bought. Domestic services began in 1947, with Airwork responsible for technical matters, and Sudan Railways, rather improbably, for commercial affairs.[56] Service prospered nevertheless, perhaps not too surprisingly, since there was little alternative transportation available. Until 1954 Sudan Airways restricted itself to intra-Sudanese operations. Then routes expanded: to Cairo with DC-3s, and then with Viscounts and Comet 4Cs to London. While the aircrews for these international flights consisted of British expatriates, Sudanese gradually took over the domestc routes.

Up until 1968 Sudan Airways did not publish annual reports, but rather had its budget buried in the Ministry of Communication. It was still considered to be "opening up" this country, and doing the classical development work: for example, the Er Roseires dam project, which brought 2 million acres under irrigation, was totally supplied by air.[57] It should be remembered that the Sudan is as big as all of Western Europe, but that its population is equal to only that of the Netherlands. Given these facts, the flexibility of air transportation should have made air, and Sudan Airways, predominant in national development plans. As late as 1968, however, there was little evidence that the Sudanese Government was even remotely aware of the importance of air transport in the Sudan.

Money was spent to shore up a dated rail system but little support was given to airport development.

In 1968 Sudan Airways was removed from the protective umbrella of Government patronage (and Sudan Railways) to become an independent corporation charged with the task of conducting ifself"efficiently." Mr. Amir, then the General Manager, was optimistic: "We are required now to run commercial services on an economic basis. Social services will be taken care of by submitting details of deficits route by route. The Government will meet these losses by subsidy."[58]

Aside from the problem of obtaining (and holding) Sudanese crews and technicians, Sudan Airways is faced with the aforementioned lack of government investment in the air transportation infrastructure. In 1968, apart from Khartoum, let-down aids and night lighting equipment did not exist in the Sudan. Thus operations were restricted to daylight hours and caused irritating cancellations in the rainy months. Sudan Airways consequently had to spend more than it should have on aircraft maintenance and staff and had extremely poor utilization of its fleet. The airline was caught in a bind; unless the Government spent more on its ground facilities Sudan Airways had little chance of improving results and service.[59]

In 1968 the national service function seemed rather forgotten; Sudan Airways had taken on the organizational format of a profit-

making corporation. As such it must concern itself with on-time performance (although there is very little competition from railroads, whose performance is apparently atrocious) and must operate on routes only where there is enough traffic to warrant a profitable run. This type of airline operation, however, hardly exploits all of the possibilities of air transportation in the Sudan.

Ethiopian Airlines is perhaps the best example of an airline in a developing country where the international operation became the dominant feature of the airline. Uncertainty remains as to what the opportunity costs of expansion into the jet age have been. Ethopian Airlines was formed (by Imperial proclamation) in 1945. Concurrent with the formation of the airline, a management assistance program was signed with Trans World Airlines.[60]

Domestically, T.W.A. created a network to open up Ethiopia's interior providing a needed cargo and passenger transportation system for this geographically difficult country. Access for Ethiopia to the outside world was created by establishing a direct route to Western Europe, from Addis Ababa via Cairo to Athens and Frankfurt. This route provided Ethiopia with its political and economic bond with the West. Due to technical deficiencies of the airport at Addis Ababa, no large international carrier operated into Ethiopia. Ethiopian Airlines thus enjoyed a virtual monopoly on this route and showed high profits. The domestic routes never quite broke

even, and airline management began to look upon its interior services as a strictly social loss operation, which was being subsidized by the profits of the international flights. Naturally enough Ethiopia's attention shifted more toward the international operation, to the neglect of the domestic transportation improvement. Consequently, in 1962 Ethiopia made the decision to convert to jet operations, and bought two Boeing 720B aircraft for use on its international routes. These planes, with supporting maintenance and shop equipment, represented a capital investment of approximately $20 million, financed through the Export-Import Bank and the Development Loan Fund. To be able to use the jets, Ethiopia also required more sophisticated ground service facilities as well as improved airports. Another $20 million was expended, financed through a DLF loan. Heymann wonders about the cost.[61]

> One might argue that, given the past record of profitability on its international routes, Ethiopia acted rationally in investing heavily in this area. But two questions might be posed: Is this the best way for an underdeveloped country to use its limited human and material resources from a development point of view? and, Is the airline's past commercial record or its future profit prospects the relevant consideration?

After answering the first rhetorical question in the negative, Heymann goes on to point out that the improved runways will open up

Addis Adaba Airport to foreign competition, and that the jets' more efficient performance will increase capacity and lower Ethiopian Airlines' load factors; and consequently the airline's earnings may go down. He also points out that the coming of the jets will delay the time that Ethiopian Airlines becomes independent of Western help.

Be that as it may, Emperor Haile Selassie did need an aircraft befitting his role as patriarch of Africa, and Heymann's prediction of financial difficulties for Ethiopian Airlines was true only in the short run. For example, in 1971, Ethiopian Airlines was an exception among African airlines: it made money. The coming of the jets may have also speeded up Ethiopia's industrial development. It is now building up its aviation business on the continent, but it is running into another problem which it may not have foreseen, and which will probably occur again in other developing countries which advance their technological capability in some area and then attempt to market it.

Ethiopian Airlines has established an excellent pilot training service and is also seeking maintenance and overhaul work for its extensive shops in Addis Ababa. But the old colonial ties with Europe (which had been carefully nurtured) still exist for many African countries. Thus airplanes of these developing nations

are maintained in European bases and much of the training of pilots and mechanics is done there. Africans, although nationalistic, still do not appear to trust their neighbors - no matter how good their facilities are.[62]

It would be remiss to conclude the discussion of airlines in Africa without touching upon Air Afrique. This airline was started in 1961 in an attempt by France to maintain a visible presence among the newly independent states of French West and Equatorial Africa (Mali and Guinea did not join and chose Soviet aviation aid instead) - similar to the British efforts fifteen years earlier. Each of the 11 states owned 6% of the airline, while the remainder is owned by a subsidiary of the two major French airlines.

Air Afrique has been a success, and is a profitable and major airline of Africa. For example, in 1968, it carried 43% of all the scheduled air freight in Africa.[63,64] It has been successful despite the fact that it has, at least theoretically, multiple corporate objectives. As noted, for France the objective was to make Air Afrique an instrument for preserving French influence in its ex-colonies. For the African nations, Air Afrique was to provide air service to the interior of the region, for administrative as well as for developmental purposes. These two objectives may have been irreconcilable from the start, as Mali and Guinea believed them to be. However, one strong personality welded the

airline into his own image. The Senegalese Cheikh Fal, selected to be president of the new airline, saw the objective of the company to be simple: it should make money.[65] The way to do this was clear, at least to Cheikh Fal:

> Air Afrique has attempted to drop its unprofitable routes as rapidly as possible by encouraging local national airlines to take them over. The local airlines presumably would operate unprofitable routes under subsidy, permitting Air Afrique to make a profit on its better routes. So far, Togo, Cameroon, Congo (Brazzaville), Niger, Ivory Coast, and Chad have fallen for the bait; they have set up local lines and are relieving Air Afrique of some of the social services load.[66]

And so much for national service. But there are signs that even this highly successful, commercially, venture among multi-national corporations is being doomed by conflicting national objectives. Cameroon became unhappy with what it considered a subordinate role and started its own airline. And in 1972, Chad, located in the center of the continent and beset with guerilla warfare, has left the international consortium.[67] It may only be a matter of time before Air Afrique splits into its national components.

ASIA

Although many countries in Asia appear ideally suited for development by means of air transportation, little has been done, with one notable exception. This observation must be tempered by

the fact that relatively less information is readily available about aviation developments in Asia than about those in other developing countries.

In Indonesia, the K.L.M. Inter-Island Division was taken over by Garuda Indonesian Airways in 1949 (following independence) and the airline was initially jointly owned by K.L.M and the Indonesian government. Nationalization took place in 1954, but the Dutch remained until 1956 to provide technical assistance in the running of the airline and the maintenance of the aircraft.[68] The West Irian operation was handed over to Merpati Nusantara in 1964, a state-owned airline organized for this purpose.[69] In 1968 it was reorganized under a joint United Nations-International Civil Aviation Organization technical assistance program, whose aim was to establish adequate air transportation within West Irian.[70] An additional program of assistance, including crew training, was signed with All Nippon Airways, when All Nippon sold two Viscount 800's and one YS-11A to Merpati Nusantara.[71] Although lack of adequate air transportation could be considered as one of Indonesia's less pressing problems during Sukarno's reign, the new government does appear to be paying some attention to this area.

Air-India has consistently been profitable, and ranks in the top twenty of international airlines. It has its own jet engine overhaul facilities, which save about $1 million annually in

foreign exchange. The first U.S. Federal Aviation Administration approved maintenance facility for 707 jets in the Middle East, Far East and Southeast Asia (in 1961) was established by Air-India, and the airline is in this way helping the industrial development of India.[72]

However, it is to Pakistan International Airlines that most of the plaudits must go for imaginative use of air transportation. Although it has a large and successful international division, P.I.A. is truly pioneering in its domestic operations. When the airline bought Fokker F.27s as a replacement for its DC-3s, instead of mothballing them, P.I.A. began to use them in a special configuration between places which had not previously been served by air in East Pakistan. These places had been previously served by railroad, but were usually at least an overnight journey away from Dacca, the capital, or Chittagong, the chief port. The railroad routes were highly circuitous due to the long detours which had to be made to avoid the many wide rivers of East Pakistan. This new air service was patterned after buses and was truly economical, with no refreshments or amenities and no reservations system. It was not intended to be a profit making operation, but rather to stimulate travel by air. It turned out to be a complete success and its popularity minimized the drain on P.I.A.s resources.

Davies is uncharacteristically enthusiastic describing the operation.

> Pakistan has here produced an example of the true spirit which should characterize civil air transport. The complication of booking an air ticket is still an annoying adjunct to flying...For short journeys the provision of meals, reading material and other amenities is an archaic survival. There is plenty of opportunity for widening the scope of the air bus system which Pakistan has so successfully started.[73]

P.I.A. also pioneered the use of helicopters (Sikorsky S-61Ns) in an area network in East Pakistan in 1963. It chose helicopters after deciding that their high operating cost was offset by the initial capital savings on the building of new airfields. Prior to the outbreak of the recent civil war, P.I.A. had switched to Twin Otters (a STOL (Short Take-Off and Landing) aircraft manufactured by DeHavilland of Canada) as a replacement for the helicopters in East Pakistan, and was planning to extend this STOL service to West Pakistan.[74] As Davies notes, the advanced countries of the world could well emulate Pakistan in some of their air transportation operations.

VII. AVIATION AID TO DEVELOPING COUNTRIES

The dissemination of aviation technology can be considered as a subset of technology transfer, and the conditions that should exist for a successful transfer of technology are equally valid for aviation. Aviation should be considered as an appropriate technology by any country that is short of capital resources and lacks a transportation infrastructure. There can of course be discussion as to the exact form of aviation technology to be transferred, be it propeller, jet, etc.

Before transfer is attempted, it is important to determine whether conditions are right for some facet of aviation to be introduced, expanded, or modified: i.e., to see if an area is ready for a variation which implies technological change or innovation. Appraisal of the type of conditions that exist in a (developing) country should be a prerequisite to anyone who is planning to engage in aviation assistance to that country.

Various conditions have been postulated as being necessary. Among these have been some that can only be described as ideal. For transfer to take place successfully, it has been assumed that a broad range of analytical capabilities should be present in the developing country. These capabilities, including long-range planning, technological forecasting, and systems analysis, will

then allow the developing country to utilize their scarce resources more effectively and to absorb technology successfully. The onus for accomplishing technology assessment and transfer is put squarely on these high-powered analysts of the developing countries.[75]

Such eminently desirable personnel and circumstances are unlikely to appear in the near future, even if they could be recognized; it would seem that capabilities such as those described might exist in a scholarly atmosphere in a developing country, but not in the more operationally oriented air transportation industry.

Circumstances that can more readily be seen to be applicable to aviation technology have been postulated - and they can be recognized more easily. First, the developing country must recognize that the technology will meet some important needs, such as needs for change and for development. Second, the technology should not be perceived as being in conflict with values (be they cultural, psychological, social, etc.) that are held by the developing country. Third, the persons that are expected to use the technology must understand how this technology will be absorbed and implemented. Fourth, the new technology should not be seen by persons in power as a threat to the existing system; on the contrary, the more it is perceived by leaders as enhancing their prestige and power, the more likely is technology to be accepted. This

particular circumstance has been noted to be particularly applicable to flashy and quick innovation - which leaders of developing countries sometimes perceive aviation to be. In general, technology transfer is likely to be successful when some need within a nation grows to crisis proportions and new technology is (correctly) perceived as meeting that need.[76]

Aviation technology transfer has many facets. It can consist of nothing more than the acquisition of new, more modern, airplanes by an airline of a developing country. Then the technology transfer is accomplished by the aircraft manufacturer who trains the recipient in the proper usage of the new equipment. Transfer can extend to the establishment of a whole civil aviation infrastructure including airfields, aircraft, maintenance shops, air traffic control procedures, etc. This chapter addresses itself to the aims and procedures used in the past by advanced nations (either singly or collectively) in providing aviation assistance in developing countries.

One purpose of the colonial powers in helping to set up airlines in ex-colonies has already been recognized: to maintain economic influence. Additionally, the management of these flag carriers usually had subsidiary, non-political reasons for undertaking the assistance programs. Among these were: (1) the

development of regional air carriers to act as a feeder to the long haul (and profitable) trunk line (i.e., B.O.A.C.'s attempt in Africa); (2) establishment of new carriers as a market for used aircraft of the assisting carriers (for example, All Nippon in Indonesia); (3) establishment of new carriers in return for an equity position. (Equity served as a means of, first, obtaining entry into a new country or territory, and later, when the subsidiary is totally absorbed by the parent company, as route expansion. Even if only a minority shareholding is maintained, a more favorable route structure can usually be worked out with the subsidiary's country.) Finally, (4) technical assistance can be a straightforward, money-making proposition of the turnkey variety (as TWA in Ethiopia).[77]

Financial aid given to the airlines of developing countries has taken many forms. The ones that can be defended on the basis of economics have just been discussed. At various times, however, a government that is interested in maintaining influence has ignored the probable loss to its own carrier and undertaken some of the following actions: The government has insisted that its flag airline participate, on the equity side, in a developing country's airline when that investment has a very small chance of success (i.e., K.L.M. in Indonesia). At other times the flag

airline has had to subscribe to a pool which was highly favorable to the developing country's airline. (An international airline pool is generally defined as an agreement entered into by two (or more) carriers under which the revenues received for specified routes are placed into one account (pool), regardless of which airline sold the ticket or carried the traffic, and are re-distributed to the airlines in accordance with a previously agreed upon formula. The fomula for the pool is almost always a deep secret, even when the existence of the pool is admitted.)

Sometimes the government has granted a very favorable route to the developing country's international airline, which can then use the profit it has made on the long haul international route (at the expense of the home flag carrier) to subsidize its domestic operations. The government has also had its flag carrier pay for rights to land in certain countries even when there was no possibility of enough traffic being generated on these routes to compensate for this fee. Finally, subsidies in terms of cash or favorable loans have also been used, but these do not usually adversely affect the flag airline.[78] All of these methods attempt to use air transportation as a means to achieve non-aviation related ends.

The United States has upon occasion indulged in some, or all, of the above practices - but, generally speaking, these events

occurred prior to the end of World War II and were mostly confined to Latin America. Since about 1956, when aid to developing countries became politically acceptable in the United States, there has been a program of aviation assistance run by the Agency for International Development and its predecessor agencies. The program was evaluated during 1964, and this report will be drawn upon here to point out past US aims and procedures.[79] By 1964 AID had spent some $200 million for aviation assistance grants and loans. United States objectives were described in this way:

> The aviation program has not been limited to promoting the economic and social development of the recipient countries. The desire to improve international air transport, to gain some short-term political objective and to export US goods have played a leading role. However, in most of the forty countries receiving assistance, economic and social development was the dominant or at least an important motivation.

Concerning the effectiveness of the program in improving international air transportation, the report stated that air transportation to, from, and among the developing countries had improved tremendously. The developing countries were said to have joined the international air transportation system, spurred on principally by the U.S. As evidence, the report noted that U. S.

procedures, concepts and equipment dominated the aviation scene in most developing countries...

In supporting U.S. political aims, the assistance program found that great difficulties are involved in attempting to use aviation projects for political purposes. Sound aviation programs, unlike showcase airports and international airlines, are unglamorous, large, invisible, and slow moving: the aeronautical training, the navigation and meteorological skills, the rules and procedures must be brought along alowly and carefully so that they take permanent hold.

As to exports, whereas U.S. aircraft sales constituted the largest single positive item in the balance of trade during any year, most of the sales were to developed, rather than developing, countries. Of course, the reason for the successful sales program is presumably the general superiority of American equipment rather than A.I.D. programs.

The effectiveness of the aviation assistance program in achieving its main purpose of economic and social development was considered as good. It noted that its success was based upon the unique capabilities of air transportation as a quick, economical transportation mode. The evaluation concluded that:

> The program has demonstrated that there is considerable truth to the claim that aviation is an effective agent for

the social development and modernization of a country. It has given central government officials a quick, direct contact with remote areas, which have proved to be valuable stabilizing influences. It has permiteted private enterprise (airlines) to participate in the development process of a basic economic activity. It has given both managers and employees a feeling of participating in the scientific, technological 20th century, a feeling of brotherhood with other technicians in the mystique-filled aviation world. It is beginning to teach certain attitudes necessary for successful transition to industrialization - such as the penalties for ignoring preventive maintenance.

It is difficult to distinguish between the avowed main aims of United States aviation assistance and those of the International Civil Aviation Organization (ICAO). The general objectives of ICAO were established in 1946 at the Chicago Air Conference (which founded ICAO itself):

(a) Insure the safe and orderly growth of international civil aviation throughout the world.

(b) Encourage the arts of aircraft design and operation for peaceful purposes.

(c) Encourage the development of airways, airports, and air navigation facilities for international civil aviation

(d) Meet the needs of the peoples of the world for safe, regular, efficient, and economical air transportation.

(e) Prevent economic waste caused by unreasonable competition.

(f) Insure that rights of contracting states are fully respected and that every contracting state has a fair opportunity to operate international airlines.

(g) Avoid discrimination between contracting states.

(h) Promote safety of flight in international air navigation.

(i) Promote generally the development of all aspects of international civil aeronautics.[80]

ICAO became a special agency of the United Nations after the establishment of the U.N. and participates in the technical assistance programs of the U.N. The ICAO portion of these programs has been at about $5 million a year. ICAO provides assistance in the following activities: the ground services and facilities needed to support air transportation, flight safety services; the economics of air transportation; the organization and administration of civil aviation; air law and regulation; and flight training. Though assistance is accomplished by provision of international experts, fellowships for training abroad and the supply of training equipment.[81]

The Director of ICAO's Technical Assistance Bureau clarified the aims of ICAO, vis a vis developing countries, in a recent interview. He stated that ICAO was basically interested in developing a

civil aviation system within a country only as it was related to economic or social development. Only indirectly is ICAO assisting civil aviation development in terms of infrastructure and improved quality of their service.[81] ICAO also recognized that aviation was an aspect of technology transfer. ICAO's most effective programs have been those where a government was determined to make a success of a project.

> We just send people to the assisted countries with a package of knowledge that has to be delivered...The most difficult task is how the recipient party is going to use this package of knowledge...The willingness of the counterparts and the determination of the civil aviation administration to really put the transferred knowledge to good use, is the important thing. After all, what we are looking for is development, that is, a step ahead in the progress of the services in the country. But to do that, certain changes should occur - changes of habits, of attitudes, of thinking...If that is not done, then the piece of knowledge...cannot be put to good use.[83]

In general, the difference between U.S. aid and ICAO assistance is that the U.S. effort had been oriented toward operations and infrastructures (airline management, airport construction), whereas the ICAO effort is directed more toward long-range planning and education.

Clearly, all these forms of aid have had a beneficial effect. Domestic air transportation of developing nations, as well as inter-

national air travel, have all improved. All developing countries can now be reached by scheduled air transportation, and although many improvements, notably in safety aspects, still remain to be made, there has been measurable progress, and aviation technology has been usually successfully transferred.

VIII.

THE FUTURE OF AIR TRANSPORTATION IN DEVELOPING COUNTRIES

Air transportation in developing countries faces many problems. Those that have been touched upon are necessarily ones that are most clearly visible. One basic drawback to this study has been its reliance on written (and published) information: just as doctors are said to buy their mistakes, governments can be said to classify theirs.

A topic that clearly needs further exploration is the attitude of the governments of developing countries toward aviation. Already noted have been the plaints of Latin American air enthusiasts as to the disproportionate amount of funding going to other modes of transportation.(19) In Africa voices are raised attempting to alert governments to the advantages of tourism. They are aware that development of a significant tourist industry cannot begin until the appropriate departments of government and sectors of private business have become convinced of the important contribution that tourism can make to an economy. At the same time they observe that the development of African tourism will depend primarily on air transportation. Accordingly, government officials are asked to take necessary action with respect to such matters as airports, airline equipment, air fares, traffic rights, authorization of non-scheduled operations, and the facilitation of international air travel.[84]

The view that government policy planners have of air transportation and more importantly, the trend of their thinking, cannot readily be discerned. Similarly, the problems that civil aviation authorities have within their own government bureaucracies are unlikely to be aired in widely disseminated publications.

One problem that is alluded to occasionally is the question of priorities in aviation between military and civilian needs. This involves not only the relative chunk of the national budget allocated for the purchase of fighter planes versus commercial aircraft, but (again) the question of attitude. In Latin America, as seen, many of the airlines are state owned. Some of these are directly or indirectly subject to military control, and executive positions in these airlines are filled in many cases by military personnel as a regular tour of their duty. Consequently, development of civilian aviation executives is slow. Moreover, the fact that it is only a limited tour prevents those executives from understanding totally the problems of civil aviation. Thus decisions may be made on the basis of military considerations.[85]

The problems that have been discussed during the course of this study fall into the general category of managerial rather than technical difficulties. One problem that faces the domestic airlines in developing countries and has been repeatedly noted is the lack

of clear-cut policy. As another example, in India the government was urged to decide whether it wanted its domestic airline to act primarily as a commercial undertaking or whether it wanted management to make its decisions according to some social welfare criteria.

> The present mixture of policies seems to result in serious inefficiencies of a kind that are rather easy to avoid by a consistent strategy...What is wrong with the present set of public policies concerning aviation is a total lack of coordination and a consequent complete absence of consistency.[86]

This point is worth reiterating because absence of policy leads to a host of other complications, and in fact may, through a rather insidious feedback mechanism, negatively influence a government's view of aviation. It could go something like this: in the absence of clearly defined objectives, the airline assumes that it should emphasize the national service aspect; it does so at the expense of regularly scheduled service and loses money; the government sees apparently inefficient service and extra demands for operational expenses (simultaneously) from the airline and decides that air transportation simply isn't doing the job in that country. Then, instead of encouraging air service, the government curtails further development.

Even when air is recognized as a worthy transportation mode, economic (or rational) analysis is either not undertaken within the civil aviation department (when, in fact, such a department exists), or if it is undertaken, overridden for non-economic reasons. For example, in the Ethiopian case it is hard to tell, by merely examining the record, on what basis the decision was made to go jet.

In the situation described as ideal for technology transfer, even when all those paragons of analytical wisdom do finally come into being, they will most likely not be in a position of power, and the decision makers will continue to act on the basis of political expediency rather than economic reasoning. Of course this situation is not unique to developing countries - systems analysts or operations researchers have for a long time been registering similar complaints in the United States.

Passenger air transportation will remain highly dependent on the ticket price. When the government owns the airline, it can essentially charge what it wishes on the domestic routes, and can greatly influence the price on the international link. The price will be influenced by cost, of course. For a private airline company, the type of service, the kind of aircraft, and the competition (either air or ground) will have an overriding effect, factors which

a state-owned airline, to the degree that the government is willing to subsidize it, can ignore. Reflecting these different situations, a diversity of prices currently exists, ranging from a low of 4.8¢/mile on the San Francisco-Los Angeles run, to about 6.2¢/mile average in the short-haul routes of Colombia and Venezuela, to the previously noted 14.3¢/mile in Zaire.

From a technological viewpoint, aircraft have historically become more and more efficient; it is up to governments to decide whether they wish to further encourage air travel by their nationals. The alternative of private automobile for short (and long) haul transportation has many drawbacks, not the least of which are the high true costs of ownership and the concomitant air pollution. In many ways the idea of air transportation as the dominant travel mode of a nation is highly appealing.[87]

For commercial applications, however, air transportation cannot readily be considered a panacea. Air provides a basic transportation mode, but does not usually totally supplant surface transportation. Assuming that the typical industrial transport problem is bulk movement of raw materials, agricultural produce and manufactured goods, air transportation is efficient only where the traffic is initially too thin to justify heavy investment in road or rail systems.[88]

Air transportation generally leads to the development of the area directly around an airport, but usually does not contribute to economic growth of the area in between airports. That is not to say that the idea of the "airport city" is unreasonable; for example, Ireland is successfully promoting Shannon Airport as an industrial center now that it is no longer an important transatlantic stopping place.

In summary, the first priority for persons responsible for air transportation activities in developing countries should be to ensure that a nation's overall development plan realistically reflects the unique capabilities that air can provide. Only then will other problems of aviation, some of which have been highlighted in this study, be amenable to solution.

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