Notes

Output, Value Added and Employment in the Small Scale Textile Industry

SFEMIN ANWAR*

The small scale manufacturing sector is in many ways the step-child of Pakistan's national income accounts. A number of sample surveys of the output and employment characteristics of small industries have been conducted, but no attempt has been made to apply these surveys, in a systematic fashion, to the measurement of the growth of output of this sector. In the absence of better information, compilers of Pakistan's national accounts simply assume that the small scale sector's contribution to the national product grows at the same rate as the population. However, given the rapid structural changes in large scale industry and the sharp fluctuations in the past decade in the rate of increase in the gross national product, it is unlikely that the samll scale sector grew at such a uniform rate.

The small scale manufacturing sector encompasses a wide array of highly differentiated economic activities and separate estimates of the value added annually by each of these activities is not feasible, in large part because the establishments in this sector rarely keep systematic records even for major items such as sales or employment.

Even if firms kept records, it would be extremely difficult to monitor the thousands of existing establishments, much less keep track of firms leaving or entering the sector. Thus, any effort àt sampling or regular census-taking in the small scale sector is likely to provide insufficient information from which to construct an annual index of production.

An indirect method for measuring the growth of certain small scale industries can, however, be adopted since certain small scale manufacturing processes use inputs in fixed proportion to output and the quantity of these inputs used by the small scale sector can be estimated. In this study we apply the indirect estimation technique to the small scale textile weaving industry.

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Cotton textiles is not only the most important large scale industry in Pakistan but it is also apparently one of the most important small scale industries as well. See, for example, [4. p. 62]. It is possible to apply the indirect approach to estimating the level of output in this industry because small weaving units purchase the bulk of their cotton yarn from large scale firms, and the sales of yarn to the smaller units can be derived as a residual by deducting the deliveries of yarn to all *other* purchasers from total output.

The Definition of the Small Scale Textile Industry

The distinction between large and small industries is understandably an arbitrary one dependent on the purpose of the analysis. Several different definitions of the small scale textile industry are employed in Pakistan. The Census of Manufacturing Industries (CMI), for example. includes in the small scale sector any establishment not registered under section 2(j) or 5(i) of the Factories Act. A recent survey of small scale industries, conducted by the West Pakistan Small Industries Corporation in 1965-66 [7], adopted a much broader definition based on the value of fixed assets. Establishments were classified as small scale if their total fixed assets amounted to less than Rs. 5 lakh regardless of the number of employees. The small scale sector was then further sub divided into small industries (assets Rs. 15,000 to 5 lakhs) and household industries (assets less than Rs. 15,000).

Finally, for the textile sector a distinction is made between the mill sector, the powerloom sector and the handloom sector. The mill sector includes those establishments with more than 4 looms which at previous times in Pakistan's recent past has been the cut-off point, below which certain excise taxes have not applied. The powerloom sector covers those firms with 1 to 4 looms, whether they are located in households or not. The handloom sector includes all establishments producing cloth without motive power regardless of the number of looms contained under one roof.

Plainly, these alternative ways of dividing the continuum of establishments by size category overlap one another, and considerable error could be introduced when, for example, data on the small scale sector defined according to one alternative are compared with data for the large scale sector defined according to another. Fortunately, establishments in the powerloom and handloom sectors are not registered under either 2(j) or 5(i), and most mill sector firms are covered by the *CMI*. In this study, we will confine ourselves to the growth of the powerloom and handloom sectors.

Methodology

The method adopted in the study of estimating the total cloth production in the small scale (i.e. powerloom) sector is, first, to estimate the amount of yarn absorbed by this sector and then, on the basis of known input-output coefficients, calculate the quantity of cloth produced from the yarn purchased by the sector.

Since the small scale sector purchases almost all of its yarn from the mill sector, producing very little of its own and importing none from abroad the quantity of yarn used in this sector can be calculated by subtracting the quantity of yarn sold by the mill sector to *all other* buyers from total sales. Because data are not available on the sales of large scale firms but only on

production, allowance must also be made for accumulation (or decumulation) of yarn stocks held by the mill sector. The equations below will make the methodology more explicit.

$$P-E-M-A-S = Y_s \quad\text{———————} (1)$$

$$C_s = \alpha Y_s \quad\text{———————} (2)$$

where the following variables refer to quantities (in lbs.)

Y_s = Yarn available for the small scale sector,

P = The cotton yarn produced by the mill sector,

E = Exports of cotton yarn, including exports of yarn to East Pakistan (now Bangladesh),

M = Consumption of cotton yarn by the mill sector,

A = Consumption of cotton yarn by ancillary industries, such as hosiery, tapes, ribbons etc.,

S = Increase (or if positive, decrease) in stocks of cotton yarn held by mill sector,

α = Yards of cloth produced per pound of yarn in the small scale sector, and

C_s = Yards of cloth produced by the small scale sector.

To arrive at quantitative estimates of cloth output (C_s), several assumptions are necessary. First, it is assumed that the input-output coefficient, α, is constant. As the coarse cloth produced in the small scale sector is fairly uniform—typically 36 inch wide grey cloth using 20 count yarn with 60 weft and warp threads per inch—the weight of the yarn per square yard of cloth can be reasonably regarded as a constant over time. For this study, we have adopted the coefficient used by the Planning Division and others of 4 yards per pound of yarn. Second, certain minor textile industries such as towel making, hosiery, tapes, ribbons etc., consume a relatively small amount of yarn. The consumption of this industry has been estimated by the Ministry of Industries to increase by 5 million pounds each year. Unfortunately, this assumption cannot be empirically verified for lack of any census or survey data on these industries. Third, it is assumed that the wastage in the small scale sector is constant from year to year and that the stocks of yarn held by this sector, while possibly fluctuating from year to year, do not increase or decrease over the long term. Again this assumption is born out of necessity rather than any informed judgment about the efficiency and operating characteristics of this industry. Finally, the inventories of yarn held by producers are assumed to be constant (i.e. S = 0). This assumption is unlikely to hold for each year in view of the fluctuations in the demand for yarn and cloth over the past decade but over the longer run the year-to-year changes in stocks should be small and related to the growth in capacity.

Review of the Data

Data on the yarn produced and consumed by large scale mills are reported annually by the Statistical Division [2 and 5]. However, there are several reasons

Table 1

Data set Year	(A) Yarn production reported (Mln.lbs.)	(B) Estimated Yarn Production. Indirect method. (Mln.lbs.)	(C) Average of yarn production (Mln.lbs.) (A+B÷2)	(A) Yarn consumption by mills reported (Mln.lbs.)	(B) Estimated yarn consumption by mills. Indirect method (Mln.lbs.)	(C) Average of yarn consumption by mills (Mln.lbs.) (A+B) ÷ 2
1	2	3	4	5	6	7
1960-61	360.0	368.96	364.48	171.22	155.33	163.20
1961-62	368.0	369.60	368.50	182.00	162.77	172.68
1962-63	385.0	383.68	384.34	185.00	171.92	178.86
1963-64	438.0	420.16	429.10	190.67	171.06	180.88
1964-65	454.0	427.20	440.60	208.64	180.36	164.50
1965-66	428.0	415.04	421.52	196.14	164.66	180.38
1966-67	456.0	438.40	447.20	203.74	177.95	197.17
1967-68	495.0	489.28	492.14	216.35	197.02	206.71
1968-69	527.0	532.80	529.90	203.07	173.49	188.29
1969-70	602.0	602.24	602.12	215.80	175.13	195.46
1970-71	670.0	648.00	659.00	216.80	185.20	201.00
1971-72	740.0	732.80	736.40	217.78	157.43	187.61
1972-73	829.0	833.60	831.00	198.15	166.56	182.35
1973-74	837.0	855.36	846.13	211.77	170.10	190.93

Source: (i) For years 1960-61 to 1970-71, for Col. 2 and 5, see [2]; and
(ii) For 1971-72 to 1973-74, see [5].

to believe that these data tend to over-report yarn consumption but under-report cloth production. Therefore, we provide a second set of data on yarn consumption and production by the mill sector that are arrived at indirectly. We refer to the indirect estimates as set B, while to the official data forms as set A.

In set B, the production of yarn (P) by the mill sector has been estimated in the following manner. On the average, 320 pounds of yarn are produced from a bale of raw cotton (392 lbs.), i.e. 18.4% is the waste. Multiplying 0.816, i.e. (320÷392) with the quantity of raw cotton consumed by mills (as reported) yields an estimate of the total yarn production. As a comparison of column 2 and 3 of Table I indicates the difference between the reported estimates of yarn production and the indirect estimates is not substantial.

The consumption of yarn by mills can be derived indirectly by working back from the reported production of cloth. Three categories of cloth, i.e. coarse, medium and fine can be distinguished and each category has a different requirement of yarn. On an average 3.25 yards of coarse cloth is produced from a pound of yarn, while the same ratios for medium and fine cloth are 4.5 yds./lbs. and 6.0 yds./lb. respectively. Dividing the quantity of each of these three categories of cloth produced by mills with their respective coefficients and summing yields an estimate of total yarn consumption. These derived figures are in some cases markedly lower than the reported data.

We have based these indirect estimates of yarn consumption in the mill sector on the reported level of cloth production. There exists, of course, the possibility that the mills under-report the level of cloth production to reduce their tax burden. Thus we assume that these figures represent a lower bound of yarn consumption. While difficult to prove, there is some evidence that under-reporting of cloth production and over-reporting of yarn consumption exists because the average input coefficient for yarn in cloth production does not show any change between the years 1960-61 and 1972-73. It was 3.59 yds./lb. in 1960-61, 3.42 yds./lb. in 1964-65 and 3.56 yds./lb. in 1972-73. At the same time the percentage of coarse cloth has declined from 44% in 1960-61 to 25% in 1972-73, which under normal circumstances should cause the technical coeffi-cient to increase. To cancel out the effects of under- and over-reporting, a simple average of the reported and derived estimates for yarn production and yarn consumption in the mill sector has been included in our study as data Set C.

Results

The results of the "residual" approach of estimating the production in the small scale sector are shown in Appendix Tables I to III, and summarised in Table 2 below.

Output

The estimated levels of cloth output under the three different assump-tions are shown in the first three columns of Table 2 along with the quantity of cloth produced in the large scale sector. Several interesting facts are apparent from this table. First, the absolute level of cloth production differs substan-tially depending on whether the reported or the derived data are used. The level of production in the small scale sector estimated using reported data is always less—even as much as 30 percent less—than the level of production

Table 2

Year	Data Set A	Data Set B	Data Set C	Coarse Cloth (Mill Sector)	All Cloth (Mill Sector)
1960-61	187	288	237	253	614
1961-62	358	444	399	282	639
1962-63	537	588	562	296	672
1963-64	485	492	489	239	693
1964-65	413	420	416	291	715
1965-66	455	528	493	264	651
1966-67	469	500	460	335	684
1967-68	343	396	370	362	715
1968-69	532	676	602	231	710
1969-70	641	804	723	218	725
1970-71	505	544	524	194	787
1971-72	625	839	731	192	751
1972-73	575	720	647	177	704
1973-74	513	753	633	204	708
Trend rate of growth (Percentage)	5.0	5.6	5.3	—3.4	1.1

arrived at by using derived estimates of yarn production and yarn consumption in the mill sector. Set A—the reported data—shows a trend growth rate of 5 percent per annum while Set B shows a slightly high growth rate of 5.6%.

The contrast in the rates of growth in the small scale and large scale sectors is striking. From Data Set C, which, as we have argued, is probably a more reliable estimate of the level of output than either Set A or B, it can be observed that the level of coarse cloth production in the two sectors was approximately the same in 1960-61. Coarse cloth production expanded in the large scale sector at a moderate pace until 1967-68 and then fell off rather dramatically, causing an average rate of decline of more than 3 percent per annum over the 1960-61 to 1973-74 period. The small scale sector, on the other hand, showed fairly steady growth over the same period. In 1973-74 the small scale sector accounted for more than three quarters of coarse cloth production.

Value Added

To obtain estimates of the value added in small scale cotton textiles, we have applied a constant value added—total output ratio obtained from the 1965-66 survey to the value of cloth produced in each year measured in 1969-70 prices. The assumption of a constant proportion of value added to total output implies no increase in productivity. Because of the organization of this sector into small units using, for the most part, second hand looms, this assumption is less stringent than it might otherwise seem. Embodied technological change is probably minimal, the only change in productivity would therefore, come about through increased labour skills and no evidence exists to suggest that productivity has been improved through this means over the past decade.

The 1965-66 survey reported a total value of output of almost Rs. 250 million for the small scale sector (presumably including handlooms) and a total value added of Rs. 73 million. Thus, in our study we have generated a value added series by multiplying 0.292, i.e. (73÷250) by the value of output in each year. For 1965-66, the year of the survey, this approach yields an estimated value added, using data Set C, of Rs. 254 million. The difference between our estimate and the value added reported by the survey can be explained to a large extent by the incomplete coverage of the 1965-66 survey, which enumerated small scale establishments in only selected urban areas and even within these urban areas possibly overlooked many weaving establishments.

Employment

Total employment within the small scale sector has been estimated by assuming a fixed output-labour ratio, which is tantamount to assuming a constant labour productivity over the period. As with value added, the ratio is taken from the 1965-66 survey, which suggests that one employee produces 3,745 yards of cloth each year. This amounts to slightly less than 15 yards per day. Since the average powerloom operates at a speed that will produce between 30 and 35 yards per 8-hour shift, the survey results suggest considerable under utilization of labour. The working group on Investment [4] reported a slightly higher ratio—4,600 yards per employee—and this ratio produces an estimate of employment that is 18 percent below the level derived from the survey data which we have included in the Appendix Table III as column 12. Obviously,

the rate of growth of employment is the same as output, but the size of the small scale textile labour force is striking. Even if the working group's ratio is used, the estimated employment of 158 thousand (i.e. 193 reduced by 18%) is larger than the 154 thousand employees reported to be working in the large scale cotton textile industry [5]*.

Conclusion

The purpose of the paper has been to explore ways in which the small scale sector's contribution to G.N.P., and the sector's rate of growth over time, can be assessed by some means other than by surveys, which in Pakistan have tended in the past to be incomplete, or by arbitrary assumption that this sector grows at a rate approximately equal to the rate of population increase. Using an indirect approach that traces the growth of a key input into cloth produced in the small scale sector—namely, yarn manufactured by the mill (i.e. large scale) sector—we have concluded that output, value added and employment grew, on the average, at 5.7 percent per annum between 1960-61 and 1973-74. However, the year-to-year rates of growth vary considerably and thus the trend rate of growth is fairly sensitive to the choice of the time period over which comparisons are made. For example, the trend rate of growth from 1962-63 to 1973-74 is only 3.6 percent, which comes much closer to the assumed rate of population growth during this period of 2.7—2.9 percent. However, if the period from 1968-69 to 1973-74 is examined, the trend in growth appears to be nil.

Even with the decelerating growth in small scale production, it appears that the growth in this sector has come at the expense of the large scale sector. This may have been due to the lower wages and lower overheads in the small scale sector which more than offset the higher efficiency in the large scale sector and turned the comparative cost balance in favour of the small scale sector. Also, the introduction of a capacity tax in 1967-68 which was assessed on a per loom basis in the small sector may have given a considerable filip to the growth in weaving establishments with less than 4 looms where this tax did not apply.

The future growth of the small scale textile sector cannot be simply extrapolated from past trends. We have not analysed the sources of growth in the small scale sector and above all we have emphasised—and reiterate here again—the extremely tentative nature of the output, value added and employment series we have pieced together from a chain of assumptions that might make a modest claim of heroism. Our hope is that this study will stimulate others to improve on our data and assumptions and to undertake parallel studies in the other major small scale industries—*desi* sugars, edible oil refining, engineering and so forth.

If, however, our estimates give a rough representation of the pattern of growth in this sector then there is some cause for concern for the growth prospects for the most important of the small scale industries. Coarse cloth

*The working group made estimates of output and employment in various small scale industries, including textiles, for the years 1969-70, 1970-71 and 1971-72. These estimates were arrived at by applying a growth rate computed from the 1965-66 base line data. For 1969-70, this procedure yields a level of output of Rs. 810 million and 99,000 employees compared to Rs. 1,286 million and 193,000 employees, from our study.

production in the large scale sector has declined so precipitously that little room remains for further replacement of large scale coarse cloth production by small scale sector. A recent study by M. I. Malik [1] of domestic consumption trends finds that the existing data on large and small scale production, imports, and exports of cloth textile goods, coupled with recent population trends strongly suggest a declining trend in per capita cloth consumption. Thus, unless export prospects for coarse cloth improve dramatically or small scale producers broaden their product mix to include the finer grades of blended cotton fabrics and synthetics, to which consumer tastes appear to be gravitating, the scope for further improvement in this sector would appear to be limited.

The policy implications of our research are then rather obvious. The foreign market for coarse cloth must be identified and developed. Technical assistance should be provided to small textile producers, as well as facilities for assuring them the necessary raw materials, which must in some instances be imported, to allow them to diversify their output mix. Finally, the declining trend in per capita consumption of cloth should be studied carefully to determine whether a reversal of this trend is possible or desirable. The small scale textile industry is labour-intensive, a minimal user of foreign exchange, regionally decentralised and often rurally based, and produces a staple consumption good for the bottom 40 percent of the income groups. It goes without saying, then, that the health of this sector should receive the highest priority by government planners.

Appendix Table I
(SET A)

1	2	3	4	5	6	7	8	9	10
Years	Yarn production (Mln. Lbs.)	Yarn exported (inclusive of sales to East Pakistan) (Mln. Lbs.)	Yarn consumed by mills (Mln. Lbs.)	Yarn consumed by ancillary industries (Mln. Lbs.)	Yarn consumed by non-mill loomage (Mln. Lbs.)	Small Scale cloth production (Mln. Lbs.)	Value of cloth at 1969-70 prices. (Mln. Rs.)	Value Added in the small scale sector. (Mln. Rs.)	Employment in the small scale sector (No. of workers).
1960-61	360	117	171.22	25	46.78	187.12	333.07	96.59	49,961
1961-62	368	66	182.60	30	89.40	357.60	636.52	184.59	95,478
1962-63	385	30	185.80	35	134.20	536.80	955.50	277.10	143,325
1963-64	438	86	190.67	40	121.33	485.32	863.87	250.52	129,581
1964-65	454	97	208.64	45	103.36	413.44	735.92	213.42	110,388
1965-66	428	68	196.14	50	113.86	455.44	810.68	235.10	121,602
1966-67	456	80	203.74	55	117.26	469.04	834.89	242.12	125,234
1967-68	495	133	216.35	60	85.65	342.60	609.83	176.85	91,475
1968-69	527	126	203.07	65	182.03	531.72	946.46	274.47	141,969
1969-70	602	156	215.80	70	160.20	640.80	1140.62	330.78	171,090
1970-71	670	252	210.80	75	126.20	504.80	898.54	260.58	134,781
1971-72	740	286	217.78	80	156.22	624.88	1112.29	322.56	166,844
1972-73	829	402	198.15	85	143.85	575.40	1024.21	297.02	153,632
1973-74	837	407	211.77	90	128.23	512.92	913.00	264.77	136,950

Source: for Col. 2, 4, see [2] for years 1960-61 to 1970-71 and [5] for 1971-72 to 1973-74.
Col. 3, (1960-61 to 1971-72) un-published data, made available to the author, by
the Ministry of Industries, Islamabad, for 1972-73 — 1973-74, see [5].

Col. 5, unpublished data, Ministry of Industries, Islamabad.
Col. 6 = 2—(3+4+5),
Col. 7 = Col. 6 x 4
Col. 8 = Col. 7 x 1.78
Col. 9 = Col. 8 x 0.29
Col. 10 = Col. 8 x 0.00015

Appendix Table II
(SET B)

1	2	3	4	5	6	7
Years	Raw cotton Produced (Lac bales)	Raw cotton consumed by mills (Lac bales)	Yarn production Estimated (Mln. Lbs.)	Yarn consumed by mills estimated (Mln. Lbs.)	Yarn consumed by Ancillary Industries (Mln. Lbs.)	Yarn Exported (Mln.Lbs)
1960-61	16.91	11.53	368.96	155.33	25	117.0
1961-62	18.23	11.55	369.60	162.77	30	66.0
1962-63	20.57	11.99	383.68	171.92	35	30.0
1963-64	23.54	13.13	420.16	171.06	40	86.0
1964-65	21.20	13.35	427.20	180.36	45	97.0
1965-66	23.31	12.97	415.04	164.66	50	68.0
1966-67	26.06	13.70	438.40	177.95	55	80.0
1967-68	29.09	15.29	489.28	197.02	60	133.0
1968-69	29.60	16.65	532.80	173.49	65	126.0
1969-70	30.17	18.82	602.24	175.13	70	156.0
1970-71	39.51	20.25	648.00	185.20	75	252.0
1971-72	39.79	22.90	732.00	157.43	80	286.0
1972-73	39.47	26.05	833.60	166.56	85	402.0
1973-74	39.10	26.73	855.36	170.10	90	407.0

—*Continued*

Appendix Table II—*Continued*

Years	8 Yarn consumed by non-mill loomage (Mln. Lbs.)	9 Cloth Produced by small-scale sector (Mln. Yds.)	10 Value of cloth at 1969-70 Prices (Mln. Rs.)	11 Value-added in the small-scale sector (Mln. Rs.)	12 Employment in small-scale sector (No. of workers).
1960-61	72.0	288	512.5	148.65	76,890
1961-62	111.0	444	790.3	229.19	118,545
1962-63	147.0	588	1046.6	203.51	156,990
1963-64	123.0	492	875.8	253.98	131,370
1964-65	105.0	420	747.6	216.80	112,140
1965-66	132.0	528	939.8	272.54	140,970
1966-67	125.0	500	89.0	258.10	135,500
1967-68	99.0	396	704.9	204.42	105,735
1968-69	169.0	676	1203.3	348.96	180,495
1969-70	201.0	804	1431.1	415.02	214,665
1970-71	136.0	544	968.3	280.81	145,246
1971-72	209.8	839	1493.8	433.20	224,070
1972-73	180.0	720	1281.6	371.60	192,240
1973-74	188.3	753.2	1340.7	388.80	201,105

Source: for Col. 2—see [2] and [5] for later three years.
Col. 4 and 5 see the text.

Appendix Table III
(SET C)

1 Years	2 Yarn production derived (Mln. Lbs.)	3 Yarn production reported (Mln. Lbs.)	4 Average yarn production (Mln. Lbs.) Col. (2+3)÷2	5 Yarn exported (Inclusive of sales to East Pakistan) (Mln. Lbs.)	6 Yarn consumed by ancillary industries (Mln. Lbs.)	7 Average yarn consumption by mills (Mln. Lbs.)
1960-61	360	368.96	364.48	117	25	163.20
1961-62	368	369.60	368.50	66	30	172.68
1962-63	385.	383.68	384.34	30	35	178.86
1963-64	438	420.20	429.10	86	40	180.88
1964-65	454	427.20	440.60	97	45	194.50
1965-66	428	415.04	421.52	68	50	180.38
1966-67	456	438.40	447.20	80	55	197.17
1967-68	495	489.28	492.14	133	60	206.71
1968-69	527	532.80	529.90	126	65	188.29
1969-70	602	602.24	602.12	156	70	195.46
1970-71	670	648.00	659.00	252	75	201.00
1971-72	740	732.00	736.40	280	80	187.61
1972-73	829	833.60	831.00	402	85	182.35
1973-74	837	855.36	846.13	407	90	190.93

Appendix Table III—*Continued*

	8	9	10	11	12
Years	Yarn consumed by non-mill loomage (Mln. Lbs.)	Cloth produced by small-scale sector (Mln. Yds.)	Value of cloth at 1969-70 prices (Mln. Rs.)	Value Added in small scale sector (Mln. Rs.)	Employment in small scale (No. of workers)
1960-61	59.28	237.12	420.29	121.88	63,044
1961-62	99.82	399.28	710.71	206.11	106,607
1962-63	140.48	561.92	1,000.21	290.06	150,032
1963-64	122.22	488.88	870.20	252.36	130,530
1964-65	104.10	416.40	741.19	214.95	111,179
1965-66	123.14	492.56	876.75	254.26	131,513
1966-67	115.03	460.12	819.01	237.51	122,852
1967-68	92.30	369.72	658.10	190.85	98,715
1968-69	150.61	602.44	1,072.34	310.98	160,851
1969-70	180.67	722.68	1,286.37	373.05	192,956
1970-71	131.00	524.00	932.72	270.49	139,908
1971-72	182.79	731.16	1,301.46	377.42	195,219
1972-73	161.65	646.60	1,150.94	333.77	172,641
1973-74	158.20	632.80	1,126.38	326.65	168,957

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