

Analysis of Economic Impact Associated With Development of an Airport-Industrial Complex

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Availability of air transport is a significant factor in the growth and prosperity of communities. The airport has become vital to business and industry by providing air access for companies that must meet the demands of expanding, competitive markets. Communities also benefit from the local expenditures of airport-related businesses for supplies, materials, equipment, and contracting services. These expenditures represent significant direct contributions to the business activity of communities served by the airport and, of course, have a multiplier effect on the communities' economies.

Wages and salaries paid by airport business activities provide the purchase prices of local goods and services while generating tax revenues. Local payrolls alone are not the only measures of the economic benefit of an airport to the community, however. Indirectly, employee expenditures also have a multiplier effect and generate successive waves of additional employment and purchases that are substantial, although more difficult to measure.

The importance of the development of a regional airport to the local and regional economy was recognized by the Louisville and Jefferson County Air Board as it planned for future aviation requirements. As part of the site evaluation process, both the financial and economic aspects of proposed airport sites were analyzed. The methodology used in financial planning was reported in a previous paper (1). This paper describes the development of the economic impact analysis that formed part of the site evaluation process.

DIRECT EMPLOYMENT

Three major sources of direct employment associated with the airport-industrial complex development were identified: airport employment, industrial and commercial employment, and construction employment. Air board staff forecasts of enplanements were used

to derive airport employment. The current employment level at Standiford Field (the existing Louisville-Jefferson County airport) is 1.8 employees/1000 enplanements. This relationship was used to derive employment projections from enplanement forecasts.

Planning for the new airport included proposed air board development of approximately 15 320.5 hm^2 (6200 acres) of land covered by the 115 composite noise rating (CNR) noise contour. (A CNR of 115 encompasses an area within which individual reactions to airport noise would likely include repeated, vigorous complaints. Concerted group action might be expected. Typically only commercial, industrial, and certain nonspectator outdoor recreational activities should be placed within this area.) The area would be developed for whatever commercial and industrial uses are compatible with airport operations. Such land uses would benefit from the high accessibility and superior utility service associated with the airport core; at the same time, they would be a buffer between the intense activity of the airport and the surrounding area.

A 1971 study of industrial land requirements of the 94-county area surrounding Louisville projected a need for 30 319.7 hm^2 (12 270 acres) during the 20-year period 1971 to 1990. A 1972 report to the Louisville and Jefferson County Riverport Authority showed a demand within the Louisville Standard Metropolitan Statistical Area (SMSA) (Jefferson County, Kentucky; Floyd and Clark counties, Indiana) of 8623.9 industrial hm^2 (3490 industrial acres) during the period 1970 to 2000. However, neither of these studies attempted to estimate how much additional industrial land requirement would result from construction of a major new airport. Therefore, these projections should serve as lower limits on industrial growth in the region. For this study, a land absorption rate of 247.1 hm^2/year (207.5 industrial hm^2/year and 39.5 commercial hm^2/year) [100 acres/year (84 industrial acres/year and 16 commercial acres/year)] was selected. This was consistent with experience at Bluegrass Park, a local commercial-industrial development and well within the projections of the previous studies. Manufacturing employment densities developed for the Economic Development Administration of the U.S. Department of Commerce in 1966 were used

with these land absorption rates to project commercial and industrial development in the airport area. Average employment density for new plants was 2 employees/hm² (6 employees/acre) and for commercial operations 3 employees/hm² (7 employees/acre).

Airport construction costs were estimated as outlined in the paper mentioned earlier (1). Based on U.S. Department of Commerce figures, an investment cost of \$15 000/job station was used for the commercial-industrial development. Construction employment was then estimated to be 25 percent of the total combined airport-commercial-industrial construction investment.

DEVELOPMENT OF AN ECONOMIC BASE EMPLOYMENT MULTIPLIER

Determination of overall economic impact of new industries on a region must account not only for their direct effect but also for their indirect or induced effect. Income received by the new industries will enter the local economy in the form of wages and salaries and purchase of services, materials, and equipment from local firms. Thus these expenditures become income to other local citizens and industries who, in turn, spend a portion of it on the purchase of goods and services in the region. As the process continues, local income increases in a continuing but diminishing chain. Payroll associated with this induced employment, as well as required additional job site investment, generates additional income and sales tax revenue for the region.

The phenomenon of the income and employment change series following initial injection of new employment is known as the multiplier effect. This term covers both direct and indirect effects of new economic activity and is, in this case, expressed in terms of employment. The multiplier for this study was devised by the location-quotient method, which develops a relationship between total employment and export employment within a region. (The location quotient of any area is the ratio of the proportion of employees in industry I in the area to the proportion of employees in industry I in a benchmark economy, such as the state or nation.) The ratio of change in total employment to change in export employment is the economic base employment multiplier; its value is 2.171. Thus total employment in the region will increase by 2.171 times the initial direct employment increase; induced employment will be 1.171 times direct industrial employment. The derivation of this economic base employment multiplier was based on employment data obtained in 31 standard industrial classifications (SICs) for the period 1961 to 1970. To determine total induced employment, we applied this economic base multiplier to the direct airport employment and to the industrial and commercial employment resulting from the development of the airport complex. This yields a somewhat conservative estimate in that construction employment is considered as transient rather than as adding to the economic base.

COMPUTER MODEL

A computerized model (programmed in an interactive time-share mode) was developed to perform the complex calculations involved in determining the economic impact of a new or expanded airport on the region and the state. The economic model determines the impact of alternative projects on investment, employment, payroll, and taxes.

Inputs to Model

The economic impact computer model requires 2 major annualized data inputs (uninflated): construction costs and enplanements. The major control parameters are:

1. Number of years to be analyzed,
2. Year construction begins,
3. Year operation begins,
4. Year land disposal begins,
5. Industrial land absorption rate,
6. Commercial land absorption rate,
7. Inflation rate for construction costs,
8. Inflation rate for wages,
9. Multiplier applied to capital costs, and
10. Multiplier applied to enplanements.

Outputs From Model

By using the inputs just mentioned, the program develops an economic impact summary for years of construction, years of operation, and all years. The outputs are

1. Direct investments (airport, commercial, industrial);
2. Direct payroll (airport, industrial, commercial, construction);
3. Induced expenditures (payroll, investment); and
4. Tax yields (state income, state sales, state tax on investment).

ANALYSIS

For each alternative, the computer model was run under 3 sets of conditions: pessimistic, likely, and optimistic. Total direct wages were determined in accordance with data obtained from the Kentucky Employment Service. The wage rate applied to the induced employment was conservatively estimated to be the average of the industrial and commercial rates, or approximately \$9000/year. Total income and sales tax yields were computed from state and federal tax returns. An average family size of 3.2 was used, and the state income tax was based on linear interpolation. A sales tax rate of 5 percent was applied to a quarter of the direct and indirect investment.

LOCAL TAX IMPACT

The final portion of this analysis concerned determining the effect of the airport-industrial development on local tax revenues. To obtain the increase in the residential tax base resulting from such development, the participation ratio method (employment divided by population) was used to derive total population growth anticipated with development. It was assumed that the airport would generate a socioeconomic structure similar to the Louisville SMSA [a participation ratio of 0.39 has been forecast for this SMSA (2)]. Direct and indirect employment totals were obtained from the economic impact computer model; total projected population increases were obtained by applying the participation ratio to the employment data. Within the Jefferson County area the average number of persons per dwelling is 2.96. Applying this with data on the ratio of urban to suburban dwellings to the population projection yielded the number of urban and suburban dwellings projected to be associated with the airport-industrial development. Assessed values were based on existing residential property valuations in the Louisville-Jefferson County area for urban and suburban dwellings.

Industrial and commercial investment (excluding the tax exempt airport) was obtained directly from the computer model. This was added to the projected increase in the residential tax base to obtain the total tax base to be expected from the airport-industrial complex development. Current tax rates were applied to this base to determine total local tax revenues (school plus local services) to be expected from the development. Local tax revenue expected without the complex development was estimated similarly by using population projections developed by the Kentucky Program Development Office. A comparison was then made of tax revenues with and without the airport-industrial complex. This analysis indicated that total local tax revenues per person with the airport development would be 162 percent greater than could be expected without the development and that, by 1995, local educational revenue per pupil would be 105 percent greater than would have been obtained without the development.

These analyses support the contention that both the region and local community benefit economically from development of air carrier facilities.

REFERENCES

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