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**AGRICULTURAL AND INDUSTRIAL
INTERRELATIONSHIPS IN
WEST PAKISTAN****

by

Walter P. Falcon.

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AGRICULTURAL AND INDUSTRIAL INTERRELATIONSHIPS IN WEST PAKISTAN^{**}

Walter P. Falcon^{*}

I. INTRODUCTION

In recent years, the literature on economic development has been enhanced greatly by a number of essays on the role of agriculture in economic development. These papers, in large part, have dealt with either (a) general listings of the way in which agriculture contributes to growth during the structural transformation of an economy, e.g., Johnston and Mellor [13]; Johnston and Nielson [14]; Kuznets [17]; Nicholls [24]; or (b) theoretical models involving agriculture within a two-sector framework, e.g., Fei and Ranis [2]; Jorgensen [15]; and Nicholls [23]. However, aside from the notable work on Japan and Taiwan^{1/}, there have been surprisingly few country case studies on the

* Walter P. Falcon is Lecturer and Development Advisor, Harvard University.

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^{1/} In this connection, see the work of Johnston [12], Hsieh and Lee [10], and Ohkawa and Rosovsky [25].

interaction between the industrial and agricultural sectors.

The purpose of this essay, therefore, is to examine the structural changes in West Pakistan within the context of the general literature cited above^{2/}. Part II, through the use of several input-output tables, provides some quantitative estimates of the present interactions. Attention in that section is devoted to the magnitude of the flows and the appropriateness of various levels of disaggregation in pinpointing the important interrelationships. Part III asks the historical question, "How did the present set of interactions evolve from the purely agrarian economy that characterized Pakistan immediately after Partition in 1947?" Emphasis there is concentrated on the effects -- both competitive and complementary -- of various sectoral developments. The final section offers a few conjectures as to how West Pakistan's agricultural and industrial interrelationships may change in the years ahead.

II. INPUT-OUTPUT RELATIONSHIPS: THE PRESENT

In addressing the matter of interrelationships, one of the easiest ways of answering the question is with the assistance of an input-output table. This idea is hardly revolutionary; yet the results for West Pakistan are nevertheless interesting -- especially when compared with United States' tables.

^{2/} Because of the special geographic nature of Pakistan, it is necessary to take a regional approach in this discussion. The irrigated rice-wheat-cotton agriculture of West Pakistan is vastly different from the monsoon rice-jute farming in East Pakistan; similarly, the industrial structure is quite different in the two areas. To aggregate across these regions would obscure many of the important interactions.

Before turning to a comparison of these tables, however, it is useful to repeat some of the well-known facts about West Pakistan. About half of the gross regional product/^(GRP)arises from agriculture, about three-fourths of the 55 million people live in rural areas and approximately 80 percent of the inter-provincial and foreign exports are either raw or only minimally processed agricultural commodities. Even after twenty years of what is generally regarded as a very successful industrialization effort, the livestock sub-sector of West Pakistan still contributes more to GRP than combined large- and small-scale industry^{3/}!

These magnitudes, which are radically different from the developed world, might suggest that all elements of the input-output inverse would also be radically different. However, for a variety of reasons, this is not entirely the case. Tables 1 and 2 indicate the flow and the inverse matrices for West Pakistan in 1962/63 and for the United States in 1947, respectively. Although the flows indicate that the countries are at the opposite ends of the development spectrum, there are some similarities in the two inverse tables^{4/}. Agriculture has a high internal requirement for both countries and the service coefficients are also of

^{3/}At least as measured by the National Accounts. See Khan and Bergan [16].

^{4/}Each column of the inverse matrix represents a production function for that sector. Each element contains both the direct and indirect requirements for meeting an additional unit of final demand.

the same magnitude. As might be expected, however, one of the most significant differences involves manufacturing deliveries to agriculture. Even the highly aggregated tables presented here give some quantitative effects of what might be called the inter-relationships of underdevelopment. The per unit direct and indirect manufacturing input to agriculture in West Pakistan is presently only about 40 percent of that found in the United States twenty years ago. This is simply another measure of the long recognized fact that purchased industrial inputs into agriculture are the sine qua non of agricultural development^{5/}.

While manufacturing's contribution to agriculture was as expected, the converse flow, i.e., agriculture's contribution to industry, came initially as a surprise -- in the sense that a priori one might guess that the agricultural component of U.S. industry would be very much lower than that of West Pakistan. In fact, the U.S. and Pakistan coefficients of .22 and .31 appear to be quite similar^{6/}.

^{5/} The Pakistan input-output information presented here was adapted from the work by Ghulam Rasul of the Planning Commission's Perspective Planning Section [6]. Clearly all of the qualifications usually made about input-output tables and the data underlying them should be capitalized and underlined for West Pakistan. The U.S. data were adapted from Fox [4].

^{6/} More generally, one could hypothesize a process whereby the least developed and most developed countries might have very "low" direct and indirect agricultural inputs to manufacturing. The argument would be that in most developed countries, the manufacturing sector would have moved beyond an agrarian base, while in the least developed, all the processing might be done in the household sector. The latter might arise in a dualistic economy where there was a relatively small surplus that was marketed, where there was some planned investment in the heavy forms of industry, and where private processing industries were lagging initially.

It turns out, however, that a final judgment on this point rests heavily on one's view of small-scale industry, as is clearly demonstrated by a comparison of Tables 1 and 3. In Table 1, most agricultural products for West Pakistan are assumed to enter final demand directly^{7/}. That is, except for large-scale milling^{8/}, food processing, ginning, etc., which have been specifically allocated to industry, small-scale establishments are assumed to do the processing in a typical subsistence fashion. Alternatively, in Table 3, it is assumed that agriculture does not deliver directly to final demand, but rather that the processing done by small-scale shops is a part of "industry". In the latter case, the inverse element roughly doubles from 0.3 to 0.6, and in so doing, substantially alters the conclusion about the agricultural nature of West Pakistan industry.

In one sense, the above comparison is simply a matter of sectoral definition and of working with a highly aggregated table. Perhaps more significantly, however, it isolates the important role of the agricultural processing sectors at the early stage of development. Of particular interest may be the small-scale processing firms. For in this case, they fit neither the "traditional" nor "modern" sectors in the usual 2-sector growth models; yet they

^{7/} This has the effect of saying that small-scale processing is really "agricultural" in a two- or three-sector framework.

^{8/} Large-scale in the Pakistan context is not really very "large". It refers to any establishment using power and employing 20 or more persons.

are one of the largest elements in the agricultural-industrial interactions^{9/}.

This importance is revealed much more directly in the 60-sector West Pakistan table emphasizing agriculture that has been developed, but which cannot be included here because of space limitations. However, even the seven-sector flows and inverse presented in Table 4 point out the importance of small-scale industry for agriculture. To cite but one example, the "crop" flow to small-scale industry was more than five times that to large-scale agricultural processing. Table 4 was also aggregated (except for the division of large- and small-scale processing) in such a way as to be comparable to Fox's tabulation of the U.S. economy [4], which is offered for comparative purposes in Table 5. More generally, it is clear from the Pakistan table that the highest order coefficients for the entire economy are concentrated in the five by five agriculture-agribusiness array that includes small-scale industry.

Thus, in a very limited sense, Tables 1 and 4 answer the question: "What are the agricultural and industrial relationships in West Pakistan?" Perhaps above all else, they indicate quantitatively the important role of the much neglected small-scale industrial activities in assessing sectoral interactions.

To pose the question of interactions only in static input-output terms of this section, however, would miss several of the

^{9/}Some specific examples of the role of small-scale industry in West Pakistan are presented in Section III. The importance of small-scale and household industry in the dual economy models also has been stressed recently by Hymer and Resnik [11].

more interesting dynamic interactions that have evolved in West Pakistan during the last 20 years -- a matter to which attention is now turned.

III. SECTORAL COMPLEMENTARITY AND COMPETITION: THE PAST

Although West Pakistan today is far from being an "industrialized" region, the structure of the economy is vastly different from that which characterized the region 20 years ago. For at that time, what is now West Pakistan served mainly as an agricultural supplier to undivided India. To cite but one example of change, Karachi, which is today the leading industrial center and a city of over two million population, was in 1947 largely a fishing town of less than 400 thousand.

With these radical changes, it is not surprising that at various times agricultural development has had important influence on industrial growth and vice versa. Thus the purpose of this section is to examine some of the dynamic interactions between the sectors. Since the historical development of both sectors has been extensively reported elsewhere^{10/}, the intent here is to examine several specific issues which the general literature on structural transformation would suggest as being most important. At least some of the examples cited below seem to suggest that the conventional wisdom on structural transformation is of limited historical validity for West Pakistan.

^{10/} For a fuller discussion of the agricultural sector see Falcon and Gotsch [1], and G. Mohammed [22]. Industrial development is covered in the important works of Lewis [18,19], and Papanek [26,27].

The Early Period (1947/48 to 1957/58)

One of the commonly held ideas about the development process is that increased agricultural production is "necessary" for industrialization. For example, Nicholls [23, p.12] states that "agricultural progress is normally a prerequisite for industrial development", and Mellor [21, p.4] argues that "agriculture must provide major increases in agriculture production [and] ... make significant net contributions to the capital needs of the other sectors of the economy." Japan is usually cited as the example, par excellence, which other Asian countries should observe in this regard.

Given the strong agrarian character of West Pakistan in 1947, one might have expected the above set of arguments to have been particularly important. The evidence on this issue, however, is mixed at best, and perhaps even contradictory. And in discussing this point, as well as most others, it is useful to break West Pakistan's development into two broad periods, 1947/48 to 1957/58, and 1958/59 to 1966/67. The break at 1958 coincides with President Ayub's coming into power. Most of the economic series also show sharp breaks around that time, especially those concerning agriculture and foreign aid.

The first thing that is clear from an examination of the data is that between 1947/48 and 1957/58, agricultural growth per se was not a prerequisite to rapid industrialization. This is not to argue that industrial growth would not have been easier or faster if agriculture had grown. But the fact remains, it did not.

In quantitative terms, the period of 1947/48 to 1957/58 was a period of declining per capita production for agriculture. Population in the rural areas was growing around 2.4 percent annually, while crop production grew at only about 0.9 percent per year^{11/} Large-scale industry, on the other hand, roughly quadrupled during this same period, growing at over 18 percent per annum. In part, the rapid growth of industry was simply a matter of the small base from which it started. However, by 1957/58 value-added from large-scale manufacturing equalled about 25 percent of the contribution from major and minor crops. This suggests that there was more than just a statistical phenomenon at work which explained one of the world's highest growth rates for industry and one of the world's worst performances for agriculture.

It is of course possible (as evidenced by the Russian case) to put an increasing squeeze on agriculture, at least in the short run, even if there are no increases in agricultural production. Although the authoritative work on this point is yet to be written for Pakistan, some preliminary data are very revealing.

The first point, generally understood but often overlooked, is that within an open economy framework, it is possible for industry to grow without an increased surplus from agriculture. This is important in the West Pakistan context for three reasons. First, much of the very early capital for trade and industry came

^{11/} Based on provincial data from 1949/50 to 1957/58 as reported by Khan and Bergan [16]. Because of the vast disruption at Partition, no national accounts data exist for 1947/48 and 1948/49.

from the accumulated savings of several groups which emigrated to Pakistan at the time of Partition. Secondly, and equally important for Pakistan, is the importance of foreign aid. Haq [9, p.257] estimated that foreign aid and loans into West Pakistan had risen to over Rs 600 million annually by 1957/8.^{12/} Finally, by considering the region of West Pakistan rather than the total Pakistan economy, there was the possibility of a net transfer of resources from East Pakistan. There is a good deal of debate on this point, but Rahman [28], for example, estimates that West Pakistan received a cumulative regional resource transfer of over Rs 1.5 billion between 1948/49 and 1956/57.

Although each of the above points is significant, even collectively they do not "prove" that there were no net transfers from agriculture to industry in aggregative terms. Certainly through fiscal and foreign exchange policy, the Government could effect transfers from agriculture to industry. Similarly, through internal price policy measures, the Government might have altered directly the sectoral terms of trade between agriculture and industry.

The first evidence on sectoral transfers, most of which has only been recently developed, offers considerable insight into the transfer process. Among other things, it indicates the care with which one must speak about agriculture's "contribution".

Looking first at agriculture's terms of trade, the movement varied less than 10 percent throughout the early period. In fact, Lewis and Hussain [19] estimate that the agricultural terms of trade index was approximately the same in 1957 as it was in 1950. However, this choice of years is a little misleading,

^{12/} One Rupee equals \$.205

in that in the 1953-56 period the index did fall fairly rapidly as a result of changes in both the numerator and denominator, i.e., the price of agricultural goods, especially those internationally traded, fell following the end of the Korean conflict, and industrial prices rose rapidly as the result of the foreign exchange crisis and the very large cutback in industrial imports into Pakistan. During these few years, industrial and trading profits earned largely at the expense of agriculture, were extraordinarily high. Over the longer run, however, the terms of trade did not increasingly worsen for the rural sector.

Thus it is clear that an increased agricultural surplus was not generated from continually increased production or from continuing changes in the terms of trade. But even this is not sufficient evidence that the agricultural sector was not a major contributor -- at least if world prices are used as the evaluation standard. For by this criterion, agriculture was squeezed relatively hard throughout the early period. Industrial goods, on the one hand, were "protected" by import controls and by tariffs almost from the beginning. Because of this protection, and the resulting scarcity values, both final and intermediate industrial goods were priced substantially above world market prices. Conversely, many agricultural goods were exported, and thus by definition, were internationally competitive. A fortiori, most of these agricultural goods even had export taxes levied against them. Cotton, for example, had an export tax equal to over 10 percent of its value during most of the early period. In attempting to quantify these effects more precisely, Lewis [18] has calculated implicit exchange

rates for both the agricultural and manufacturing sectors using international prices as a basis. As one illustration he shows that in 1951-54 West Pakistan agriculture received about Rs 3.8 per dollar, but paid around Rs 8.4 per dollar for the products it sold and bought, respectively.

Thus, to summarize the early period, it is clear that the growth of agricultural output was not a prerequisite to industrial growth, and that there was not a radical worsening in the terms of trade for agriculture. In part, this was possible because of the more open nature of the development. Regional transfers, foreign aid and the inflow of capital at Partition no doubt spared agriculture somewhat. But while agriculture was not increasingly squeezed, it nonetheless bought dearly and sold cheaply throughout the period, largely as the result of the Government trade policy. Protection, almost from the beginning, permitted high trading and industrial profits. And in turn, it was the reinvestment of these profits (earned largely on sales to the rural masses) that made for the spectacular industrial growth^{13/}. It was mainly in the latter sense that agriculture "contributed" to industrial growth.

^{13/} Papanek [27, Chap. 7] concludes on the basis of his 1959 survey that more than 40 percent of the financing for industrial assets existing at that time had come from reinvested earnings.

The Later Period (1958/59 to 1965/66)

From 1958 onwards, the agricultural picture changed rather radically in West Pakistan. Major crop production, which had previously been advancing on a trend basis at less than 1 percent annually, rather suddenly increased to over 4 percent. Concomitantly, the growth of exports rose from practically zero to over 12 percent per annum. West Pakistan industry continued its rapid growth, and rates of over 10 percent annually were commonplace. As a result of all these changes, Pakistan generally (and West Pakistan particularly) was regarded as one of the great development success stories of the early 1960's.

Although it was relatively easy to talk about the early period and about the way in which agriculture did and did not contribute to industrial growth, the picture is certainly much less obvious for the more recent years. In broad terms, the later period was a case of rapid expansion with a sectoral balance more on the order of the early Japanese growth. A more specific evaluation of whether or not agriculture made a net contribution to industry must await the completion of two studies now underway^{14/}; however, it is already clear that several intersectoral flows were critical to the sudden surge in agricultural output. (Whether, in this regard, it is more correct to say that agriculture deserves the credit for creating the demand for these inputs or industry deserves it for increasing the supply of them, seems relatively unimportant). And of the many intersectoral

^{14/} One is by Scott M. Eddie at Williams College and the other by Sarfraz K. Qureshi at Harvard University.

relationships which were an integral part of the performance since 1958/59, two stand out as being of particular interest: the growth of fertilizer production and use, and the large increase in irrigation water availability through private tubewell development.

There is now general agreement that water and fertilizer accounted for over two-thirds of the increased agricultural production^{15/}. In the case of fertilizer, for example, consumption went from approximately 18 thousand tons of nutrients in 1958/59 to about 85 thousand in 1965/66, of which approximately two-thirds was produced domestically. However, even reporting this quantitative increase in fertilizer use, impressive as it was, fails to capture the full meaning and solution of a much broader intersectoral problem.

In Pakistan, like many countries, two of the critical development problems are (a) creating an import-substituting industrial base, and (b) having farmers adopt a new agricultural technology. Although at first glance these problems appear quite unrelated, in a policy sense, they are highly interconnected. One of the near essentials in the development of large-scale industry is a mass domestic market -- which generally means sales to agriculture. Thus it is natural that new agricultural inputs offer one important area for industrialization. What is often the case, however, is that these new plants are "high cost" by world standards. If the commodities produced are

^{15/} The sources of recent agricultural growth have been extensively reported in Falcon and Cotsch [17].

consumer goods, the problem (from the point of view of growth) may not be overly severe since this may be one way to have agriculture finance industry. But if the commodities are key intermediates, there may be a real dilemma because higher costs and prices may seriously retard agricultural innovation. Fertilizer in West Pakistan was just such an example. For although it is likely that in the future West Pakistan will have a comparative advantage in fertilizer production based on natural gas, the early plants had the general characteristics and high costs of infant industries.

To solve this problem of direct sectoral competition, the Government instituted a 50 percent subsidy on fertilizer sold to farmers. Although many unkind words have been written about such subsidies, this attempt appears to have been a remarkable success. It increased greatly the return to farmer innovation and was a major factor in the rapid growth of fertilizer use. Moreover, it permitted Pakistan to give birth to an infant industry, which has good prospects for some day becoming a competitive adult. (One hopes that a happy ending to this story will occur in the next several years, i.e., that fertilizer costs will come down, and that farmers will have learned more about the benefits of fertilizer, thus making a continued subsidy unnecessary).

Hence, even though it can be conjectured that agriculture in the later period continued to make a net aggregate contribution to industry, the fertilizer example is a good case where agriculture was selectively given something back -- in this case a critical new input at a "low" price.

A second major factor in West Pakistan's rapid agricultural progress was the large increase in private tubewells for irrigation. This development was amazing in several regards: its size, its overlooked nature, and its interaction with small-scale industry.^{16/}

Even as late as 1961, when Pakistan's Second Plan was revised, relatively little attention was given to the dynamism that had been accumulating in the countryside. This was particularly true with regard to water development, and in fact, the Plan document does not once mention the words "private tubewell". However, by the end of 1965, over 35,000 of these wells had been privately installed in the major cotton and rice tracts of West Pakistan. In total, this represented an investment of over Rs 300 million, a sum thought utterly impossible in the traditional agriculture of West Pakistan. Collectively, these wells increased the irrigation water supplies of West Pakistan by over 5 million acre feet annually -- and in the arid regions of West Pakistan, increased water meant near proportional increases in production. Of special importance was the fact that these tubewells could tap the excellent aquifer independently of the seasonal canal flows. This, in turn, meant that farmers had considerably more flexibility in when and in what they planted.

The private tubewells that were installed were of various shapes and sizes. While from a technical engineering point of

^{16/} The entire water development story in West Pakistan is a remarkable one, especially since this region contains the world's largest irrigation network. More details about the water program are given by Harza [8], the Revelle Report [29], Falcon and Gotsch [1] and G. Mohammed [22].

view many of them were not very efficient, they all had one point in common -- they were extraordinarily profitable. Gotsch [5], for example, estimates the internal rate of return on many of these wells at over 100 percent in both the rice and cotton areas. This profitability was an obvious reason for the rapid increase in numbers. Most of the wells were installed by cultivators with 25 acres or more, but there were important exceptions. In the Gujranwala area, for example, perhaps 20 percent of the installations were made by investors in the towns who had little or no land. In addition, there was widespread selling of water as smaller farmers attempted to utilize more fully the capacity of their tubewells.

The entire story of how this movement was started and accelerated is fascinating, although outside the main theme of the present paper. What is an integral part of it, however, is the sectoral interaction created by this development. For example, as a result largely of the tubewell installations, cotton and rice production both grew at annual rates of greater than 7 percent. Exports of these commodities more than doubled between 1960 and 1965, and this foreign exchange (plus a substantial increase in foreign aid) had a major impact on industrial growth.

In terms of the reverse flow from manufacturing to agriculture, one of the interesting features was that virtually all of the diesel engines and pumps for the wells were manufactured locally, mainly in small-scale shops. Towns, where it was impossible to buy the proverbial pot in the mid-1950's had by 1965 become centers of diesel engine and pump manufacture. The

small town of Daska, for example, had only a few machine shops as late as 1961; but by 1965, over 120 shops were engaged in engine manufacture. These small-scale industries used a technology borrowed from one or two of the larger and older firms. And although the products they produced were heavy and crude in some respects, the training and ingenuity displayed in these operations was most impressive.

One other facet of this development should also be mentioned, as it was a critical ingredient of the growth in small-scale machinery production. During the late 1950's, the Pakistan economy was subject to a very tight system of import licensing. Under this system, industrial firms (mainly large-scale) were given specific rights to import materials. In the early 1960's, however, there was considerable liberalization and many raw materials and intermediates were permitted to enter without a specification as to end use. A strong case can therefore be made that this policy of liberalization was a prerequisite to the development of the small-scale machine industry. Since most of the latter firms were unregistered, it is unlikely they would have been able to acquire the necessary raw materials had it not been for the increase in commodity aid and the change in import procedures. As in the case of fertilizer, sensible policy was again the factor changing sectoral relationships from being competitive to complementary.

To describe all of the other important inter-relationships of the later period would require a complete volume. Simply too many things were happening in agriculture, industry, trade and

Government policy to make even a brief summary which is above challenge. What generally seems to have happened, however, is that in absolute aggregate terms, agriculture was again a net contributor to industry. But in contrast to the earlier period, agriculture "received" several critical new inputs at attractive prices which lead to a vastly improved agricultural performance.

IV. SECTORAL GROWTH: THE FUTURE

The rapid growth of both agriculture and industry has already had a large impact on the structure of the economy. Even more importantly, the recent performance has engendered great optimism within West Pakistan. There is widespread feeling, especially about agriculture, that the growth rates can be accelerated in the years ahead. The Third Five Year Plan (1965-70) [7], for example, projects an annual increase of 5.5 percent for the agricultural sector of West Pakistan. This growth is based largely on a five-year increase of irrigation-water availability of over 20 million acre feet, an increase in fertilizer use from about 85 to 200 thousand tons of nutrients, and a large increase in wheat production based on the spectacularly successful importation of improved Mexican seeds^{17/}. Even with the drought conditions of the first two years of the Plan, there is optimism that the 1970 targets can be reached. In industry too, the objectives are very ambitious. Industrial growth is projected at 10 percent, of which a large component is to be of the heavier, import-substituting variety.

^{17/}

In this regard, see Ford Foundation [3]

Obviously, the kinds of interactions to be expected in the future depend on the success of the above programs and the continued availability of large-scale foreign aid, (which has been on the order of 6-7 percent of GNP in recent years). Therefore, to say anything very precise about what will happen in the future requires a boldness not really justified by information presently available.

Nevertheless, a few things about the next ten years can be said with some assurance. Firstly, West Pakistan will still retain its agrarian character by 1975. Based on what appear to be reasonable assumptions of income growth, labor productivity, and capital-labor ratios, it is likely that the total labor force in industries and services will still be less than that in agriculture by 1975. Secondly, the rapid growth of incomes over the next decade in West Pakistan will begin to affect the composition of demand and, concomitantly, the nature of the interindustry flows. Finally, what happens to the structure of the economy will depend in large part on the flexibility and adaptability of economic policy. For if there is a major lesson for the West Pakistan experience to date, it is that pragmatic economic policy can do much to relieve problems of sectoral competition. A continuation of this policy will surely be required if the region is to further accelerate its growth, and if the economic structure is to change in accordance with social goals and private desires.

TABLE 1. WEST PAKISTAN ECONOMY, 1962/63

TABLE OF FLOWS*
(Billions of Rupees)

From \ To	1	2	3	Final Demand	Gross Output
1. Agriculture	4.61	1.98	0.00	7.17	12.74
2. Manufacturing	0.57	2.28	0.70	8.79	12.47
3. Services	0.90	2.04	0.19	5.94	9.26

$(I-A)^{-1}$ MATRIX (DIRECT AND INDIRECT REQUIREMENTS)

	1	2	3
1. Agriculture	1.591	0.314	0.024
2. Manufacturing	0.099	1.263	0.098
3. Services	0.132	0.233	1.039

One Rupee equals \$0.205

* Assumes small-scale agricultural processing is a part of the household sector rather than a part of industry. Includes domestic flows only.

Source ADAPTED FROM PERSPECTIVE PLANNING SECTION [6]

TABLE 2. UNITED STATES ECONOMY, 1947

TABLE OF FLOWS
(Billions of Dollars)

From \ To	1	2	3	Final Demand	Gross Output*
1. Agriculture	12.8	20.5	0.1	12.7	46.1
2. Manufacturing	4.3	89.9	13.6	113.1	211.4
3. Services	3.0	19.4	24.4	102.8	149.7

* Does not equal row sums due to rounding error.

$(I-A)^{-1}$ MATRIX (DIRECT AND INDIRECT REQUIREMENTS)

	1	2	3
1. Agriculture	1.416	0.224	0.026
2. Manufacturing	0.243	1.750	0.190
3. Services	0.136	0.201	1.117

Source: Adapted from Fox [4].

TABLE 3. WEST PAKISTAN ECONOMY 1962/63

$(I-A)^{-1}$ MATRIX (DIRECT AND INDIRECT REQUIREMENTS)*

	1.	2.	3.
1. Agriculture	1.595	0.610	0.047
2. Manufacturing	0.117	1.215	0.094
3. Services	0.131	0.208	1.037

* Assumes small-scale agricultural processing is a part of the industrial sector.

Table 4. West Pakistan Economy, 1962/3

TABLE OF FLOWS
(Billions of Rupees)

From \ To								Final* Demand	Gross Output
	1	2	3	4	5	6	7		
1. Livestock	-	1.17	0.74	0.83	*	-	-	1.23	3.97
2. Crops	2.28	0.99	0.51	2.70	0.66	0.06	-	1.57	8.77
3. Large Scale Agricultural Processing	0.01	-	0.08	-	0.03	*	-	2.63	2.75
4. Small Scale Industry (Mainly Processing)	0.16	-	-	-	-	0.27	0.02	3.75	5.20
5. Textile Processing	0.09	0.05	0.09	0.07	0.59	0.03	0.01	2.17	3.13
6. Other Mfg.	0.02	0.40	0.05	0.19	0.13	0.74	0.05	3.91	5.79
7. Services	0.33	0.58	0.39	0.27	0.43	1.13	0.19	5.95	9.26

*Less than 5 billion.

(I-A)⁻¹ MATRIX (Direct and Indirect Requirements)

1.	1.1100	.1686	.3422	.2655	.0439	.0161	.0019
2.	.7589	1.2480	.4626	.7768	.3343	.0571	.0079
3.	.0039	.0007	1.0310	.0012	.0112	.0009	.0001
4.	.0477	.0103	.0174	1.0150	.0066	.0519	.0060
5.	.0376	.0143	.0560	.0317	1.2360	.0101	.0061
6.	.0596	.0705	.0675	.0914	.0888	1.0590	.0075
7.	.1641	.1146	.2299	.1516	.2183	.2271	1.0390

Source: Adapted from Perspective Planning Section [1967].

TABLE 5.

U. S. Economy, 1947.

Table of Flows
(billion of dollars)

From \ To							Final	Gross
	1	2	3	4	5	6	Demand	Output*
1. Livestock	1.4	0.0	11.2	0.6	*	0.1	6.6	19.9
2. Crops	7.4	9.0	6.6	1.8	0.3	*	6.1	26.2
3. Agricultural Processing	2.4	0.1	12.0	0.6	2.2	0.6	40.1	58.3
4. Textile Processing	*	0.1	0.2	8.5	1.6	0.2	15.9	26.0
5. Manufacturing	0.2	1.5	3.2	1.9	59.7	12.8	57.1	136.5
6. Energy, Transportation, and Services	1.6	1.4	5.1	1.7	12.6	24.5	102.8	149.7

*Less than 50 million.

**May not equal row sum due to rounding.

$(I-A)^{-1}$ MATRIX (Direct and Indirect Requirements)

	1	2	3	4	5	6
1.	1.1120	.0023	.2705	.0474	.0093	.0032
2.	.5123	1.1840	.2948	.1467	.0167	.0038
3.	.1747	.0095	1.1307	.0554	.0403	.0106
4.	.0061	.0092	.0119	1.4750	.0320	.0056
5.	.1160	.1368	.1949	.2324	1.8190	.1872
6.	.1710	.0925	.2038	.1579	.2093	1.2170

Source: Adapted from Fox [7].

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