

## Chapter 4

# Disaggregation of District Income by Cropping Pattern

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## 4.1 Introduction

This chapter significantly deals with the actual process of estimation of district income for Kolhapur district by considering the cropping pattern. Initially we have tried to estimate the contribution of crop husbandry sector in general and sugarcane crop in particular in the overall district income. Since sugarcane crop occupies an important place in the economy of the district as it is the most important cash crop of the district. The total area under this crop has increased considerably in the recent years.

Hypothetically sugarcane contributes major share in agricultural income of the farmers and also in the district income from primary sector. Further, the researcher has attempted to study the association between the prices of sugarcane and its area under the crop. The trends in various variables like prices, production, area under crop, irrigation, etc. by using the least square method also studied.

In this chapter we have tried to highlight the overall scenario of sugarcane cultivation at national, state and district level. This includes the trends in area, production and yield of sugarcane crop along with its Statutory Minimum Price (SMP). While considering the cropping pattern of the district we have taken five important crops (viz. Rice, Jawar, Wheat, Maize, Soyabean, Sugarcane) which together contributes more than 60 per cent of GCA.

Presently state income estimates for Maharashtra state is carrying out by the Directorate of Economics and Statistics (DES), Mumbai by following the CSO methodology. Afterwards the state income is allocated among the different districts of the state on the basis of variety of parameters which are not objective.

Afterwards I have tried to explain the process of district income estimation by using Indical software in which estimates of Gross Value Added (GVA) for each crop has been estimated by deducting estimated value of input from gross value of output. Subsequently we have explained the reports generation in the software through providing necessary commands.

At the end the hypothesis has been tested so far assumed in this study by applying appropriate statistical (Correlation and Regression analysis) technique as well as in the conclusion we have tried to summarise the all issues so far discussed in this chapter.

## 4.2 Agriculture and Land Utilisation of Kolhapur District

Agriculture is the main source of livelihood to 65 percent population of the district, including self-supporting persons, both earning and non-earning, besides providing subsidiary occupation to a fairly large number of persons. Persons engaged in agricultural cultivation; land owners cultivating and non-cultivating; farm labourers; labourers working in forests; and persons engaged in rearing, breeding and dealing in livestock. (Census, 2001)

According to the Census 2001 out of the total geographical area of 776261 thousand hectares, 18 per cent area was under forest, 10 per cent of non-fertile land, 15 per cent of barren land and net area sown was 57 per cent.

Table No. 4.1

### Land Utilisation Statistics of Kolhapur District

Area in thousand hectares

Year	Total Geographical Area	Cropping Area		Gross Cropped Area	% of Gross Cropped Area to Geographical Area
		Net area sown	Area sown more than once		
1960-61	776261	413800	29587	443387	57.12
1970-71	776261	403400	50022	453422	58.41
1980-81	776261	427600	54690	482290	62.13
1990-91	776261	425800	71534	497334	64.07
2000-01	776261	442300	121720	564020	72.66
2001-02	776261	417688	105512	523200	67.40
2002-03	776261	442305	121695	564000	72.66
2003-04	776261	442305	121695	564000	72.66
2004-05	776261	442305	121695	564000	72.66
2005-06	776261	434400	119460	553860	71.35
2006-07	776261	447800	120190	567990	73.17

Source: Socio-economic survey reports of Kolhapur District from 2000-01 to 2006-07

It is clear from the above table that the percentage of GCA to Geographical Area has considerably increased from 57.12 per cent to 73.17 per cent in the concerned period, since the area sown more than once has showing more growth than net area sown.

### 4.3 Irrigation Status of Kolhapur district

Since Kolhapur is an agrarian district the significance of irrigation is essential for the development of agriculture sector and in that way overall prosperity of the district economy.

District has four major irrigation projects namely Radhanagari, Tulsi, Dudhganga and Warna having command area of 220434 hectares, out of which two projects are finished and other two are under construction. In the case of medium irrigation projects district has 12 medium irrigation projects out of which construction of 10 projects are completed and two are on the way. There are 146 minor irrigation projects having the command area of 27306 hectares. Irrigation through well is also significant in the district which provides irrigation facilities to more than 52 thousand hectares.

The sugarcane crop requires plenty of water. The increase in area under the crop is mainly due to increased irrigation facilities in recent years, namely, *pacca bandharas* and co-operative lift irrigation societies.

Table No. 4.2

#### Area Irrigated by Various Sources in Maharashtra State

Area in thousand hectares

Year	Area Irrigated			Gross Cropped Area	% of Gross Irrigated Area To Gross Cropped Area
	Wells	Other Sources	Gross Irrigated area		
1996-97	2059	1028	3769	21836	17.26
1997-98	2090	1050	3693	21384	17.27
1998-99	2210	1063	3858	21589	17.87
1999-00	2285	1012	3873	21382	18.11
2000-01	2262	987	3852	22255	17.31
2001-02	1922	1053	3667	22404	16.37
2002-03	1931	1040	3668	22387	16.38
2003-04	1914	1030	3636	22190	16.39
2004-05	1942	1001	3665	22368	16.39
2005-06	2077	1070	3810	22556	16.89

Source: Commissionerate of Agriculture, Maharashtra State, Pune

It is clear from above table that the percentage of gross irrigated area to gross cropped area is fluctuating between 16 to 18 per cent for Maharashtra state. Situation is more or less similar for the Kolhapur district; the detailed district level data on irrigation status is unavailable. However with the help of following table we may understand the irrigation position of Kolhapur District.

Table No. 4.3

**Irrigation status in regard with cropping area in Kolhapur district**

Area in thousand hectares

Year	Cropping Area		Gross Cropped Area	Gross Irrigated Area	% of Gross Irrigated Area to Gross Cropped Area
	Net area sown	Area sown more than once			
1960-61	413800	29587	443387	39100	8.82
1970-71	403400	50022	453422	50600	11.16
1980-81	427600	54690	482290	71300	14.78
1990-91	425800	71534	497334	95200	19.14
2000-01	442300	121720	564020	135400	24.01
2001-02	417688	105512	523200	117057	22.37
2002-03	442305	121695	564000	135400	24.01
2003-04	442305	121695	564000	135400	24.01
2004-05	442305	121695	564000	135400	24.01
2005-06	434400	119460	553860	155800	28.13
2006-07	447800	120190	567990	135100	23.79
CGR*	0.41	0.75	0.48	2.04	

CGR = Compound Growth Rate for last 7 years.

Source: Socio-economic survey reports of Kolhapur District from 2000-01 to 2006-07

It is clear from above table that gross cropped area has increased with growing gross irrigated area and thus percentage of gross irrigated area to gross cropped area is also increased from 8.82 per cent in 1960-61 to 23.79 per cent in 2006-07.

Compound growth rate for Net area sown, Area sown more than once, Gross cropped area and Gross irrigated area is calculated 0.41 per cent, 0.75 per cent, 0.48 per cent and 2.04 per cent respectively for the last 7 years.

#### 4.4 Cropping Pattern of Kolhapur district

Cropping pattern is the allocation of available land for the cultivation of different crops. Cropping pattern of Kolhapur district is mainly dominated by Sugarcane, Soyabean, Rice, Maize, Jawar and Wheat which together contributes more than 50 per cent of total gross cropped area.

Chandgad, Shahuwadi, Bhudargad, Radhanagari, Karveer and Panhala tehsils are front runners in the production of paddy crop.

Details regarding the cropping pattern in Kolhapur district are shown in the following table.

Table No. 4.4

#### Season wise Cropping Pattern in the Kolhapur District

During 2000-01 to 2006-07

Area in hectare

Year	Season\Crop	Rice	Jawar	Wheat	Maize	Soyabean	Sugarcane
2000-01	Kharriff	100047	9108	0	2931	49145	90112
	Rabi	0	10467	8444	6613	0	0
	Summer	511	174	0	0	0	0
	Total	100558	19749	8444	9544	49145	90112
2001-02	Kharriff	100556	6357	0	2418	54430	95130
	Rabi	0	10954	7965	4480	0	0
	Summer	545	160	0	0	0	0
	Total	101101	17471	7965	6898	54430	95130
2002-03	Kharriff	99815	6925	0	2718	59742	95130
	Rabi	0	10682	7227	6710	0	0
	Summer	561	105	0	185	48	0
	Total	100376	17712	7227	9613	59790	95130
2003-04	Kharriff	1023	74.34	0	29	626	74815
	Rabi	0	11520	7802	4987	0	0
	Summer	754	235	0	330	58	0
	Total	1777	11829	7802	5346	684	74815
2004-05	Kharriff	110330	7920	0	3782	69535	98166
	Rabi	0	11697	7818	6407	0	0
	Summer	603	99	0	1023	170	0
	Total	110933	19716	7818	11212	69705	98166
2005-06	Kharriff	110322	8383	0	2892	64776	115371
	Rabi	0	11628	8183	4979	0	0
	Summer	430	143	0	1326	0	0
	Total	110752	20154	8183	9197	64776	115371
2006-07	Kharriff	107238	7919	0	2582	57012	114589
	Rabi	0	11382	7641	4735	0	0
	Summer	555	25	0	2198	0	0
	Total	107793	19326	7641	9515	57012	114589

Source: Agriculture Office, Zilla Parishad, Kolhapur.

Above table shows the season wise (Khariff, Rabi and Summer) cropping pattern for major crops (Sugarcane, Soyabean, Rice, Maize, Jawar and Wheat) in the district during year 2000-01 to 2006-07. Summarisation of above table is given in the table 4.

Table No. 4.5

**Cropping Pattern of Kolhapur District during 2001-02 to 2006-07**

Crop\Year	Area in hectare							CGR <sup>#</sup>
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	
Rice	100558	101101	100376	17770	110933	110752	107793	1.77
	(17.8)	(19.3)	(17.8)	(3.0)	(19.7)	(20.0)	(19.0)	
Jawar	19749	17471	17712	11829	19716	20154	19326	1.18
	(3.5)	(3.3)	(3.1)	(2.1)	(3.5)	(3.6)	(3.4)	
Wheat	8444	7965	7227	7802	7818	8183	7641	-0.60
	(1.5)	(1.5)	(1.3)	(1.4)	(1.4)	(1.5)	(1.3)	
Maize	9544	6898	9613	5346	11212	9197	9515	2.60
	(1.7)	(1.3)	(1.7)	(0.9)	(2.0)	(1.7)	(1.7)	
Soyabean	49145	54430	59790	684	69705	64776	57012	3.44
	(8.7)	(10.4)	(10.6)	(0.1)	(12.4)	(11.7)	(10.0)	
Sugarcane	90112	95130	95130	74815	98166	115371	114589	4.15
	(16.0)	(18.2)	(16.9)	(13.3)	(17.4)	(20.8)	(20.2)	
GCA*	564020	523200	564000	564000	564000	553860	567990	0.48

\* GCA = Gross Cropped Area

# CGR = Compound Growth Rate

(Figures in the brackets shows the per cent to the Gross Cropped Area)

Source: Computed from data of Records of Agriculture Office, Zilla Parishad, Kolhapur

In 2005-06 Sugarcane (21 per cent), Paddy (20 per cent) and Soyabean (12 per cent) crops together contributes 53 per cent in the district gross cropped area of 553860. Area under sugarcane crop shows the significant growth (4.15 per cent) in the last 10 years along with compound growth rate of Soyabean and Maize crop is calculated 3.44 per cent and 2.60 per cent respectively. Rice and Jawar show the lower growth rate (1.77 per cent & 1.18 per cent respectively) and wheat shows the negative growth (-0.60 per cent) for last 10 years.



Table No. 4.6

**Growth trends for main crops in Kolhapur District**

During 2000-01 to 2006-07

Area in hectare

Year	Rice	% change	Jawar	% change	Wheat	% change
2000-01	100558	-	19749	-	8444	-
2001-02	101101	0.5	17471	-11.5	7965	-5.7
2002-03	100376	-0.7	17712	1.4	7227	-9.3
2003-04	17770	-82.3	11830	-33.2	7802	8.0
2004-05	110933	524.3	19716	66.7	7818	0.2
2005-06	110752	-0.2	20154	2.2	8183	4.7
2006-07	107793	-2.7	19326	-4.1	7641	-6.6
	CGR =	1.77	CGR =	1.18	CGR =	-0.60

Cont...

Year	Maize	% change	Soyabeen	% change	Sugarcane	% change
2000-01	9544	-	49145	-	90112	-
2001-02	6898	-27.7	54430	10.8	95130	5.6
2002-03	9613	39.4	59790	9.8	95130	0.0
2003-04	5346	-44.4	64748	8.3	74815	-21.4
2004-05	11212	109.7	69705	7.7	98166	31.2
2005-06	9197	-18.0	64776	-7.1	115371	17.5
2006-07	9515	3.5	57012	-12.0	114589	-0.7
	CGR =	2.60	CGR =	3.44	CGR =	4.15

Source: Computed from table no. 4.5

From the above table it is describe the following conclusions. In case of rice and Jawar shows the lower rate of growth (1.77 per cent and 1.18 per cent respectively), Whereas Maize and Soyabeen shows moderate rate of growth (2.60 per cent and 3.44 per cent). In case of wheat is shows the negative rate of growth (-0.60 per cent), whereas Sugarcane shows the highest rate of growth (4.15 per cent) in the cropping pattern of Kolhapur district.

Percentage change over previous years for 2002-03 and 2003-04 shows the negative situation due to serious drought situation in the district and most of the part of state. One more thing clear from above table is in the drought situation

wheat shows the positive percentage change (but haven't worth mentioning share in cropping pattern) as against all other crops shows negative percentage change, it means people have a preference to cultivate wheat as an alternative of sugarcane and soyabean. Still sugarcane has a significant share in the total cropping pattern of the Kolhapur district.

#### 4.5 Sugarcane Scenario

In this part we attempted to review the overall situation of sugarcane cultivation at national, state and district level. In which the trends in area, production and yield has been discussed along with irrigation status of that entity. Since, Sugarcane is a cash crop which provides good returns on investment as compared to other crops but it requires plenty of water. During the planning period the area under sugarcane has shown increasing trend along with increase in irrigation facilities.

##### 4.5.1 Sugarcane Scenario in India

India has been known as the original home of sugar and sugarcane. Indian mythology supports the above fact as it contains legends showing the origin of sugarcane. India is the second largest producer of sugarcane next to Brazil. Presently, about 4.8 million hectares of land is under sugarcane with an average yield of 67 tonnes per hectare.

Indian sugar industry has contributed to about 16% of the world's total production and also India is the largest single producer of sugar including traditional cane sugar sweeteners, khandsari and Gur equivalent to 26 million tonnes raw value followed by Brazil in the second place at 18.5 million tonnes. Even in respect of white crystal sugar, India has ranked No.1 position in 7 out of last 10 years. (<http://www.sugarindustry.com/>)

The trend in area, production and yield of sugarcane in India is described in the following table along with % of area covered under irrigation facilities.

Table No. 4.7

**All-India Area, Production and Yield of Sugarcane (Cane) from 1997-98 to 2006-07 along with percentage coverage under Irrigation**

Area - Million Hectares  
Production - Million Tones  
Yield - Kg./Hectare

Year	Area	Production	Yield	% Coverage Under Irrigation
------	------	------------	-------	-----------------------------

1997-98	3.93	279.54	71134	91.3
1998-99	4.05	288.72	71203	91.7
1999-2000	4.22	299.32	70935	92.0
2000-01	4.32	295.96	68577	92.1
2001-02	4.41	297.21	67370	91.6
2002-03	4.52	287.38	63576	91.3
2003-04	3.93	233.86	59380	90.7
2004-05	3.66	237.08	64752	NA
2005-06	4.20	281.17	66928	NA
2006-07*	4.83	322.94	66833	NA

\* Advance Estimates

Source: Annual Report 2006-07, Ministry of Agriculture & Co-op., GOI

The above table highlights that the area under sugarcane crop has increased from 3.93 million hectares in 1997-98 to 4.83 million hectares in 2006-07. In addition to this the percentage coverage under irrigation for sugarcane crop is more than 90 per cent at national level.

Details regarding the decadal growth of area under cane and its production are discussed in the following table.

Table No. 4.8

**Decadal Growth of Area and Production of Sugarcane in India**

Area - Million Hectares  
Production - Million Tones

Year	Area	% change	Production	% change	Yield	% change
1997-98	3.93	-	279.54	-	71134	-
1998-99	4.05	3.05	288.72	3.28	71203	0.10
1999-2000	4.22	4.20	299.32	3.67	70935	-0.38
2000-01	4.32	2.37	295.96	-1.12	68577	-3.32
2001-02	4.41	2.08	297.21	0.42	67370	-1.76
2002-03	4.52	2.49	287.38	-3.31	63576	-5.63
2003-04	3.93	-13.05	233.86	-18.62	59380	-6.60
2004-05	3.66	-6.87	237.08	1.38	64752	9.05
2005-06	4.20	14.75	281.17	18.60	66928	3.36
2006-07*	4.83	15.00	322.94	14.86	66833	-0.14
<b>CGR =</b>	<b>0.69</b>	<b>-</b>	<b>-0.48</b>	<b>-</b>	<b>-1.17</b>	<b>-</b>

Source: Calculated from table no. 4.7

The above table shows that the area under cane crop shows the compound growth rate of 0.69 per cent, whereas the production figure shows the negative growth (-0.48 per cent), and yield figures also shows the negative growth (-1.17 per cent). With regard to percentage change over previous year for 2002-03 and 2003-04 it shows the reduction in both area under crop and production because of drought situation in the most of the states in the nation.

#### 4.5.2 Sugarcane Scenario in Maharashtra State

In Maharashtra, presently there are 188 sugar factories having daily sugarcane crushing capacity of 4.552 lakh tones. With the opening stock of 49.80 lakh tones at the start of the season 2006-07, India produced 283 lakh tonnes of sugar as compared with the previous season's production of 192.60 lakh tones. The sugar production increased by 90.40 lakh tonne over the previous season. The contribution of Maharashtra in nation's total sugar production increased from 26.98 per cent to 32.16 per cent during the season 2006-07. (VSI, Annual Report, 2006-07)

During the crushing season 2007-08, 171 sugar factories from Maharashtra State have crushed around 76.122 million tones of sugarcane and produced 9.087 million tones of sugar with an average recovery of 11.94%. The forthcoming season may have declining trend of sugarcane production due to which the sugar industry may face critical situation. (VSI, 2008)

The position of area under crop, production and yield of sugarcane in the Maharashtra state is shown in the following table.

Table No. 4.9

#### Area, Production and Yield of Sugarcane crop in Maharashtra State

(Area in '00' hectares, Production in '00' Metric Tons & Average yield in Metric Tons/hectare)

Year	Area under sugarcane	% change	Production	% change	Yield	% change
2000-01	5953	-	495687	-	83	-
2001-02	5780	-2.91	451400	-8.93	78	-6.02
2002-03	5731	-0.85	426170	-5.59	74	-5.13
2003-04	4425	-22.79	256684	-39.77	58	-21.62
2004-05	3269	-26.12	230137	-10.34	73	25.86
2005-06	5010	53.26	388530	68.83	78	6.85

2006-07	8490	69.46	662770	70.58	78	0.00
2007-08*	10880	28.15	805990	21.61	74	-5.13
	<b>CGR =</b>	<b>6.69</b>	<b>CGR =</b>	<b>6.05</b>	<b>CGR =</b>	<b>-0.49</b>

\* advance estimations

Source: 1. Various Annual Reports of Department of Agriculture, Govt. of Maharashtra

2. Various Annual Reports of Vasantdada Sugar Institute, Pune

The important conclusions drawn from the above table that area under sugarcane crop in Maharashtra state shows the compound growth rate of 6.69 per cent as against national average of 0.69 per cent in the same period, while the production of cane is showing the compound growth rate of 6.05 per cent as against national average of -0.48 per cent and yield figures shows the negative CGR of -0.49 per cent in the above mentioned period. Percentage change over previous year for 2003-04 and 2004-05 shows the negative values because of drought situation in the state.

#### 4.5.3 Sugarcane Scenario in Kolhapur District

Since sugarcane has its dominance in the cropping pattern of the district, it contributes a major share in the state's sugarcane production. In 2005-06 the area under Sugarcane crop was 94,500 hectares which is 21 per cent of the total cross cropped area of 5,53,860 hectares. Area under sugarcane crop shows the significant growth (4.15 per cent) in the last 10 years.

The state of affairs of sugarcane production in the district is shown in the following table.

Table No. 4.10

#### Area, Production and Yield of cane in Kolhapur District

(Area in '00' hectares, Production in '00' Metric Tons & Average yield in Metric Tons/hectare)

Year	Area under sugarcane	% change	Production	% change	Yield	% change
2000-01	897	-	81583	-	91	-
2001-02	449	-49.94	44724	-45.18	100	9.89
2002-03	984	119.15	84210	88.29	86	-14.00
2003-04	689	-29.98	49184	-41.59	57	-33.72
2004-05	763	10.74	65294	32.75	86	50.88

2005-06	945	23.85	72293	10.72	77	-10.47
2006-07	1063	12.49	85040	17.63	80	3.90
2007-08*	1722	61.99	127230	49.61	74	-7.50
	<b>CGR =</b>	<b>11.12</b>	<b>CGR =</b>	<b>7.6</b>	<b>CGR =</b>	<b>-2.91</b>

\* Advance Estimates

Source: Annual Report 2006-07, Ministry of Agriculture & Co-op., GOI

From the above table we may conclude that the compound growth rate for area under cane is calculated 11.12 per cent during the 2000-01 to 2007-08 as against the state's average of 6.69 and national's average of 0.69 per cent. In case of production district also shows the higher rate of growth of 7.6 per cent as against the state's average of 6.05 per cent and national's average of -0.48 per cent. But with regard to the yield of sugarcane is showing the negative trend and compound rate of growth is calculated -2.91 per cent as against state's average of -0.49 per cent and nation's average of -1.17.

Planting season wise distribution of sugarcane crop in Kolhapur district is shown in the following table.

Table No. 4.11

**Planting Season wise distribution of Sugarcane crop in Kolhapur District**

Area in hectare

Year	Aadsali	Pre-season	Suru	Ratoon	Total	% change
2002-03	1826	22735	17305	32949	74815	-
	(2.44)	(30.39)	(23.13)	(44.04)		
2003-04	686	28857	32227	36396	98166	31.21
	(0.70)	(29.40)	(32.83)	(37.08)		
2004-05	145	32084	31920	51222	115371	17.53
	(0.13)	(27.81)	(27.67)	(44.40)		
2005-06	2000	32686	29277	50626	114589	-0.68
	(1.75)	(28.52)	(25.55)	(44.18)		
				<b>CGR =</b>		<b>15.49</b>

(Fig. in brackets shows per cent to total)

Source: Agriculture Office, Zilla Parishad, Kolhapur.

The above table shows the distribution of sugarcane area by planting season (i.e. Aadsali, Pre-season, Suru and Ratoon). Ratoon planting season has

major share of 44.04 per cent in 2002-03 and increased up to 44.18 per cent in 2005-06. Area under Pre-season and Suru season seasons is more or less constant between 23.13 per cent to 25.55 and 30.39 per cent to 28.52 per cent respectively. The percentage share of Aadsali season shows the decreasing trend in the above mentioned period. The CGR for concerned period is calculated 15.49 per cent.

#### 4.6 Trends in MSP

The minimum support price (MSP) for various crops in India is recommended by the CACP and then afterwards announced by the central Govt. to ensure farmers their income by providing them assured minimum price for their output before starting of the cropping season. Here I have attempted to study the trends in the MSP for last 10 years for major crops in the district (i.e. Paddy, Jawar, Wheat, Maize, Soyabean and Sugarcane). While determining the value of any product the price figures are vital important as like the production figures.

Table No. 4.12

#### Minimum Support Prices of Principal Crops in Kolhapur district (According to Crop Year)

(Rs. per quintal)

Sr. No.	Commodity	1998-99	1999-00	2000-01	2001-02	2002-03	5Years CGR
1	Paddy	470	520	540	560	560	4.34
2	Jowar	390	415	445	485	485	6.10
3	Wheat	550	580	610	620	620	3.11
4	Maize	390	415	445	485	485	6.10
5	Soyabeen	795	845	865	885	885	2.64
6	Sugarcane@	52.70	56.10	59.50	62.05	69.50	6.76

Cont...

Sr. No.	Commodity	2003-04	2004-05	2005-06	2006-07	2007-08	5Years CGR	10Years CGR
1	Paddy	580	590	600	610	625	1.84	2.7
2	Jowar	505	515	525	540	550	2.21	3.7
3	Wheat	630	640	640	650	750	3.71	2.4
4	Maize	505	525	540	540	570	2.74	4.2

5	Soyabeen	930	1000	1010	1020	1050	2.66	3.1
6	Sugarcane@	73.00	74.50	79.50	80.25	81.18	2.91	5.2

@Statutory Minimum Price (SMP) linked to a basic recovery of 8.5% (9% for last two years) with proportionate premium for every 0.1% increase in recovery above that level. The SMP for 2002-03 includes the one time drought relief of Rs. 5 per quintal recommended by CACP.

Source: Directorate of Agriculture and Statistics, Department of Agriculture and Co-operation, Ministry of Agriculture, GOI.

Above table shows the trends in the minimum support prices of principal crops in Kolhapur district. The compound growth rate for major crops in the district i.e. Paddy, Jowar, Wheat, Maize, Soyabeen and Sugarcane is calculated 2.7 per cent, 3.7 per cent, 2.4 per cent, 4.2 per cent, 3.1 per cent and 5.2 per cent respectively. If we calculate the CGR for first five year from 1998-99 to 2002-03 it shows the higher rate of growth in minimum support prices for all crops than the last five years. With regard to sugarcane crop the decadal growth for last ten years shows 5.2 percent rate of growth, however rate of growth in prices for first five years is 6.76 per cent whereas for last five years it is calculated just 2.91 per cent.

#### 4.7 State Income Estimates of DES, Mumbai

In this section I have attempted to study the composition of State income at both current and constant prices on data provided by Directorate of Economics and Statistics, Mumbai which is the prime authority to estimate the state income for Maharashtra state. All these estimates are taken from the Economic Survey of Maharashtra from last few issues. The growth of the state income is described in the following table along with percentage change over previous year and CGR.

Table No. 4.13

#### Growth of GSDP of Maharashtra State

(Rs. In crores)

Year	GSDP at Current price	% Change	GSDP at Constant prices	% Change
1999-00	247830	-	N.A.	
2000-01	252,283	1.80	242,615	-
2001-02	274,113	8.65	253,072	4.31
2002-03	300,476	9.62	270,170	6.76
2003-04	341,424	13.63	290,468	7.51
2004-05	387,390	13.46	314,312	8.21



2005-06	438,058	13.08	343,501	9.29
2006-07	509,356	16.28	376,783	9.69
<b>CGR</b>	<b>11.27</b>		<b>7.72</b>	

Source: Various reports of Economic Survey of Maharashtra, Govt. of Maharashtra.

The above table highlight the rapid growth of the state economy. The percentage change over previous year during the concerned period shows rapid growth in the last three years. Especially, it is calculated 16.28 per cent for 2006-07 at current and 9.69 per cent at constant prices. The CGR for state income at current price is calculated 11.27 per cent, whereas the CGR for state income at constant prices is calculated 7.72 per cent.

It is significant to study the sector wise distribution of gross state domestic product for Maharashtra state in the view of changing composition of the state economy.

Table No. 4.14  
**Sector wise distribution of GSDP for Maharashtra**

(Rs .in crore)				
Year	Primary	Secondary	Tertiary	Total
<b>At Current Prices</b>				
1999-00	40,870	71,280	135680	247830
	(16.49)	(28.76)	(54.75)	
2000-01	40,601	67,558	144124	252,283
	(16.09)	(26.78)	(57.13)	
2001-02	44,842	70,164	159,107	274,113
	(16.36)	(25.60)	(58.04)	
2002-03	45,719	78,382	176,375	300,476
	(15.22)	(26.09)	(58.70)	
2003-04	52,519	91,722	197,183	341,424
	(15.38)	(26.86)	(57.75)	
2004-05	52,811	105,092	229,487	387,390
	(13.63)	(27.13)	(59.24)	
2005-06	59,654	120,861	257,543	438,058
	(13.62)	(27.59)	(58.79)	
2006-07	69,791	143,064	296,501	509,356
	(13.70)	(28.09)	(58.21)	
<b>CGR</b>	<b>7.79</b>	<b>11.51</b>	<b>12.09</b>	<b>11.27</b>
<b>At Constant (1999-2000) Prices</b>				
2000-01	39,203	64,814	138,598	242,615
	(16.16)	(26.71)	(57.13)	
2001-02	41,974	64,416	146,682	253,072
	(16.59)	(25.45)	(57.96)	

2002-03	43,050	69,485	157,635	270,170
	(15.93)	(25.72)	(58.35)	
2003-04	47,588	76,320	166,560	290,468
	(16.38)	(26.27)	(57.34)	
2004-05	44,902	82,738	186,672	314,312
	(14.29)	(26.32)	(59.39)	
2005-06	48,796	90,934	203,771	343,501
	(14.21)	(26.47)	(59.32)	
2006-07	52,950	102,693	221,140	376,783
	(14.05)	(27.26)	(58.69)	
CGR	4.55	8.35	8.28	7.72

Figures in the bracket show the percentage to the total value of corresponding year.

Source: Various reports of Economic Survey of Maharashtra, Govt. of Maharashtra.

Above table highlights the trends in the sectoral composition of the state economy of Maharashtra state. The percentage share of primary sector in the GSDP at current price has been continuously decreasing, it was 16.49 per cent in 1999-2000, now in 2006-07 in reached at 13.70 per cent. However the share of secondary sector is more or less constant and ranges between 26 to 28 per cent. In case of tertiary sector, its share in the GSDP is tremendously increased from 54.75 per cent to 58.21 per cent in the concerned period. In the absolute volume term it contributes about 3,00,000 crores. The CGR of GSDP at current prices for primary, secondary and tertiary sector during the above mentioned period is calculated 7.79 per cent, 11.51 per cent and 12.09 per cent respectively. The overall CGR for GSDP at current prices is calculated 11.27 per cent.

The percentage share of primary sector in the GSDP at constant (1999-2000) prices has also shows the decreasing trend, its share has decreased from 16.16 per cent to 14.05 per cent. The percentage share of secondary sector is more or less constant and ranges between 25 to 27 per cent. On the other hand the share of share of tertiary sector has increased from 57.13 per cent to 58.69 per cent. The CGR of GSDP at constant prices for primary, secondary and tertiary sector during the above mentioned period is calculated 4.55 per cent, 8.35 per cent and 8.28 per cent respectively. The overall CGR for GSDP constant (1999-2000) prices is calculated 7.72 per cent.

The details regarding the per capita GSDP at current and constant prices with index measurement for Maharashtra state is described in the following table no. 4.15

Table No. 4.15  
**Per Capita GSDP for Maharashtra**

Year	At Current Price	At Constant (1999-2000)Prices	Index
1999-00	26,257	26,257	100.0
2000-01	26,234	25,228	96.1
2001-02	27,992	25,843	98.4
2002-03	30,238	27,188	103.5
2003-04	33,816	28,769	109.6
2004-05	37,770	30,645	116.7
2005-06	42,056	32,978	125.6
2006-07	48,171	35,633	135.7
CGR	9.49	4.93	

Source: Economic Survey of Maharashtra 2007-08

The Per Capita GSDP at current price has increased from Rs. 26,257 to 48,171 during the 1999-00 to 2006-07 which shows the CGR of 9.49 per cent. Whereas Per Capita GSDP at constant (1999-2000) prices has also increased from Rs. 26,257 to Rs. 35,633 which shows the CGR of 4.93 per cent in the concerned period. Index for the above mention period is calculated 135.7 per cent.

#### **4.8 District Income Estimates of DES, Mumbai**

Presently there is no special system available to estimate the district income in India. Hence, the state income data which is estimate by the Directorate of Economics and Statistics for the concerned state is further allocated among the various districts in state.

For the Maharashtra state DES, Mumbai is the prime institute to estimate the state income by following the CSO's methodology. Since the availability of district wise basic data required for estimation of income at the district level is not still up to the mark therefore the proxy indicators are used to allocate State level estimates to districts. Because of the paucity of data, use of proxy indicators and various limitations in estimation procedure, the district domestic products may be used with a margin of error and can be used to have a broad judgement of income at district level. (Economic Survey of Maharashtra, 2007-08, p.157)

The district income estimation for Kolhapur district at current and constant prices is shown in the following tables.

Table No.4.16

## Estimations of Kolhapur District Income

By Directorate of Economics and Statistics, Mumbai  
At current price

Sector	2000-01		2001-02		2002-03	
	Gross District Income	Net District Income	Gross District Income	Net District Income	Gross District Income	Net District Income
A. Primary Sector	20492873	19482947	21398526	20478837	21140691	19987454
1. Agriculture	19279039	18327114	20189555	19192669	19713377	18619121
2. Forestry	990444	973509	1103226	1084363	1189843	1173650
3. Fishery	85872	75719	90043	79397	94382	83015
4. Mining	137518	106605	15702	122408	143089	111668
B. Secondary Sector	21520196	17820714	25053457	20645608	23847747	18984312
C. Tertiary Sector	45088693	41441311	51922554	47802315	57996033	53544405
Total Gross District Income (A+B+C)	87101762	78744972	98874537	88926760	102984471	92516171
Per Capita District Income (Rs.)	24922	22403	27758	25092	28751	25828
Gross State Income	2388751747	2131510848	2714061839	2418770839	2955249218	2608117244
% to Gross State Income	3.65	3.69	3.64	3.68	3.48	3.55

Source: Socio-Economic Survey Report from 2000-01 to 2006-07, Directorate of Economics and Statistics, Mumbai

Cont.....

Sector	2003-04			2004-05*			2005-06*		
	Gross District Income	Net District Income	Gross District Income	Net District Income	Gross District Income	Net District Income			
A. Primary Sector	20568226	19443635	235181	221553	259759	247184			
1. Agriculture	18995134	17940747	217278	204435	245396	233679			
2. Forestry	1279659	1262245	14144	13955	9753	9552			
3. Fishery	117424	103283	1585	1355	1064	945			
4. Mining	176009	137360	2174	1808	3546	3008			
B. Secondary Sector	30404211	24293408	337363	268699	360443	291072			
C. Tertiary Sector	65543511	60566552	734317	679398	832265	772520			
Total Gross District Income (A+B+C)	116515948	104303595	1306861	1169650	1452467	1310776			
Per Capita District Income (Rs.)	32205	28829	35785	32028	38691	34917			
Gross State Income	3331453297	2940008349	37187763	32845146	43241313	38624067			
% to Gross State Income	3.50	3.55	3.51	3.56	3.36	3.39			

Source: Socio-Economic Survey Report from 2000-01 to 2006-07, Directorate of Economics and Statistics, Mumbai

\* Rs. in lakh

Rs. in thousand (except last two year)\*

Table No.4.17  
**Estimations of Kolhapur District Income**  
 By Directorate of Economics and Statistics, Mumbai  
 At constant price (1993-94\*\*)

Sector	Rs. in thousand					
	2000-01		2001-02		2002-03	
	Gross District Income	Net District Income	Gross District Income	Net District Income	Gross District Income	Net District Income
A. Primary Sector	15896075	15158111	16817796	16033850	16337509	15534028
1. Agriculture	15303247	14593902	16191148	15440640	15711589	14937894
2. Forestry	475012	467087	485488	477390	498148	490531
3. Fishery	56818	50488	63677	56530	62449	55713
4. Mining	60998	46674	77488	59280	65323	49890
B. Secondary Sector	15477699	12698602	16306943	13378220	15408310	12044418
C. Tertiary Sector	27941298	25505864	30515199	27883970	33093135	30288885
Total Gross District Income (A+B+C)	59315072	53362577	63639938	57296049	64838954	57867331
Per Capita District Income (Rs.)	16967	15264	17957	16167	18101	16155
Gross State Income	1558751531	1376899631	1665156788	1473586188	1771379851	1545524524
% to Gross State Income	3.81	3.88	3.82	3.89	3.66	3.74

Source: Socio-Economic Survey Report from 2000-01 to 2006-07, Directorate of Economics and Statistics, Mumbai  
 \*\* 1993-94 has considered as base year up to the 2004-05, 1999-2000 has considered as base year for 2005-06.

Cont.....

Sector	2003-04		2004-05**		2005-06**	
	Gross District Income	Net District Income	Gross District Income	Net District Income	Gross District Income	Net District Income
A. Primary Sector	14700456	13975529	154579	146591	206188	196609
1. Agriculture	14056484	13364293	14003	140337	198917	189786
2. Forestry	503509	495810	5060	4983	5139	5004
3. Fishery	63473	56626	705	601	662	577
4. Mining	76990	58800	811	670	1470	1242
B. Secondary Sector	17998088	14114937	193762	151996	269841	215832
C. Tertiary Sector	35822976	32805826	397276	365125	664658	617532
Total Gross District Income (A+B+C)	68521520	60896292	745617	663712	1140687	1030013
Per Capita District Income (Rs.)	18939	17183	20417	18174	30386	27438
Gross State Income	1901512048	1658958769	20825322	18238870	33942498	30295239
% to Gross State Income	3.60	3.67	3.58	3.64	3.36	3.40

Source: Socio-Economic Survey Report from 2000-01 to 2006-07, Directorate of Economics and Statistics, Mumbai

\* Rs. in lakh for last two years, i.e. 2004-05 & 2005-06

\*\* 1999-2000 has considered as base year for 2005-06.

Table No. 4.18

**Per Capita GDDP for Kolhapur**

(In Rs.)

Year	At Current Price	% Change	At Constant Prices*	% Change
2000-01	24922	-	16967	-
2001-02	27758	11.38	17957	5.83
2002-03	28751	3.58	18101	0.80
2003-04	32205	12.01	18939	4.63
2004-05	35785	11.12	20417	7.80
2005-06	38691	8.12	30386	48.83
	<b>CGR =</b>	<b>9.18</b>	<b>CGR =</b>	<b>10.03</b>

\* Base year 1993-94 up to 2004-05 &amp; 1999-00 for last year

Source: As above

With the help of data provided by the DES, Mumbai we may conclude the above table by remark that the per capita gross district domestic product at current prices has increased from Rs. 24,922 to Rs. 38,691 during the above mentioned period (i.e. 2000-01 to 2005-06). Per capita gross district domestic product at constant prices is also increased from Rs. 16967 to Rs. 30,386 in the same period. CGR for per capita district income at constant prices shows the higher growth rate of 10.03 per cent than current price which is calculated 9.18 per cent for the concerned period.

**4.8.1 Trends in District Income at Current Prices**

The district income for Kolhapur district is shown in the table no. 4.16, which highlights the following points.

District income at current prices of Kolhapur district is continuously increasing in the last few years, it has increased from Rs. 8,710.18 crores to Rs. 14,524.67 crores during 2000-01 to 2005-06. It shows annual compound rate of growth of 10.57 per cent during the above mentioned period as against states annual compound rate of growth of 11.27 per cent.

**4.8.2 Trends in District Income at Constant Prices**

District income at constant prices of Kolhapur district has also increased from Rs. 5,931.51 crores to Rs. 11,406.87 crores during 2000-01 to 2005-06. It



shows annual compound rate of growth of 11.47 per cent during the above mentioned period as against states CGR of 7.72 per cent.

#### 4.9 Sector-wise Contribution of Kolhapur's District Income in GSDP

In this section I have attempted to study the sector wise composition of the district income. Hence, the sectoral composition of district economy of Kolhapur is given in the following table.

Table No.4.19  
Sector wise GDDP for Kolhapur

Rs. In thousand

Year	Primary	Secondary	Tertiary	Total
<b>At Current Prices</b>				
2000-01	20492873	21520196	45088693	87101762
2001-02	21398526	25053457	51922554	98874537
2002-03	21140691	23847747	57996033	102984471
2003-04	20568226	30404211	65543511	116515948
2004-05	23518100	33736300	73431700	130686100
2005-06	25975900	36044300	83226500	145246700
CGR =	4.2	11.2	12.84	10.57
<b>At Constant Prices (1993-94 up to 2003-04 &amp; 1999-00 for years)</b>				
2000-01	15896075	15477699	27941298	59315072
2001-02	16817796	16306943	30515199	63639938
2002-03	16337509	15408310	33093135	64838954
2003-04	14700456	17998088	35822976	68521520
2004-05	15457900	19376200	39727600	74561700
2005-06	20618800	26984100	66465800	114068700
CGR =	2.73	10.37	16.03	11.47

Source: Socio-Economic Survey Report of Kolhapur from 2000-01 to 2006-07, Directorate of Economics and Statistics, Mumbai

The above table shows the sectoral composition of GDDP at both current and constant prices. The major findings from the above tables are described below.

1. Income from primary sector at current prices has increased in absolute volume from Rs. 2,049.29 crores to Rs. 2,597.59 crores during 2000-01 to 2005-06. It shows the annual compound rate of growth of 4.2 per cent as against states

average 7.79 per cent. Income from secondary sector has increased greatly and reaches at Rs. 3,604.43 crores from Rs. 2,152.02 crores during same period. It shows CGR of 11.2 per cent as against states average of 11.51 per cent. The income from tertiary sector has increased tremendously from Rs. 4,508.87 crores to 8,322.65 crores during the same period. It shows the CGR of 12.84 per cent as against states average of 12.09 per cent.

2. With regard to district income at constant prices from primary sector has increased in absolute volume from Rs. 1,589.61 crores to Rs. 2,061.88 crores during 2000-01 to 2005-06. It shows the annual compound rate of growth of 2.73 per cent as against states average 4.55 per cent. Income from secondary sector has increased greatly and reaches at Rs. 2,698.41 crores from Rs. 1,547.77 crores during same period. It shows CGR of 10.37 per cent as against states average of 8.35 per cent. The income from tertiary sector has increased tremendously from Rs. 2,794.13 crores to 6,646.58 crores during the same period. It shows the CGR of 16.03 per cent as against states average of 8.28 per cent.

Table No. 4.20  
**Sectoral Composition of the Kolhapur District Income**  
(In per cent)

Year	Primary	Secondary	Tertiary
At Current Prices			
2000-01	23.53	24.71	51.77
2001-02	21.64	25.34	52.51
2002-03	20.53	23.16	56.32
2003-04	17.65	26.09	56.25
2004-05	18.00	25.81	56.19
2005-06	17.88	24.82	57.30
At Constant Prices (1993-94 up to 2003-04 & 1999-00 for last two years)			
2000-01	26.80	26.09	47.11
2001-02	26.43	25.62	47.95
2002-03	25.20	23.76	51.04
2003-04	21.45	26.27	52.28
2004-05	20.73	25.99	53.28
2005-06	18.08	23.66	58.27

Source: Computed from table no. 4.19

The above table highlights the changing pattern of composition of district income of Kolhapur and the percentage share of primary, secondary and tertiary sector in total district income. The following conclusions we may derived from above table.

1. The percentage share of primary sector in the district income of Kolhapur at current prices has been showing the decreasing trend. It is decreased from 23.53 per cent to 17.88 per cent during 2000-01 to 2005-06. In the case of secondary sector the percentage share of it in the district income at current prices is more or less static between 24 to 26 per cent for the same period. With regard to tertiary sector its contribution to the district income at current prices has been showing the increasing trend. Its share has increased from 51.77 per cent to 57.30 per cent during the concerned period.
2. The percentage share of primary sector in the district income of Kolhapur at constant prices has been showing the decreasing trend. It is decreased from 26.80 per cent to 18.08 per cent during 2000-01 to 2005-06. In the case of secondary sector the percentage share of it in the district income at constant prices has been decreased from 26.09 per cent to 23.66 per cent for the same period. With regard to tertiary sector its contribution to the district income at constant prices has been showing the increasing trend. Its share has increased from 47.11 per cent to 58.27 per cent during the concerned period.

The contribution of agriculture sector in the income from primary sector of district economy and total GDDP is discussed in the following table.

Table No. 4.21

**Contribution of Agricultural Sector to the Primary sector and overall District Domestic Product**

(Rs. In thousand)			
Year	Agriculture	Primary	Total GDDP
<b>At Current Price</b>			
2000-01	19279039	20492873	87101762
2001-02	20189555	21398526	98874537
2002-03	19713377	21140691	102984471
2003-04	18995134	20568226	116515948
2004-05	21727800	23518100	130686100
2005-06	24539600	25975900	145246700
<b>At Constant Prices (1993-94 up to 2003-04 &amp; 1999-00 for last years)</b>			

2000-01	15303247	15896075	59315072
2001-02	16191148	16817796	63639938
2002-03	15711589	16337509	64838954
2003-04	14056484	14700456	68521520
2004-05	14003000	15457900	74561700
2005-06	19891700	20618800	114068700

Source: Computed from table no. 4.16 & 4.17

The above table shows the income from agriculture sector, primary sector and total GDDP at both current and constant prices from year 2000-01 to 2005-06 in the absolute term.

The absolute figure can not provides the real picture of the district economy. Since the relative composition (percentage share) of district income is discussed in the next table.

Table No. 4.22  
**Contribution of Agricultural to the Primary sector and overall  
Gross District Domestic Product**

In per cent

Year	Agriculture to Primary Sector	Agri. to Total GDDP
At Current Price		
2000-01	94.08	22.13
2001-02	94.35	20.42
2002-03	93.25	19.14
2003-04	92.35	16.30
2004-05	92.39	16.63
2005-06	94.47	16.90
At Constant Prices (1993-94 up to 2003-04 & 1999-00 for last two years)		
2000-01	96.27	25.80
2001-02	96.27	25.44
2002-03	96.17	24.23
2003-04	95.62	20.51
2004-05	90.59	18.78
2005-06	96.47	17.44

Source: Computed from table no. 4.21

Table No. 4.23

**MSP of Sugarcane and its final Prices (based on average recovery)**

Year	Avg. Rec.	SMP (Rs./qtl)	Linked to basic rec.	Premium on every 0.1% increase In recovery (Rs./qtl)	Final Price (Rs./qtl) (((Col.2-Col.4)* Col.5)*10)+Col.3)
1	2	3	4	5	6
2001-02	12.34	62.05	8.5	0.8	92.77
2002-03	12.28	69.5	8.5	0.82	100.50
2003-04	11.23	73	8.5	0.85	96.21
2004-05	12.01	74.5	8.5	0.88	105.39
2005-06	12.5	79.5	9	0.88	110.30
2006-07	12.7	80.25	9	0.9	113.55

Source: Computed by the researcher

Source: Computed from data provided by Deptt. of Agri. Govt. of Maharashtra, Maharashtra State Co-op. Sugar Factories Federation Ltd. Mumbai and VSI, Pune.

To estimate the gross value of output for any crop we may have the final price of it. Since, the prices paid by sugar factories are different thereby the final price has been calculate on the basis of statutory minimum price fixed by the central govt. along with the basic recovery and premium on increase in recovery. In the above mentioned example we have derived the final price by adopting following procedure. We may take the example of year 2001-02 in which the average recovery of cane was 12.34 per cent which is 3.84 per cent more than the basic recovery, so we have multiplied this value from premium of it (i.e. Rs. 0.80 for every 0.1 per cent increase in recovery). Now we have the figure Rs. 30.72 as a premium, now we have to add the SMP price of Rs. 62.05 in the premium price of Rs. 30.72, then we have the final price of Rs. 92.77, we have consider it as proxy price. We have followed the same methodology to calculate the final price for further five years. We have used this value to estimate the gross value of output from sugarcane in the district which is further described in the following table.

Table No. 4.24

**Gross Value of Sugarcane crop**

Year	Production of cane (in MT)	Final Price (Rs./MT) (Col.6*10)	Value of Output of Sugarcane (Col.7* Col.8) (in Rs.)
------	----------------------------	---------------------------------	--

1	2	3	4
2001-02	44,72,400	927.70	414,90,45,480
2002-03	84,21,000	1004.96	846,27,68,160
2003-04	49,18,400	962.05	473,17,46,720
2004-05	65,29,400	1053.88	688,12,04,072
2005-06	72,29,300	1103.00	797,39,17,900
2006-07	85,04,000	1135.50	965,62,92,000

@ Cost of cultivation figures are taken from CACP norms  
Source: as above.

From the above table we may have the understanding of the significant contribution of sugarcane in the district income. In this exercise we have taken SMP for estimation of gross value of output from sugarcane crop. However some sugar factories in the district find themselves unable to pay even the SMP fixed by the Govt. on the other hand some sugar factories paid the price for sugar more than the SMP. Therefore we have taken SMP to estimate the gross value of output of sugarcane crop in the district.

The gross value of output of sugarcane crop is estimated Rs. 414.90 crores in 2000-01. Which is further increased up to 965.63 crores in 2006-07 it shows the CGR of 13.46 in the above mentioned period.

To estimate the net contribution for sugarcane crop in the district income we have to deduct the value of cost of cultivation from the gross value of output. Here, I have used a per hectare cost of cultivation figures provided by CACP norms. The net value of output from sugarcane crop is estimated in the following table.

Table No. 4.25

**Estimation of Net Value of Output of Sugarcane in Kolhapur district**

Year	Area under Sugarcane (in 00 ha)	Per Hectare Cost of Cultivation @ (in Rs.)	Total Cost of Cultivation (in Rs.) (Col.5 * Col.6)	Net Value of Output of Sugarcane (in Rs.) (Col.4 – Col.7)
1	5	6	7	8
2001-02	449	N.A.	N.A.	-
2002-03	984	N.A.	N.A.	-

2003-04	689	N.A.	N.A.	-
2004-05	763	N.A.	N.A.	-
2005-06	945	N.A.	N.A.	-
2006-07	1063	63,731	677,46,05,300	288,16,86,700

@ taken from report of the CACP on price policy for sugarcane for the 2006-2007 season, Department of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India, new Delhi  
Source: Computed by researcher

Due to unavailability of data on cost of cultivation for sugarcane crop the net contribution can not be estimated for first four concerned years. Since, for year 2006-07 we have the data on per hectare cost of cultivation, so we have estimated total value of input for sugarcane for 2006-07 is Rs. 677.46 crores which has to be subtract from the gross value of output from sugarcane crop (i.e. Rs. 965.63 crores). We have estimated the net contribution of sugarcane crop in the district income is about Rs. 288.17 crores for the year 2006-07.

One more thing that should be cleared that the cost of cultivation figures are varies in large amount by region to region and even we found difference in cost in a particular district also.

#### **4.10 Process of District Income Estimation by Applying Indical Software**

At this juncture, I have attempted to discuss the process of estimation of district income by using the computer application software namely Indica<sup>1</sup>. In which first I tried my level best to summaries about the software, and then after the step by step proceedings have been discussed. Including the estimation of value of output for each crop separately, value of input and presentation of reports has also discussed.

##### **4.10.1 About Indical Software**

Indical is district income calculating application computer software. Indical (India District Income Calculator) is a comprehensive tool for district income calculation, spatial analysis and report generation. It is user friendly and interactive software to calculate income and store the data, generate reports and carry out spatial analysis of data.

Indical software has been developed by Spatial Data Pvt. Ltd. ([www.spinfosoft.com](http://www.spinfosoft.com)), for the Centre for Budget and Policy studies (CBPS),

Bangalore. The Indical software is based on the book "*Estimating District Income in India*" by Rohini Nayyar, Vinod vyasulu, Meenakshi Rajeev, published by Macmillan India ltd. in the year 2003.

As per the methodology suggested in the above mentioned book, district product, based on the commodity producing sectors is estimated first and then district income, based on the non-commodity producing sectors are estimated next. Furthermore Indical software has separate areas for estimating district product and district income. In addition to this the value added by various sectors and gross value added, is calculated and stored in the Indical database.

The sectors included in District Product are

- Crop Husbandry
- Forestry and Logging
- Fisheries
- Mining

The sectors included in District Income are

- Manufacturing Unregistered
- Manufacturing Registered
- Construction
- Electric, Gas & Water

Customized district level reports based on the values stored in the database can be generated with the help of this software. Consolidated or detailed reports can also be generated for each sector of the economy. Map button launch the district map of India to spatially analyse district product and district income data.

#### **4.10.2 Main Window**

The Home Screen interface of Indical software consists of a Menu, Tool bar, Navigation bar, a Guide and Buttons for launching District product, District income, Map and Reports.

The screen name has displayed at the name of our district. The file menu has function to exit from Indical application. The tool menu provides functionality to change password and add new password and detailed help can be accessed through the help menu of this software.

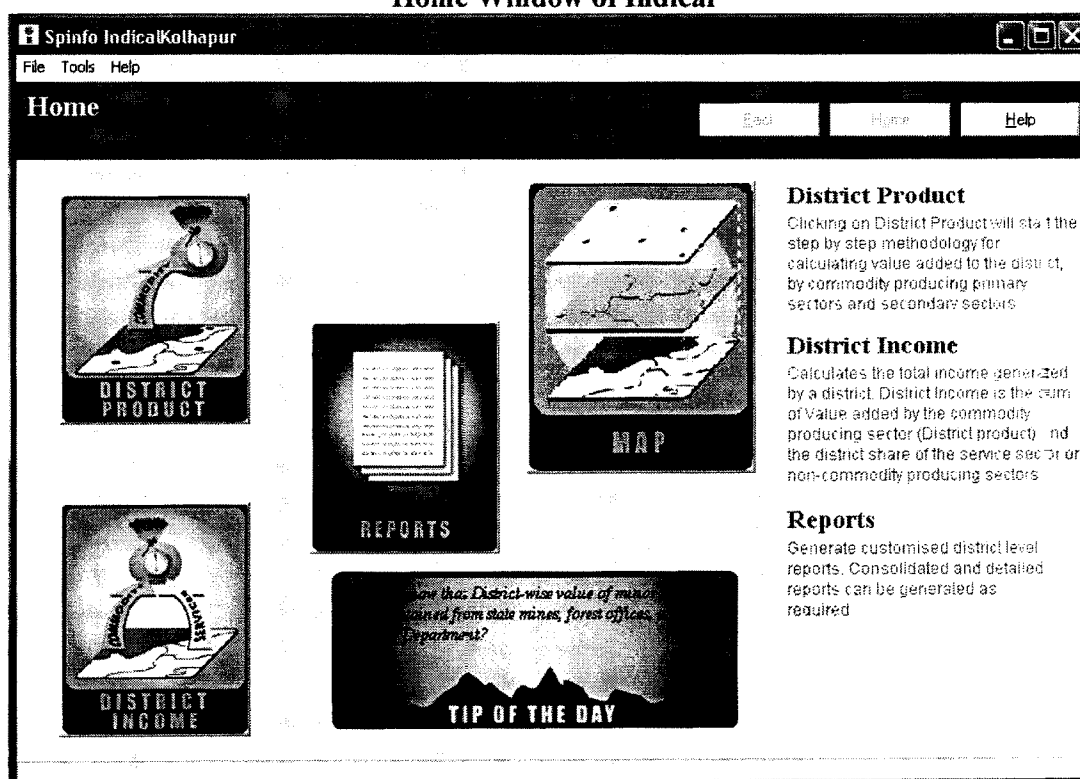


The guide on the left-hand side of the screen provides a brief explanation on what each of sector is and brief on the screen. The guide also gives a clue on what next form will be.

Clicking on the buttons launches wizard, which takes us through a step by step process to estimate the district income. By clicking on the District product launches a series of forms one after other, to estimate the value added by primary sectors. The useful hints on the district income and estimation process displayed at each time the application is launched.

Some of the screen shoots has shown in the further part of this section, where a small description on that window is described along with necessary peculations.

Screen shoot No. 1  
Home Window of Indical



Source: Spinfo Indical Software

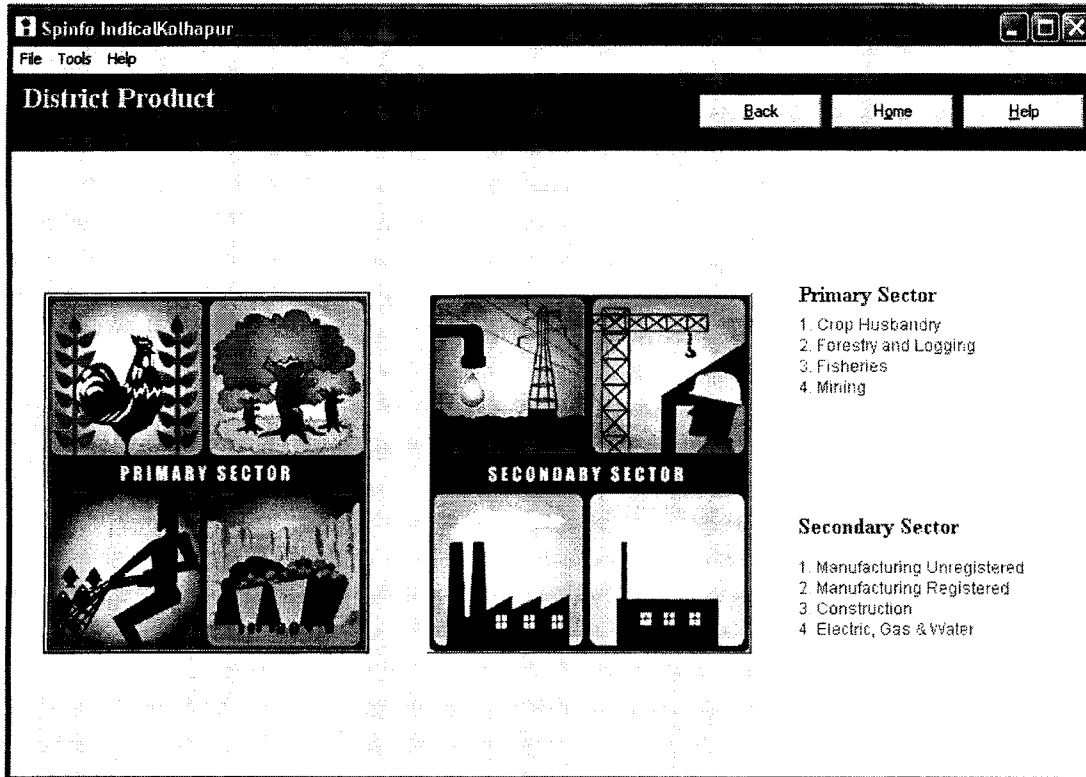
#### 4.10.3 Agriculture: Crop Husbandry Sector

Since, our study is concerned with the primary sector, I have described the actual procedure of district income estimation by following the Spinfo Indical software.

The following picture shows the state of estimation of district product which covers primary and secondary sector.

Screen shoot No.2

### Estimation of District Product



Source: As above

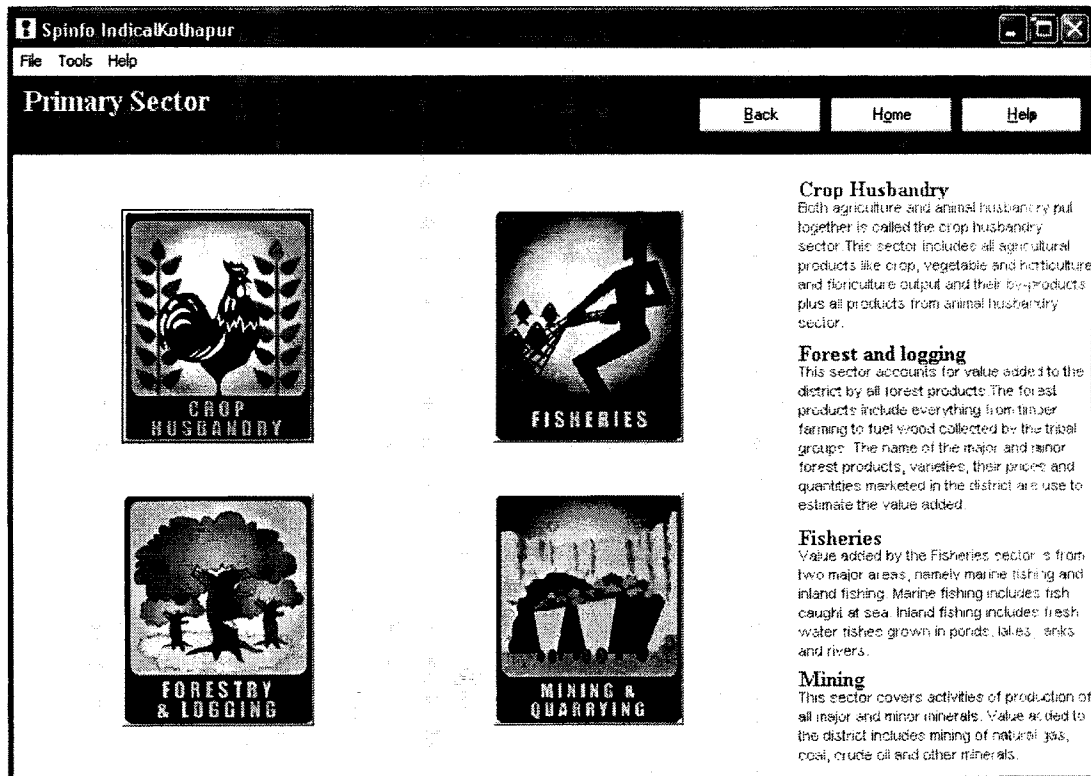
By clicking on the district product link visible on the home screen of this software the above screen appears. This contains the two main commodity producing sectors of the district economy (i.e. Primary Sector and Secondary Sector). Right side panel shows the sub sectors of the district economy.

#### 4.10.4 Estimate Value of Output from Agriculture

Agriculture is generally the largest commodity producing sector of district's economy. It includes all agricultural products like crop, vegetable and horticulture and floriculture output and their by-products plus all the products from the animal husbandry sector.

Screen shoot No.3

### Estimation of District Product from Primary Sector



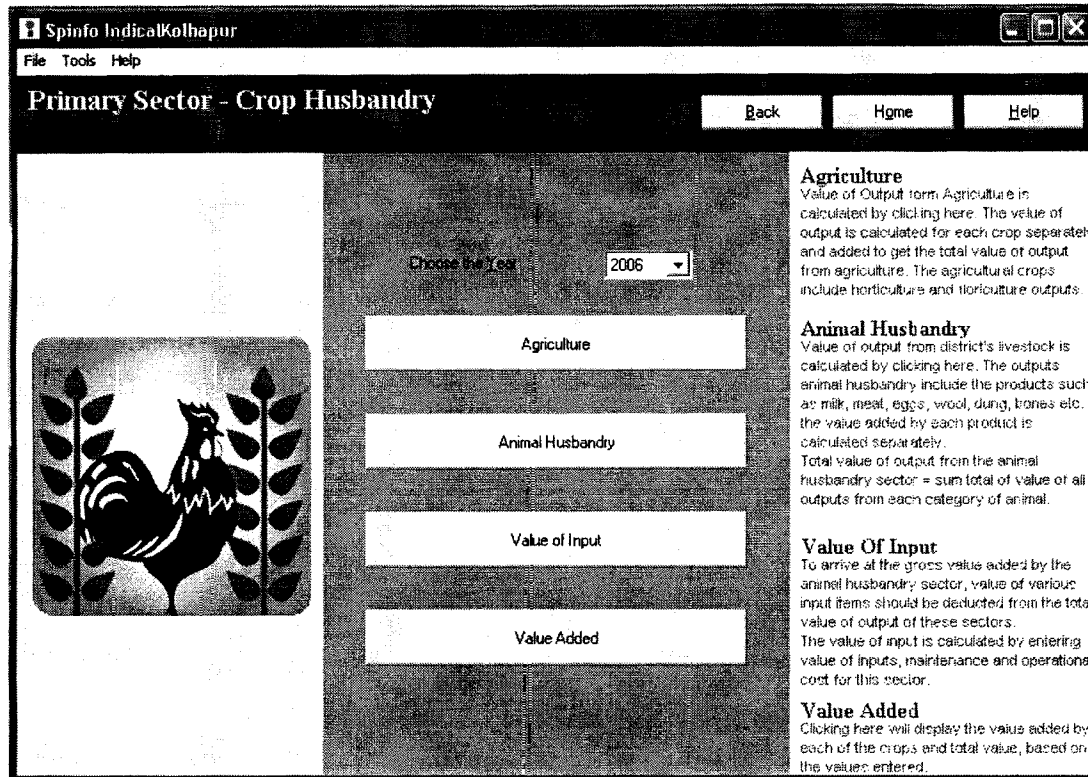
Source: As above

After clicking on the primary sector link in previous window, the next window become visible, which includes crop husbandry, fisheries, forestry and logging and mining and quarrying sectors of the district economy. Right side panel provides brief description on every sector.

In the above window we have to click on the crop husbandry link which illustrates the following window.

Screen shoot No.4

### Estimation of District Product from Primary Sector (Crop Husbandry)



Source: As above

Under the crop husbandry sector we have four separate section, these are Agriculture, Animal Husbandry, Value of Input and Value Added. Here also right hand panel provides brief information regarding each item shown in this window.

Since our study is concerned with the Sugarcane crop we have to estimate the value of output, therefore we have clicked on agriculture link. The following window appears on the screen.

Screen shoot No.5

### Estimation of Value of Output from Agriculture



Source: As above

Here we have to insert the data which we have collected from various sources. At the very firstly we have to chose crop. Ever since our study is concerned with sugarcane, therefore I have selected sugarcane crop. If the crop name is not visible in the list we can type it along with its variety which appears in the next box.

#### 4.10.5 Three Categories of Data Availability

Normally district level data on production and prices are generally not available uniformly for all the crops. Hence, for estimation purposes, crops may be classified in the following three categories depending on the availability of data.

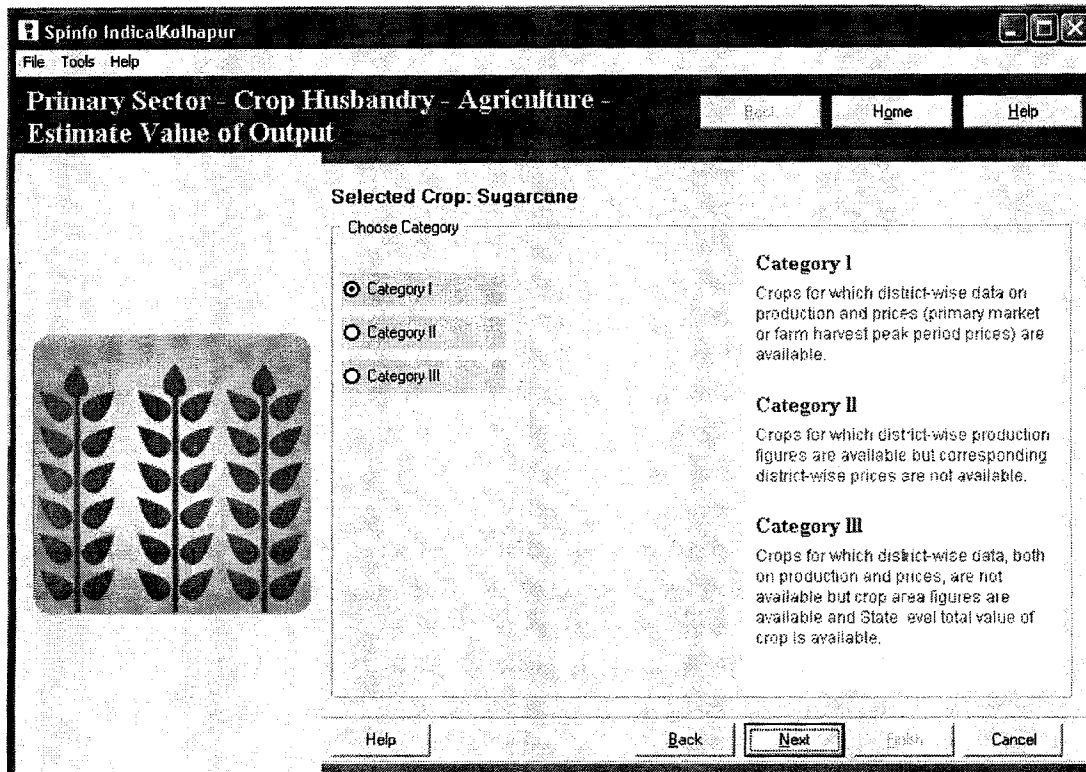
**Category I** : Data on production and prices of the crops are available.

**Category II** : Data on production are available and corresponding district-wise prices of the crops are not available.

**Category III** : Data on production and prices are not available, but crop area figures are available, and State level total value of crop is available.

## Screen shoot No.6

### Three Categories of data availability for Estimation of Value of Output from Agriculture



Source: As above

We may have to follow the procedure of this wizard in which it will ask to insert peak period of crop, average prices, production, procurement prices and quantity and bi-products also. Finally we have to save the inserted data by clicking on finish button appears which stores the data in the database file.

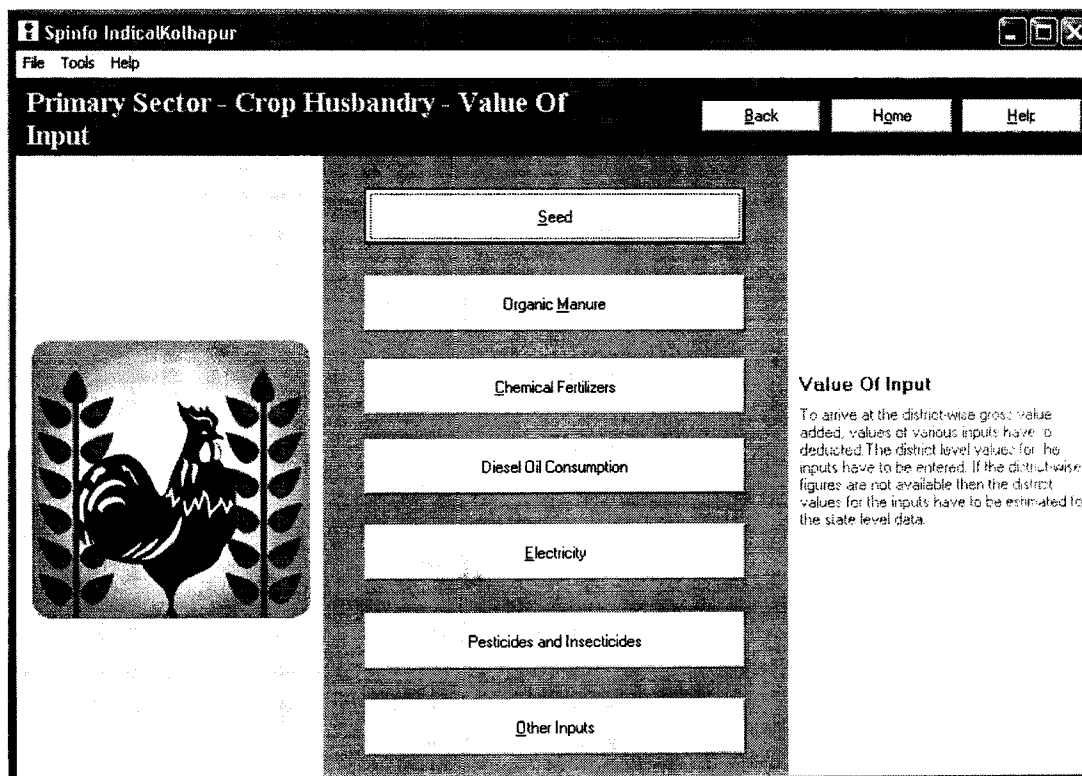
#### 4.10.6 Value of Input

To derive the net contribution of any crop in the district income, we have to subtract the value of input from the gross value of output of that crop. This software also provides the estimations for the value of input by providing necessary information to it.

Usually, the value of input consist of expenditure on seed, organic manure, chemical fertilisers, diesel oil consumption, electricity, pesticides and insecticides, some other inputs which includes feed of livestock, irrigation charges, market charges, repairs and maintenance, etc.

## Screen shoot No.7

### Estimation of Value of Input for Agriculture



Source: As above

Here we have to select one by one input from the list and insert the per hectare cost on it. At the final stage it make summation of cost made on all inputs and visualise it as the per hectare cost of production of particular crop.

#### 4.10.7 Reports in Indical

By clicking on the Reports button on the Indical Home screen, it launches the Reports screen which is visualise in the following picture.

This section provides year wise reports on commodity sector, crop husbandry and also consolidated district income reports. Reports prepared by this software are based on the data provided by the user. Spinfo Indical software use to prepare a large database for concerned district which further used for the preparation of the specialised reports. One of the examples of final report is shown in the following picture.

## Screen shoot No.8

### Final Reports in the Spinfo Indical software for Agriculture

AGRICULTURAL PRODUCTS						
Year : 2001		District : Kolhapur			Value : Rs in Lakhs Production in tonnes Area in Hectares (Rounded to two decimal Places)	
CATEGORY	CROP & BY PRODUCT	AREA	PRODUCTION	PRICE	BY PRODUCT VALUE	VALUE OF OUTPUT
<b>Sugarcane</b>						
	Sugarcane	44900	4472400	927.70	0.00	41490.45
						<b>41490.45</b>
<b>Total</b>						<b>41490.45</b>

Source: As above

Above picture shows the value of output from sugarcane crop for year 2001 which is estimated by using the data on area under crop, production and prices of it. It also shows the value of by products.

#### 4.11 Hypothesis Testing

In this section I have attempted to test the hypothesis so far adopted for this study. The study was the following two hypotheses for its research.

1. Sugarcane occupies major share in the cropping pattern in irrigated area and hence it is considered to the major source of income in the Kolhapur district.

Table 4.26

#### Share of Sugarcane in Cropping Pattern of Kolhapur District

Year	Area under Cane crop	Total GCA	Gross Irrigated Area	2 as % of 3	2 as % of 4
1	2	3	4	5	6
2000-01	90112	564020	135400	16.0	66.55
2001-02	95130	523200	117057	18.2	81.27
2002-03	95130	564000	135400	16.9	70.26
2003-04	74815	564000	135400	13.3	55.25
2004-05	98166	564000	135400	17.4	72.50
2005-06	115371	553860	155800	20.8	74.05



2006-07	114589	567990	135100	20.2	84.82
CGR <sup>#</sup>	4.15	0.48	2.04		

Source: Computed by researcher

The area under sugarcane crop is increased from 90,112 hectares in 2000-01 to 1,14,589 hectares in 2006-07 which shows the CGR of 4.15 per cent during the concerned period. In addition to this the sugarcane crop occupies a share of 20.2 per cent in 2006-07 which is increased from 16.0 per cent in 2000-01. It shows the increasing trend in the cropping pattern of Kolhapur district. More to this is the percentage of area under sugarcane crop to the gross irrigated area is also shows the increasing trend. It was 66.55 per cent in the 2000-01 which further increased up to 84.82 per cent in 2006-07. It indicates the excessive use of irrigation for a single crop (i.e. Sugarcane) which is not the welcome sign.

The rate of growth in gross irrigated area (2.04 per cent) is quite lower than the rate of growth in the area under sugarcane (4.15 per cent) in the concerned period.

Table No. 4.27

**Percentage of GIA to GCA in the Kolhapur district**

Year	Gross Cropped Area	Gross Irrigated Area	% of Gross Irrigated Area to Gross Cropped Area
1960-61	443387	39100	8.82
1970-71	453422	50600	11.16
1980-81	482290	71300	14.78
1990-91	497334	95200	19.14
2000-01	564020	135400	24.01
2001-02	523200	117057	22.37
2002-03	564000	135400	24.01
2003-04	564000	135400	24.01
2004-05	564000	135400	24.01
2005-06	553860	155800	28.13
2006-07	567990	135100	23.79
CGR*	0.48	2.04	

Source: Computed by researcher

The above table highlights the irrigation development as compared to the gross cropped area in the district. The percentage of gross irrigated area to the gross cropped area is shows the increasing trend during the last four decades. It was increased from 8.82 per cent in 1960-61 to 24.01 per cent in 2001-02. The gross irrigated area shows the CGR of 0.48 per cent whereas gross irrigated area shows the CGR of 2.04 per cent in the above mentioned period.

2. Variation in the prices of sugarcane leads to change in the share of sugarcane in the cropping pattern and thereby share of income from sugarcane to total agriculture income.

Table No. 4.28

**Value of output of sugarcane and share of sugarcane in cropping pattern in Kolhapur district**

Year	Final Price (Rs./MT) (Col.6*10)	Area under Sugarcane (in 00 ha)	Gross Cropped Area	Value of Output of Sugarcane (Col.7* Col.8) (in Rs.)
1	2	3	4	5
2001-02	927.70	449	117057	414,90,45,480
2002-03	1004.96	984	135400	846,27,68,160
2003-04	962.05	689	135400	473,17,46,720
2004-05	1053.88	763	135400	688,12,04,072
2005-06	1103.00	945	155800	797,39,17,900
2006-07	1135.50	1063	135100	965,62,92,000

Source: Computed by researcher

**Correlation Analysis:**

The value of Karl Person's Coefficient of Correlation between final price and area under sugarcane is 0.82. It indicates the strong positive association between the price of sugarcane and its area under crop.

With regard to the correlation between area under sugarcane and gross cropped area is calculated 0.66 which indicates the moderate association between these two variables.

And the finally the correlation between income from sugarcane (value of output of cane) and volume of DDP at current prices is calculated 0.64 indicating moderate positive association between these two variables.

#### 4.12 Conclusions

In this chapter we have discuss about the actual process of estimation of the district income by following the methodology which was described in the previous chapter. Since the agriculture is the backbone of the district economy of Kolhapur district. As far as the land utilisation of the Kolhapur district is concerned the percentage of GCA to Geographical Area has considerable increased from 57.12 per cent to 73.17 per cent over the last 4 decades. Also the percentage of gross irrigated area to gross cropped area shows the increasing trend. It is improved from 8.82 per cent to 23.79 per cent in the same period.

The cropping pattern of the Kolhapur district is highly concentrated by five major crops, these are Sugarcane, Soyabean, Rice, Maize, Jawar and Wheat which together contributes more than 50 per cent of total gross cropped area.

Indian sugar industry has contributed to about 16% of the world's total production, where the Maharashtra state alone contributes about 32 per cent to the national production of sugar. Kolhapur is the house of sugarcane it produces 127.23 lakh MT of sugarcane during season 2007-08.

The trends in MSP has also discussed along with their growth during last 10 years, which shows the higher rate of growth in the cane prices as compared to other crops in the district.

Further the state and district income estimation (at both current and constant prices) from DES, Mumbai is described in detail along with the sectoral composition of income and per capita state/district income during last 10 years. Then afterwards the value of output from sugarcane crop is estimated by following the methodology discussed in the chapter 3.

After that the detailed process of estimation of district income (along with screen shoots) by applying the Spinfo Indical software is described in this chapter. Finally we have also test the hypothesis so far adopted for the conducting this study.