

### **3.2.4 Provincial and Kabupaten Socio-Economic Framework**

#### **(1) Process**

The GDP excluding oil/gas product (at 1993 constant prices) is utilized as the essential macro economic indicator for the following reasons:

- 1) According to past experience, the GDP excluding oil/gas products is a more stable indicator in comparison with the GDP including oil/gas product, thus the characteristics of the data is suitable for forecasting purposes.
- 2) The GDP excluding oil/gas products are more relevant to the region's economic activities because revenues derived from oil/gas are directly transferred into the national account.

After reviewing a number of previous studies and current projections, the national and provincial GDP excluding oil/gas product were first set according to the growth rates presented in Table 3-2-1. Sectorial analyses for GRDP of Central and Southeast Sulawesi were conducted, and the future distribution of the GRDP in these provinces were adjusted based on the sectorial analyses for Pelita VII to Pelita X.

The GRDP of each kabupaten in Central and Southeast Sulawesi was then projected by adjusting the provincial growth rates to reflect the varying growth conditions and prospects of each kabupaten, using the provincial projection as a control total. The GRDP of each kabupaten in North and South Sulawesi were projected at the provincial growth rates.

#### **(2) Future GRDP**

The GRDP excluding oil/gas product in Central Sulawesi, which was recorded at Rp. 1,755,457 million in 1993, is projected to be 12,274,349 million in 2018 at 1993 constant prices. The GRDP excluding oil/gas product in Southeast Sulawesi, which was recorded at Rp. 1,289,181 million in 1993, is projected to be 10,067,220 million in 2018 at 1993 constant prices. The GRDP excluding oil/gas product in North Sulawesi, which was recorded at Rp. 2,806,948 million in 1993, is projected to be 21,894,362 million in 2018 at 1993 constant prices. The GRDP excluding oil/gas product in South Sulawesi, which was recorded at Rp. 8,067,367 million in 1993, is projected to be 60,092,075 million in 2018 at 1993 constant prices.

The projected GRDP and GRDP per capita by Kabupaten and Kecamatan for the study area are shown in the following. (Tables 3-2-7 to 3-2-15 and Figures 3-2-15 to 3-2-19)

**Table 3-2-7 Future Sectorial GRDP of Central Sulawesi**

Future Gross Domestic Product by Industrial Origin at 1993 Constant Prices (Rp. million)

Industrial Origin	1993	1998	2003	2008	2013	2018
Agriculture	793,070	1,298,108	1,897,490	2,792,002	4,064,313	6,175,865
Mining & Quarrying	41,317	59,330	84,983	125,045	186,301	289,767
Manufacturing	107,480	140,207	200,829	295,503	440,260	684,768
Elec., Gas & Water	8,864	16,989	22,706	31,173	44,333	65,806
Construction	114,091	169,370	226,361	310,777	441,974	656,050
Trade, Restaurant & Hotel	229,256	348,289	513,586	773,192	1,206,282	1,965,122
Transport & Communication	164,222	247,366	330,602	453,891	645,505	958,163
Transport & Finance	34,892	44,601	59,609	81,839	116,388	172,762
Ownership of Dwellings	52,496	63,233	84,510	116,026	165,007	244,930
Public Administration	180,448	237,515	317,436	435,814	619,797	920,003
Service	29,323	36,165	48,689	66,847	95,067	141,114
<b>Total GRDP</b>	<b>1,755,459</b>	<b>2,661,173</b>	<b>3,786,801</b>	<b>5,482,109</b>	<b>8,025,228</b>	<b>12,274,349</b>

Industrial Structure of Future Gross Domestic Product

Industrial Origin	1993	1998	2003	2008	2013	2018
Agriculture	45.18%	48.78%	50.11%	50.93%	50.64%	50.32%
Mining & Quarrying	2.35%	2.23%	2.24%	2.28%	2.32%	2.36%
Manufacturing	6.12%	5.27%	5.30%	5.39%	5.49%	5.58%
Elec., Gas & Water	0.50%	0.64%	0.60%	0.57%	0.55%	0.54%
Construction	6.50%	6.36%	5.98%	5.67%	5.51%	5.34%
Trade, Restaurant & Hotel	13.06%	13.09%	13.56%	14.10%	15.03%	16.01%
Transport & Communication	9.35%	9.30%	8.73%	8.28%	8.04%	7.81%
Transport & Finance	1.99%	1.68%	1.57%	1.49%	1.45%	1.41%
Ownership of Dwellings	2.99%	2.38%	2.23%	2.12%	2.06%	2.00%
Public Administration	10.28%	8.93%	8.38%	7.95%	7.72%	7.50%
Service	1.67%	1.36%	1.29%	1.22%	1.18%	1.15%
<b>Total GRDP</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

Growth Rate of Future Gross Domestic Product

Industrial Origin	1993-1998	1998-2003	2003-2008	2008-2013	2013-2018	1993-2018
Agriculture	10.36%	7.89%	8.03%	7.80%	8.73%	8.56%
Mining & Quarrying	7.51%	7.45%	8.03%	8.30%	9.24%	8.10%
Manufacturing	5.46%	7.45%	8.03%	8.30%	9.24%	7.69%
Elec., Gas & Water	13.90%	5.97%	6.54%	7.30%	8.22%	8.35%
Construction	8.22%	5.97%	6.54%	7.30%	8.22%	7.25%
Trade, Restaurant & Hotel	8.72%	8.08%	8.53%	9.30%	10.25%	8.97%
Transport & Communication	8.54%	5.97%	6.54%	7.30%	8.22%	7.31%
Transport & Finance	5.03%	5.97%	6.54%	7.30%	8.22%	6.61%
Ownership of Dwellings	3.79%	5.97%	6.54%	7.30%	8.22%	6.35%
Public Administration	5.65%	5.97%	6.54%	7.30%	8.22%	6.73%
Service	4.28%	6.13%	6.54%	7.30%	8.22%	6.49%
<b>Total GRDP</b>	<b>8.68%</b>	<b>7.31%</b>	<b>7.68%</b>	<b>7.92%</b>	<b>8.87%</b>	<b>8.09%</b>

Source: Dalam Angka Propinsi, Central Sulawesi and Estimation by JICA Study Team

**Table 3-2-8 Future Sectorial GRDP of Southeast Sulawesi**

Future Gross Domestic Product by Industrial Origin at 1993 Constant Prices (Rp. million)

Industrial Origin	1993	1998	2003	2008	2013	2018
Agriculture	562,297	892,749	1,303,572	1,957,679	2,191,684	4,566,880
Mining & Quarrying	56,193	68,417	99,901	150,029	228,982	366,574
Manufacturing	29,217	55,379	80,863	121,439	185,346	296,717
Elec., Gas & Water	7,478	14,692	20,023	28,066	40,897	62,496
Construction	46,058	84,951	115,777	162,285	236,481	361,373
Trade, Restaurant & Hotel	177,808	286,871	438,227	673,285	1,075,832	1,803,510
Transport & Communication	126,667	161,500	220,103	308,518	449,571	687,003
Transport & Finance	13,822	26,525	36,150	50,672	73,839	112,836
Ownership of Dwellings	40,444	49,140	66,972	93,874	136,793	209,037
Public Administration	220,840	346,836	499,903	700,712	1,021,075	1,560,335
Service	8,356	9,511	12,962	18,170	26,476	40,460
<b>Total GRDP</b>	<b>1,289,181</b>	<b>1,996,579</b>	<b>2,894,454</b>	<b>4,264,729</b>	<b>6,394,977</b>	<b>10,067,220</b>

Industrial Structure of Future Gross Domestic Product

Industrial Origin	1993	1998	2003	2008	2013	2018
Agriculture	43.62%	44.71%	45.04%	45.90%	45.66%	45.36%
Mining & Quarrying	4.36%	3.43%	3.45%	3.52%	3.58%	3.64%
Manufacturing	2.27%	2.77%	2.79%	2.85%	2.90%	2.95%
Elec., Gas & Water	0.58%	0.74%	0.69%	0.66%	0.64%	0.62%
Construction	3.57%	4.25%	4.00%	3.81%	3.70%	3.59%
Trade, Restaurant & Hotel	13.79%	14.37%	15.14%	15.79%	16.82%	17.91%
Transport & Communication	9.83%	8.09%	7.60%	7.23%	7.03%	6.82%
Transport & Finance	1.07%	1.33%	1.25%	1.19%	1.15%	1.12%
Ownership of Dwellings	3.14%	2.46%	2.31%	2.20%	2.14%	2.08%
Public Administration	17.13%	17.37%	17.27%	16.43%	15.97%	15.50%
Service	0.65%	0.48%	0.45%	0.43%	0.41%	0.40%
<b>Total GRDP</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.01%</b>	<b>100.00%</b>	<b>100.00%</b>

Growth Rate of Future Gross Domestic Product

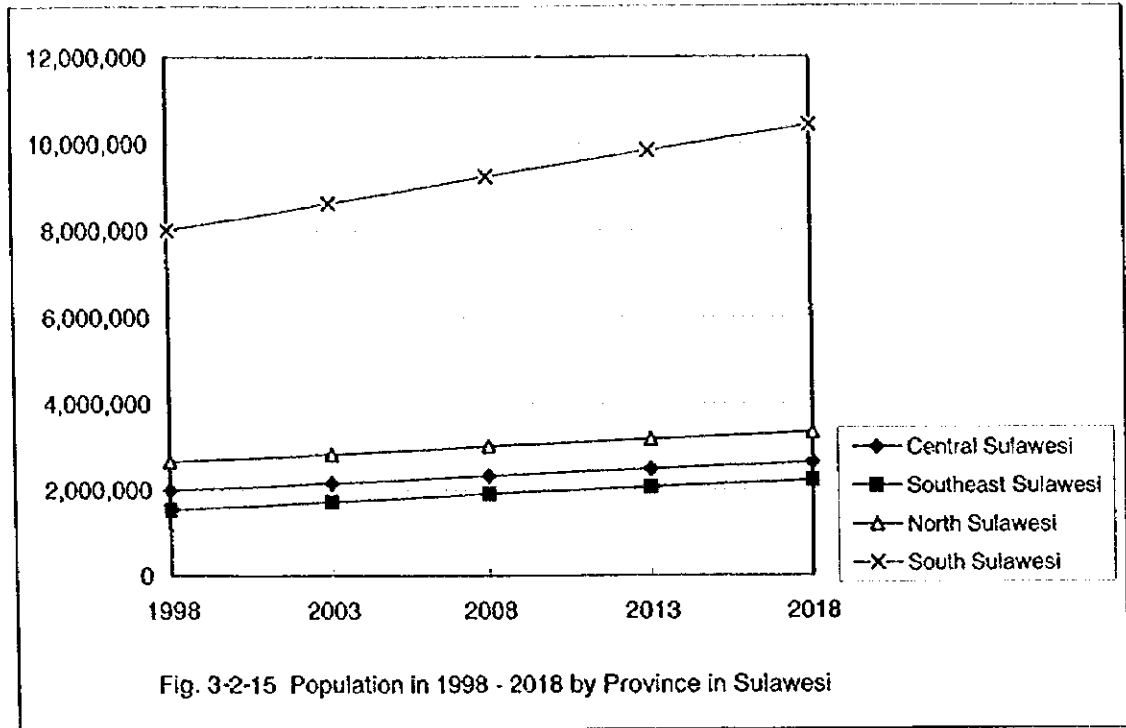
Industrial Origin	1993-1998	1998-2003	2003-2008	2008-2013	2013-2018	1993-2018
Agriculture	9.69%	7.87%	8.47%	8.32%	9.36%	8.74%
Mining & Quarrying	4.02%	7.87%	8.47%	8.82%	9.87%	7.79%
Manufacturing	13.64%	7.87%	8.47%	8.82%	9.87%	9.72%
Elec., Gas & Water	14.46%	6.39%	6.99%	7.82%	8.85%	8.86%
Construction	13.02%	6.39%	6.99%	7.82%	8.85%	8.59%
Trade, Restaurant & Hotel	10.04%	8.84%	8.97%	9.83%	10.89%	9.71%
Transport & Communication	4.98%	6.39%	6.99%	7.82%	8.85%	7.00%
Transport & Finance	13.92%	6.39%	6.99%	7.82%	8.85%	8.76%
Ownership of Dwellings	3.97%	6.39%	6.99%	7.82%	8.85%	6.79%
Public Administration	9.45%	7.59%	6.99%	7.82%	8.85%	8.13%
Service	2.62%	6.39%	6.99%	7.82%	8.85%	6.51%
<b>Total GRDP</b>	<b>9.14%</b>	<b>7.71%</b>	<b>8.06%</b>	<b>8.44%</b>	<b>9.50%</b>	<b>8.57%</b>

Source: Dalam Angka Propinsi, Southeast Sulawesi and Estimation by JICA Study Team

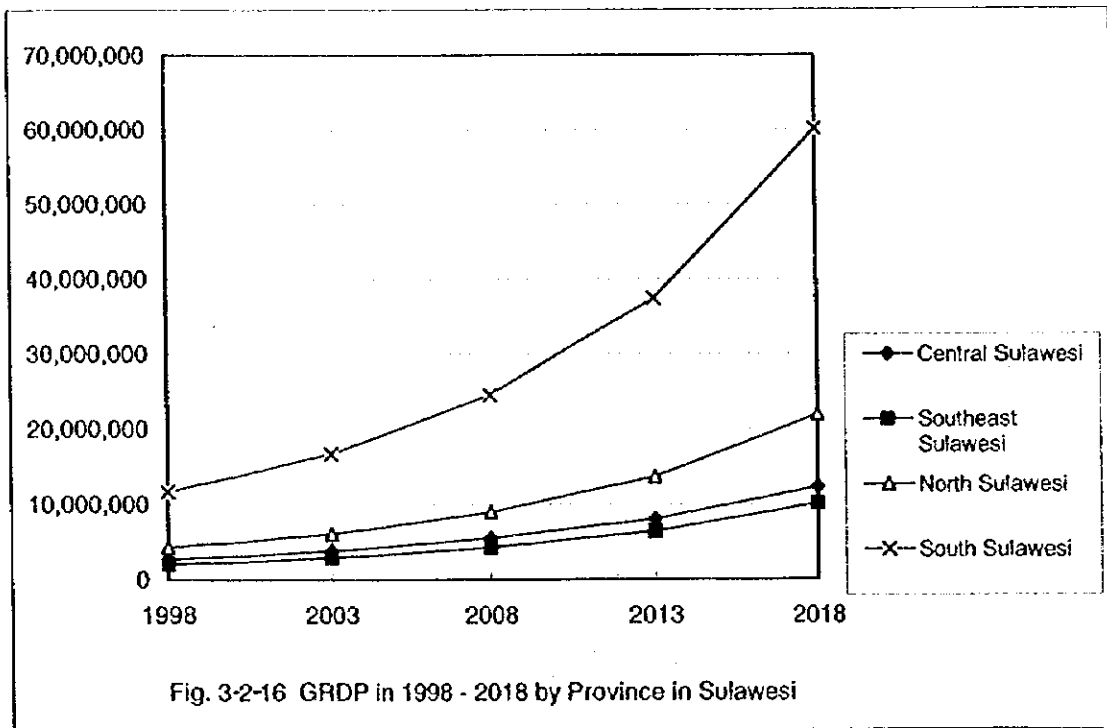
Table 3-2-9 Future GRDP by Kabupaten in Study Area

Province	Kabupaten	1993 Constant Rp. million					
		1993	1998	2003	2008	2013	1018
Central Sulawesi	Kab. Luwuk/Banggai	297,958	451,686	640,347	923,494	1,346,601	2,051,325
	Kab. Poso	283,386	429,595	623,145	919,556	1,372,298	2,139,707
	Kab. Donggala	621,336	941,907	1,335,325	1,925,777	2,808,089	4,277,662
	Kab. Buol Toli-Toli	215,443	326,598	463,013	667,747	973,681	1,483,242
	Kod. Palu	337,334	511,377	724,971	1,045,536	1,524,558	2,322,414
	Central Sulawesi	1,755,457	2,661,163	3,786,801	5,482,109	8,025,228	12,274,349
Southeast Sulawesi	Kab. Buton	323,795	501,468	735,384	1,095,935	1,662,130	2,646,258
	Kab. Muna	186,052	288,142	413,019	601,601	891,601	1,386,998
	Kab. Kendari	467,090	723,391	1,036,901	1,510,351	2,238,405	3,482,109
	Kab. Kolaka	312,244	483,579	709,149	1,056,838	1,602,835	2,551,851
	Southeast Sulawesi	1,289,181	1,996,579	2,894,454	4,264,729	6,394,977	10,067,226
North Sulawesi	Kab. Bolang Mangondow	381,891	577,791	826,796	1,214,273	1,854,636	2,978,771
	Kab. Gorontalo	431,962	653,547	935,200	1,373,480	2,097,804	3,369,330
	Kod. Gorontalo	154,325	233,489	334,114	490,696	749,471	1,203,743
	Kod. Manado	567,638	858,821	1,228,940	1,804,880	2,756,710	4,427,613
	Kab. Minahasa	877,527	1,327,674	1,899,850	2,790,210	4,261,668	6,844,762
	Kab. Sangihe Talaut	224,843	340,181	486,786	714,918	1,091,940	1,753,789
	Kod. Bitung	168,762	255,332	365,370	536,600	819,584	1,316,352
	North Sulawesi	2,806,948	4,246,835	6,077,056	8,925,056	13,631,814	21,894,362
South Sulawesi	Kab. Selayar	109,210	157,791	225,793	331,610	509,490	813,484
	Kab. Bulukumba	370,985	536,012	767,012	1,126,471	1,720,532	2,763,385
	Kab. Bantaeng	161,509	233,354	333,920	490,412	749,038	1,203,046
	Kab. Jeneponto	328,467	474,581	679,107	997,369	1,523,346	2,446,680
	Kab. Takalar	230,225	332,637	475,990	699,062	1,067,723	1,714,894
	Kab. Gowa	481,386	695,524	995,268	1,461,698	2,232,546	3,585,742
	Kab. Sinjai	215,036	310,692	444,588	652,944	997,283	1,601,758
	Kab. Bone	666,311	962,710	1,377,601	2,023,214	3,090,180	4,963,208
	Kab. Maros	267,895	387,064	553,874	813,415	1,242,427	1,995,490
	Kab. Pang. Kepulauan	274,309	396,331	567,134	832,920	1,272,172	2,043,265
	Kab. Barru	162,810	235,234	336,611	491,363	755,073	1,212,739
	Kab. Soppeng	250,304	361,648	517,504	760,031	1,160,845	1,864,460
	Kab. Wajo	420,193	607,117	868,761	1,275,904	1,948,771	3,129,964
	Kab. Sid. Rappang	256,906	371,187	531,154	780,078	1,191,463	1,913,636
	Kab. Pinrang	329,392	475,917	681,019	1,000,176	1,527,634	2,453,567
	Kab. Enrekang	165,130	238,586	341,407	501,407	765,831	1,230,019
	Kab. Luwu	800,679	1,156,850	1,655,407	2,431,211	3,713,345	5,964,087
	Kab. Tana Toraja	400,443	578,574	827,917	1,215,919	1,857,151	2,982,812
	Kab. Pole. Mamasa	452,640	653,991	935,836	1,374,413	2,099,229	3,371,619
	Kab. Majene	136,354	197,009	281,912	414,030	632,374	1,015,670
Kab. Mamuju	242,792	350,795	501,974	737,224	1,126,010	1,808,510	
Kod. Ujung Pandang	1,231,915	1,779,915	2,546,989	3,740,631	5,713,307	9,176,271	
Kod. Pare-Pare	112,470	162,501	232,533	341,509	521,608	837,766	
South Sulawesi	8,067,367	11,656,020	1,679,313	24,496,039	37,417,378	60,092,075	

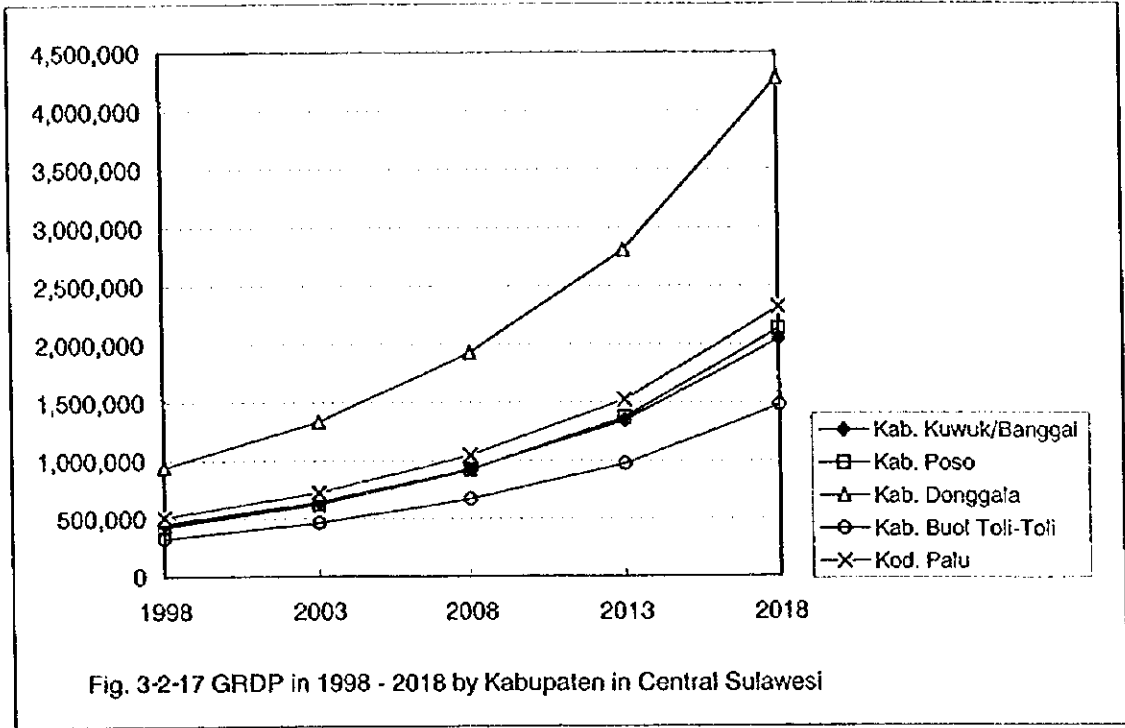
Source: Dalam Angka Propinsi and Estimation by JICA Study Team



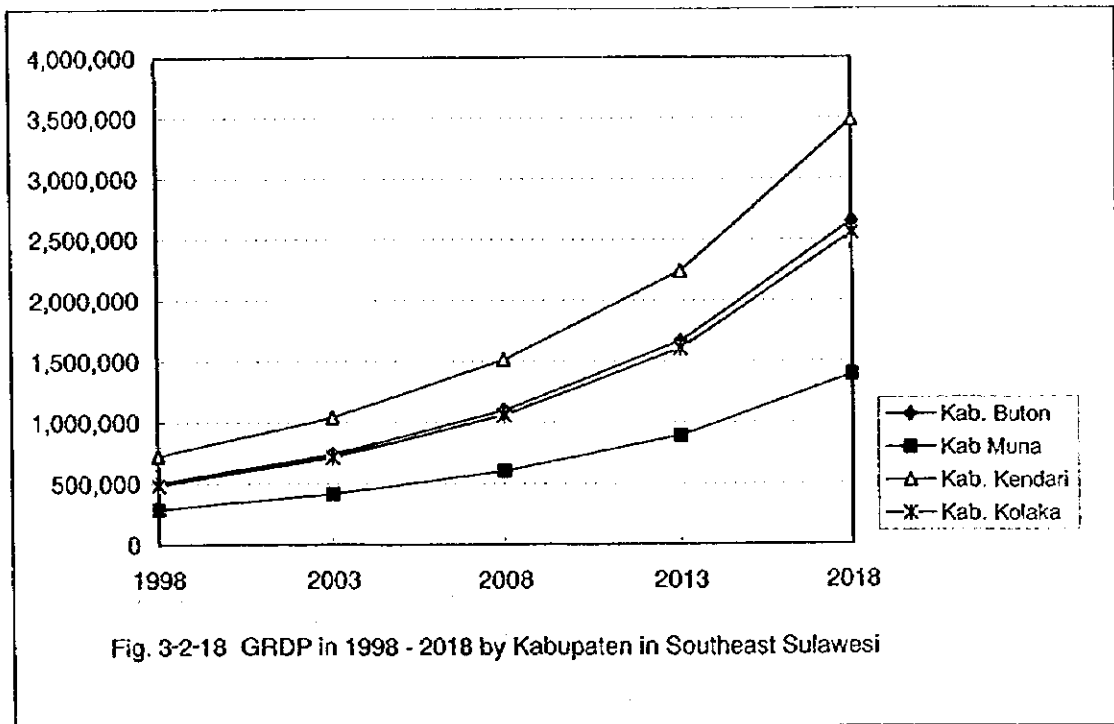
Source : JICA Study Team



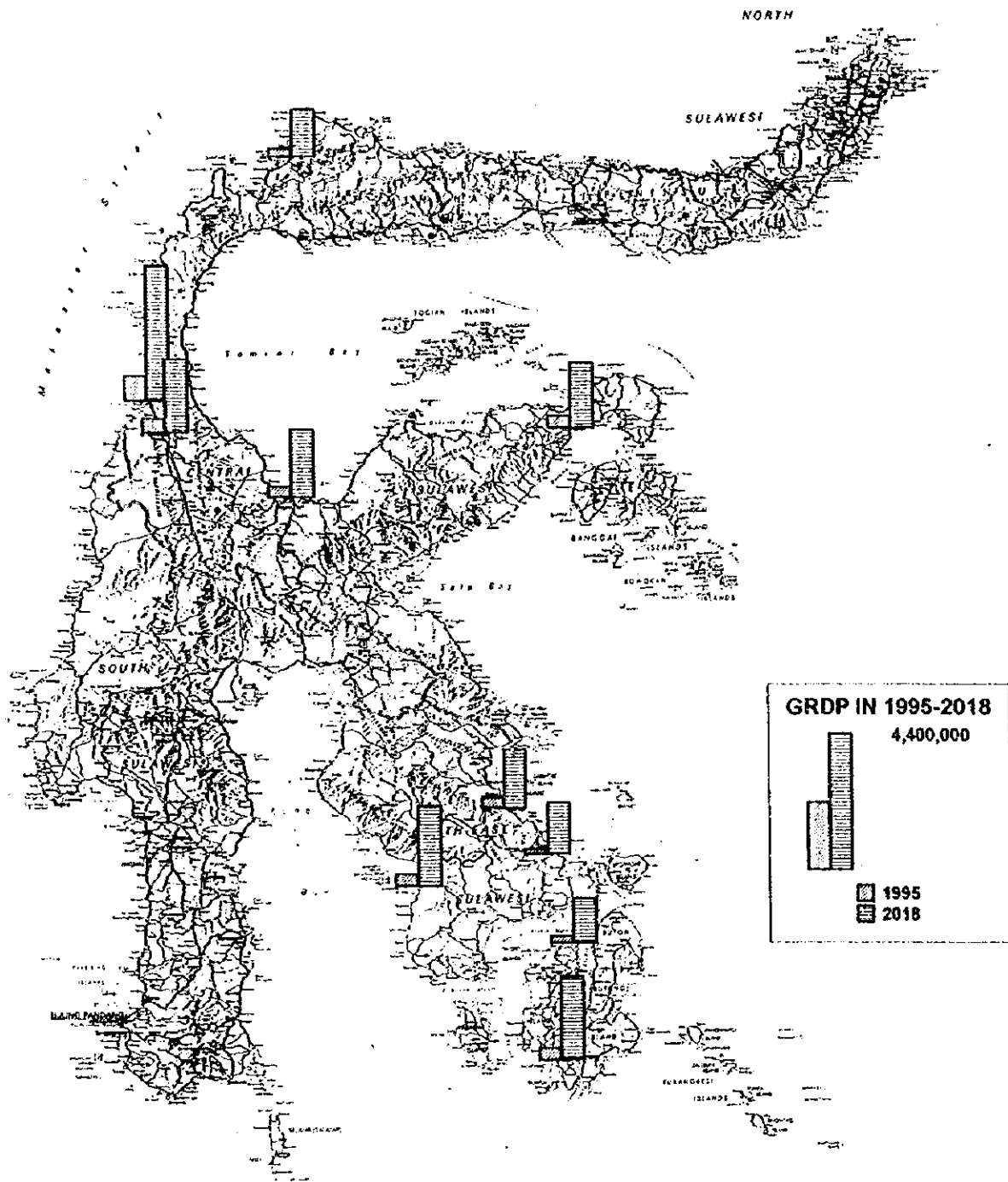
Source : JICA Study Team



Source: JICA Study Team



Source : JICA Study Team



**Figure 3-2-19 GRDP in 1995 and 2018 by Kabupaten in Central Sulawesi and Southeast Sulawesi**

Source: *Dalam Angka Propinsi and Estimation by JICA Study Team*

Table 3-2-10 (1) Urban and Rural GRDP by Kecamatan in Central Sulawesi, 1998 - 2018

(1993 Constant Rp. million)

Province	1998 GRDP			2003 GRDP			2008 GRDP			2013 GRDP			2018 GRDP		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Central Sulawesi	0	20,345	20,345	0	27,338	27,338	0	37,313	37,313	0	50,345	50,345	0	74,007	74,007
Kec. Lobang Kuning	0	79,874	79,874	0	113,156	113,156	0	162,088	162,088	0	228,566	228,566	0	349,843	349,843
Kec. Batu	0	16,235	16,235	0	21,676	21,676	0	29,412	29,412	0	39,471	39,471	0	57,739	57,739
Kec. Tonikum	0	18,486	18,486	0	24,917	24,917	0	34,105	34,105	0	46,134	46,134	0	67,979	67,979
Kec. Tinangkung	0	15,352	15,352	0	20,572	20,572	0	28,008	28,008	0	37,700	37,700	0	55,304	55,304
Kec. Liang	0	25,492	25,492	0	33,296	33,296	0	44,283	44,283	0	58,348	58,348	0	83,939	83,939
Kec. Bulagi	0	17,042	17,042	0	22,502	22,502	0	30,224	30,224	0	40,185	40,185	0	58,288	58,288
Kec. Buko	5,368	21,166	26,534	9,253	28,091	37,344	16,316	37,105	53,421	30,903	47,616	78,519	57,319	64,650	121,969
Kec. Buno	10,701	40,018	50,719	18,407	58,459	76,866	32,532	85,983	117,915	61,618	121,130	182,748	114,292	183,483	297,775
Kec. Kintom	0	10,930	10,930	0	14,736	14,736	0	20,173	20,173	0	27,292	27,292	0	40,220	40,220
Kec. Luwuk	77,852	15,360	93,212	133,905	8,189	142,094	218,822	0	218,822	349,875	0	349,875	531,235	0	531,235
Kec. Lamala	1,095	21,439	22,534	1,884	28,838	30,722	3,329	39,276	42,603	6,106	52,672	58,978	11,697	76,581	88,278
Kec. Balantak	0	13,899	13,899	0	18,446	18,446	0	24,892	24,892	0	33,238	33,238	0	48,400	48,400
Kec. Pamona	5,942	35,087	41,029	10,219	46,861	57,080	18,060	62,173	80,233	34,205	80,999	115,204	63,444	112,906	176,350
Kab. Luwuk/Banggai	100,958	350,725	451,683	173,648	466,899	640,547	289,059	634,435	923,494	482,907	863,695	1,346,602	777,987	1,273,339	2,051,326
Kec. Menui Kepulauan	0	11,288	11,288	0	15,422	15,422	0	21,396	21,396	0	29,692	29,692	0	44,056	44,056
Kec. Bungku Selatan	0	20,312	20,312	0	27,777	27,777	0	38,572	38,572	0	51,410	51,410	0	79,547	79,547
Kec. Bungku Tengah	1,434	42,522	43,956	2,493	64,931	67,424	4,531	98,899	103,430	8,874	149,322	158,196	16,867	249,287	257,154
Kec. Lombo	0	16,894	16,894	0	25,601	25,601	0	42,025	42,025	0	65,478	65,478	0	108,633	108,633
Kec. Mori Atas	0	11,174	11,174	0	15,082	15,082	0	20,694	20,694	0	28,421	28,421	0	41,793	41,793
Kec. Pamona Selatan	0	22,447	22,447	0	34,293	34,293	0	52,696	52,696	0	80,048	80,048	0	129,761	129,761
Kec. Pamona Utara	0	28,403	28,403	0	39,475	39,475	0	55,630	55,630	0	78,078	78,078	0	117,221	117,221
Kec. Lore Selatan	1,113	7,001	8,114	1,937	9,247	11,184	3,519	12,275	15,792	6,892	16,020	22,912	13,192	22,026	35,128
Kec. Lore Utara	0	12,762	12,762	0	18,221	18,221	0	26,319	26,319	0	37,779	37,779	0	58,150	58,150
Kec. Poso Pesisir	0	32,325	32,325	0	48,764	48,764	0	74,072	74,072	0	111,338	111,338	0	178,745	178,745
Kec. Poso Kota	48,707	11,021	59,728	84,788	6,121	90,909	140,749	0	140,749	227,134	0	227,134	344,159	0	344,159
Kec. Lage	0	14,822	14,822	0	20,816	20,816	0	29,619	29,619	0	41,935	41,935	0	63,740	63,740
Kec. Tojo	0	19,558	19,558	0	26,800	26,800	0	37,284	37,284	0	51,714	51,714	0	77,141	77,141
Kec. Petasi	7,728	21,900	28,918	13,453	27,524	40,977	24,416	35,107	59,523	47,856	43,398	91,254	90,958	53,575	144,531
Kec. Bungku Utara	0	17,492	17,492	0	27,200	27,200	0	42,479	42,479	0	65,494	65,494	0	107,620	107,620
Kec. Ulu Bongka	0	9,033	9,033	0	13,520	13,520	0	20,389	20,389	0	30,445	30,445	0	48,586	48,586
Kec. Ampana Tet	0	14,876	14,876	0	21,518	21,518	0	31,454	31,454	0	45,645	45,645	0	70,962	70,962
Kec. Ampana Kota	8,255	20,631	28,886	14,370	25,162	39,532	26,099	29,973	56,072	51,111	33,316	84,427	97,145	34,346	131,691
Kec. Una-Una	0	16,724	16,724	0	21,746	21,746	0	28,838	28,838	0	38,286	38,286	0	54,875	54,875
Kec. Walea Kepulauan	0	11,894	11,894	0	16,120	16,120	0	22,104	22,104	0	30,783	30,783	0	45,710	45,710
Kab. Poso	67,237	362,559	429,596	117,043	506,100	623,143	199,334	720,223	919,557	341,867	1,030,431	1,372,298	562,231	1,577,475	2,139,706
Kec. Kulawi	0	39,127	39,127	0	52,239	52,239	0	71,123	71,123	0	97,187	97,187	0	140,286	140,286
Kec. Dolo	0	66,760	66,760	0	89,639	89,639	0	122,676	122,676	0	168,428	168,428	0	244,174	244,174
Kec. Sigibitmaru	0	109,249	109,249	0	157,029	157,029	0	238,711	238,711	0	332,405	332,405	0	507,639	507,639
Kec. Parigi	5,103	115,006	120,109	9,181	162,704	171,885	16,240	233,344	249,584	31,088	333,526	364,614	56,920	892,968	949,888
Kec. Marawala	0	45,471	45,471	0	62,857	62,857	0	88,341	88,341	0	124,272	124,272	0	184,207	184,207
Kec. Banawa	32,350	49,006	81,356	58,026	61,688	119,714	102,638	75,288	177,926	195,465	64,967	281,432	359,700	444,689	604,378
Kec. Tawaeli	8,027	27,203	35,230	14,443	36,888	51,331	25,546	50,484	76,030	48,900	67,798	116,698	89,532	93,266	182,798
Kec. Ampibabo	0	51,892	51,892	0	70,954	70,954	0	98,732	98,732	0	137,639	137,639	0	202,312	202,312
Kec. Sindue	0	39,059	39,059	0	52,751	52,751	0	72,579	72,579	0	100,134	100,134	0	145,814	145,814
Kec. Sirenia	0	22,723	22,723	0	30,937	30,937	0	42,880	42,880	0	59,558	59,558	0	87,262	87,262



Table 3-2-10 (2) Urban and Rural GRDP by Kecamatan in Central Sulawesi, 1998 - 2018

Province	Kabupaten/Kecamatan	1998 GRDP			2003 GRDP			2008 GRDP			2013 GRDP			2018 GRDP		
		Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
	Kec. Umatene	5,064	51,680	61,384	16,920	68,190	85,110	25,927	90,768	120,692	57,288	119,415	176,703	104,883	162,420	267,303
	Kec. Tomutu	0	71,024	71,024	0	102,853	102,853	0	150,832	150,832	0	220,593	220,593	0	338,816	338,816
	Kec. Moutong	0	96,455	96,455	0	148,507	148,507	0	230,346	230,346	0	354,629	354,629	0	570,886	570,886
	Kab. Donggala	54,764	785,735	840,539	98,570	1,097,236	1,195,806	174,351	1,556,101	1,730,452	333,741	2,200,540	2,534,281	611,037	3,262,039	3,873,076
	Kec. Dampal Utara	0	22,396	22,396	0	31,436	31,436	0	43,472	43,472	0	58,786	58,786	0	86,283	86,283
	Kec. Dampal Utara	0	14,417	14,417	0	19,395	19,395	0	25,801	25,801	0	33,674	33,674	0	47,569	47,569
	Kec. Dendo	0	29,147	29,147	0	41,563	41,563	0	58,266	58,266	0	80,006	80,006	0	118,896	118,896
	Kec. Bualan	72,342	38,665	111,007	110,464	51,103	161,467	193,347	58,585	251,932	359,755	52,919	412,674	654,630	6,713	661,343
	Kec. Galang	0	31,221	31,221	0	44,730	44,730	0	63,079	63,079	0	86,805	86,805	0	129,462	129,462
	Kec. Utara Toile-Toli	0	21,665	21,665	0	30,585	30,585	0	42,518	42,518	0	57,772	57,772	0	85,167	85,167
	Kec. Biau	0	26,326	26,326	0	36,621	36,621	0	50,227	50,227	0	67,415	67,415	0	98,267	98,267
	Kec. Momumu	0	20,475	20,475	0	28,603	28,603	0	39,384	39,384	0	55,047	55,047	0	77,577	77,577
	Kec. Bokar	0	18,918	18,918	0	25,722	25,722	0	34,550	34,550	0	45,495	45,495	0	65,172	65,172
	Kec. Bunobogu	0	16,470	16,470	0	22,226	22,226	0	29,650	29,650	0	38,799	38,799	0	55,262	55,262
	Kec. Paleleh	0	14,550	14,550	0	20,625	20,625	0	28,768	28,768	0	39,210	39,210	0	57,968	57,968
	Kab. Banggai Toile-Toli	72,342	254,256	326,598	110,364	352,649	463,013	193,347	474,400	667,747	359,755	613,928	973,683	654,630	828,614	1,483,244
	Kec. Palu Selatan	170,360	6,472	176,832	250,617	0	250,617	365,388	0	365,388	543,220	0	543,220	822,574	0	822,574
	Kec. Palu Barat	152,159	7,196	159,355	225,238	0	225,238	329,739	0	329,739	490,221	0	490,221	742,319	0	742,319
	Kec. Palu Timur	122,889	896	123,785	176,067	0	176,067	254,277	0	254,277	376,545	0	376,545	570,185	0	570,185
	Kec. Ufara	451,134	60,243	511,377	666,711	58,260	724,971	974,385	71,151	97,133	47,497	67,075	114,572	88,992	98,343	187,335
	Kodi. Palu	746,455	1,813,338	2,559,793	1,166,336	2,480,944	3,647,280	1,830,476	3,456,310	5,286,786	2,975,753	4,775,689	7,751,422	4,829,955	7,039,810	11,869,765
	Central Sulawesi															

Source: JICA Study Team



Table 3-2-11 (2) Urban and Rural GRDP Per Capita by Kecamatan in Central Sulawesi, 1998 - 2018

Province	1998 GRDP Per Capita			2003 GRDP Per Capita			2008 GRDP Per Capita			2013 GRDP Per Capita			2018 GRDP Per Capita		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Kabupaten/Kecamatan															
Kec. Balarang	-	1.340.538	1.340.538	1.731.737	1.731.737	1.731.737	2.291.172	2.291.172	2.291.172	3.053.886	3.053.886	3.053.886	4.313.890	4.313.890	4.313.890
Kec. Dampelas Sopal	-	1.340.538	1.340.538	1.731.737	1.731.737	1.731.737	2.291.172	2.291.172	2.291.172	3.053.886	3.053.886	3.053.886	4.313.890	4.313.890	4.313.890
Kec. Tinombo	2.307.348	1.340.538	1.452.656	2.980.848	1.731.737	1.889.826	4.002.451	2.291.172	2.652.887	5.798.292	3.053.886	3.601.452	8.034.206	4.313.890	5.271.740
Kec. Tomini	-	1.340.538	1.340.538	1.731.737	1.731.737	1.731.737	2.291.172	2.291.172	2.291.172	3.053.886	3.053.886	3.053.886	4.313.890	4.313.890	4.313.890
Kec. Moutong	-	1.340.538	1.340.538	1.731.737	1.731.737	1.731.737	2.291.172	2.291.172	2.291.172	3.053.886	3.053.886	3.053.886	4.313.890	4.313.890	4.313.890
Kab. Donggala	2.307.348	1.340.538	1.374.024	2.989.848	1.731.737	1.787.252	4.002.451	2.291.172	2.363.433	5.798.292	3.053.886	3.235.917	8.034.206	4.313.890	4.619.044
Kec. Dampal Selatan	-	1.066.929	1.066.929	1.408.049	1.408.049	1.408.049	1.842.845	1.842.845	1.842.845	2.372.293	2.372.293	2.372.293	3.331.734	3.331.734	3.331.734
Kec. Dondo	-	1.066.929	1.066.929	1.408.049	1.408.049	1.408.049	1.842.845	1.842.845	1.842.845	2.372.293	2.372.293	2.372.293	3.331.734	3.331.734	3.331.734
Kec. Galang	2.020.680	1.066.929	1.540.900	2.417.221	1.408.049	1.970.260	3.204.997	1.842.845	2.734.909	4.512.592	2.372.293	4.045.134	6.215.455	3.331.734	6.161.228
Kec. Baolan	-	1.066.929	1.066.929	1.408.049	1.408.049	1.408.049	1.842.845	1.842.845	1.842.845	2.372.293	2.372.293	2.372.293	3.331.734	3.331.734	3.331.734
Kec. Uluara Toji-Toji	-	1.066.929	1.066.929	1.408.049	1.408.049	1.408.049	1.842.845	1.842.845	1.842.845	2.372.293	2.372.293	2.372.293	3.331.734	3.331.734	3.331.734
Kec. Biau	-	1.066.929	1.066.929	1.408.049	1.408.049	1.408.049	1.842.845	1.842.845	1.842.845	2.372.293	2.372.293	2.372.293	3.331.734	3.331.734	3.331.734
Kec. Momunu	-	1.066.929	1.066.929	1.408.049	1.408.049	1.408.049	1.842.845	1.842.845	1.842.845	2.372.293	2.372.293	2.372.293	3.331.734	3.331.734	3.331.734
Kec. Bokar	-	1.066.929	1.066.929	1.408.049	1.408.049	1.408.049	1.842.845	1.842.845	1.842.845	2.372.293	2.372.293	2.372.293	3.331.734	3.331.734	3.331.734
Kec. Bunobogu	-	1.066.929	1.066.929	1.408.049	1.408.049	1.408.049	1.842.845	1.842.845	1.842.845	2.372.293	2.372.293	2.372.293	3.331.734	3.331.734	3.331.734
Kec. Puleleh	-	1.066.929	1.066.929	1.408.049	1.408.049	1.408.049	1.842.845	1.842.845	1.842.845	2.372.293	2.372.293	2.372.293	3.331.734	3.331.734	3.331.734
Kab. Buol Toji-Toji	2.020.680	1.066.929	1.191.498	2.417.221	1.408.049	1.563.655	3.204.997	1.842.845	3.202.566	4.512.592	2.372.293	2.876.455	6.215.455	3.331.734	4.189.644
Kec. Palu Selatan	2.257.813	1.841.485	2.239.284	2.941.317	1.408.049	2.941.317	3.910.708	1.842.845	3.910.708	5.410.434	2.372.293	5.410.434	7.671.680	3.331.734	7.671.680
Kec. Palu Barat	2.257.813	1.841.485	2.234.996	2.941.317	1.408.049	2.941.317	3.910.708	1.842.845	3.910.708	5.410.434	2.372.293	5.410.434	7.671.680	3.331.734	7.671.680
Kec. Palu Timur	2.257.813	1.841.485	2.254.124	2.941.317	1.408.049	2.941.317	3.910.708	1.842.845	3.910.708	5.410.434	2.372.293	5.410.434	7.671.680	3.331.734	7.671.680
Kec. Utara	2.257.813	1.841.485	1.880.165	2.941.317	2.353.658	2.452.875	3.910.708	2.782.951	3.015.563	5.410.434	2.498.048	3.311.680	7.671.680	3.884.144	5.074.200
Kod. Palu	2.257.813	1.841.485	2.199.240	2.941.317	2.353.658	2.883.461	3.910.708	2.782.951	3.805.755	5.410.434	2.498.048	5.164.470	7.671.680	3.884.144	7.367.463
Central Sulawesi	2.098.770	1.171.196	1.336.936	2.699.683	1.523.692	1.759.797	3.585.826	2.020.719	2.465.455	5.037.133	2.671.861	3.266.678	7.093.349	3.820.725	4.668.227

Source: JICA Study Team



Table 3-2-12 (2) Future Urban and Rural GRDP by Kecamatan in Southeast Sulawesi, 1993 - 2018

Province	Kabupaten/Kecamatan	1993 GRDP Per Capita			1998 GRDP Per Capita			2003 GRDP Per Capita			2008 GRDP Per Capita			2013 GRDP Per Capita			2018 GRDP Per Capita		
		Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Sulawesi Tenggara	Kec. Anson	0	10,622	10,622	0	18,854	18,854	0	26,205	26,205	0	40,800	40,800	0	63,871	63,871	0	103,583	103,583
	Kab. Kendari	11,284	291,137	302,421	21,293	440,512	461,805	43,293	562,025	585,316	72,498	760,965	833,463	124,892	1,087,100	1,211,992	230,003	1,825,916	1,855,419
	Kec. Mandonga	62,179	19,281	81,460	119,783	20,257	140,040	253,215	16,013	269,228	424,225	9,745	433,970	696,081	0	696,081	1,149,321	0	1,499,321
	Kec. Puvasa	0	17,366	17,366	0	26,659	26,659	0	30,477	30,477	0	39,201	39,201	0	53,193	53,193	0	78,020	78,020
	Kec. Kailari	61,665	4,219	65,884	94,889	0	94,889	151,879	0	151,879	203,715	0	203,715	277,339	0	277,339	401,380	0	401,380
	Kod. Kendari	123,644	40,348	164,092	214,672	48,916	263,588	465,094	46,480	511,574	627,940	48,946	676,886	973,420	0	973,420	1,558,601	76,420	1,635,021
	Kec. Wailubang	0	30,917	30,917	0	50,852	50,852	0	73,297	73,297	0	112,652	112,652	0	176,119	176,119	0	294,660	294,660
	Kec. Pongaha	28,024	6,217	34,241	45,733	3,513	49,246	86,031	0	86,031	123,080	0	123,080	171,139	0	171,139	252,619	0	252,619
	Kec. Wundulako	0	22,279	22,279	0	29,691	29,691	0	33,973	33,973	0	42,667	42,667	0	55,969	55,969	0	77,443	77,443
	Kec. Lanuaha	0	31,655	31,655	0	53,010	53,010	0	77,926	77,926	0	121,853	121,853	0	193,409	193,409	0	316,781	316,781
	Kec. Traulawa	5,029	12,574	17,603	9,274	18,597	27,831	20,861	23,652	44,513	36,631	32,468	69,109	64,845	44,449	109,294	121,960	60,315	182,275
	Kec. Kailika	18,571	24,636	43,207	33,883	37,711	71,594	76,215	41,471	117,686	133,830	47,793	191,623	236,180	49,292	285,472	445,577	33,780	479,357
	Kec. Wolo	0	31,094	31,094	0	43,686	43,686	0	66,487	66,487	0	97,464	97,464	0	146,187	146,187	0	227,361	227,361
	Kec. Mameas	0	14,008	14,008	0	22,293	22,293	0	30,992	30,992	0	46,147	46,147	0	70,171	70,171	0	110,694	110,694
	Kec. Lasua	0	40,133	40,133	0	59,306	59,306	0	76,010	76,010	0	105,401	105,401	0	150,591	150,591	0	224,954	224,954
	Kec. Pakue	0	43,286	43,286	0	71,068	71,068	0	102,233	102,233	0	156,851	156,851	0	244,943	244,943	0	395,210	395,210
	Kab. Kolaka	51,423	290,819	342,242	88,890	394,687	483,577	183,107	526,041	709,148	293,541	763,296	1,056,837	471,964	1,340,870	1,812,834	820,156	1,731,698	2,551,854
	Southeast Sulawesi	309,519	979,662	1,289,181	529,284	1,467,294	1,996,578	1,024,634	1,869,816	2,894,450	1,629,862	2,639,865	4,264,727	2,564,265	3,830,587	6,394,872	4,258,435	5,408,704	10,167,219

Source: JICA Study Team



Table 3-2-13 (2) Future Urban and Rural GRDP Per Capita by Kecamatan in Southeast Sulawesi, 1993-2018

Province	1993 GRDP Per Capita			1998 GRDP Per Capita			2003 GRDP Per Capita			2008 GRDP Per Capita			2013 GRDP Per Capita			2018 GRDP Per Capita		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Kabupaten/Kecamatan																		
Kec. Acaia	817,497	817,497	817,497	1,145,523	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	1,486,102	1,486,102	1,486,102	4,357,625	4,357,625	4,357,625	1,935,229	1,935,229	1,935,229
Kab. Kendari	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
Kec. Mangaja	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
Kec. Paniai	817,497	817,497	817,497	1,145,523	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	1,486,102	1,486,102	1,486,102	4,357,625	4,357,625	4,357,625	1,935,229	1,935,229	1,935,229
Kec. Konda	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
Kec. Kendari	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
Kec. Watubungga	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
Kec. Pomadas	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
Kec. Wundulahu	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
Kec. Landongi	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
Kec. Tirawuta	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
Kec. Kruaka	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
Kec. Wola	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
Kec. Mowwe	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
Kec. Lausua	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
Kec. Pakue	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
Kab. Kolaka	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890
South East Sulawesi	1,294,309	817,497	817,497	1,749,565	1,145,523	1,145,523	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890	2,567,890

Source: JICA Study Team

Table 3-2-14 Future GRDP in North and South Sulawesi, 1998 - 2018

Province	Kabupaten	1993 Constant Rp. million						
		1993	1998	2003	2008	2013	2018	
North Sulawesi	Kab. Bolang Mongondow	381.891	577.791	826.796	1.214.273	1.854.636	2.978.774	
	Kab. Gorontalo	431.962	653.547	935.200	1.373.480	2.097.804	3.369.300	
	Kod. Gorontalo	154.325	233.489	334.114	490.696	749.471	1.203.743	
	Kod. Manado	567.638	858.821	1.228.940	1.804.880	2.756.710	4.427.613	
	Kad. Minahasa	877.527	1.327.674	1.899.850	2.790.210	4.261.668	6.844.762	
	Kab. Sangihe Talaut	224.843	340.181	486.786	714.918	1.091.940	1.753.789	
	Kod. Bitung	168.762	255.332	365.370	536.600	819.584	1.316.352	
	North Sulawesi	2,806.948	4,246.835	6,077.056	8,925.056	13,631.814	21,894,362	
	South Sulawesi	Kab. Selayar	109.210	157.791	225.793	331.610	506.490	813.484
		Kab. Bulukumba	370.985	536.012	767.012	1,126.471	1,720.532	2,763.385
Kab. Bantaeng		161.509	233.354	333.920	490.412	749.038	1,203.046	
Kab. Jeneponto		328.467	474.581	679.107	997.369	1,523.346	2,446.680	
Kab. Takalar		230.225	332.637	475.990	699.062	1,067.723	1,714.894	
Kab. Gowa		481.386	695.524	995.268	1,461.698	2,232.546	3,585.742	
Kab. Sinjai		215.036	310.692	444.588	652.944	997.283	1,601.758	
Kab. Bone		666.311	962.710	1,377.601	2,023.211	3,090.180	4,963.208	
Kab. Maros		267.895	387.064	553.874	813.445	1,242.427	1,995.490	
Kab. Pang. Kepulauan		274.309	396.331	567.134	832.920	1,272.172	2,043.265	
Kab. Barru		162.810	235.234	336.611	494.363	755.073	1,212.739	
Kab. Soppeng		250.304	361.648	517.504	760.031	1,160.845	1,864.460	
Kab. Wajo		420.198	607.117	868.761	1,275.904	1,948.771	3,129.964	
Kab. Sid. Rappang		256.906	371.187	531.154	780.078	1,191.463	1,913.636	
Kab. Pinrang		329.392	475.917	681.019	1,000.176	1,527.634	2,453.567	
Kab. Enrekang		165.130	238.586	341.407	501.407	765.831	1,230.019	
Kab. Luwu		800.679	1,156.850	1,655.407	2,451.211	3,713.345	5,964.087	
Kab. Tana Toraja		400.443	578.574	827.917	1,215.919	1,857.151	2,982.812	
Kab. Pole. Mamas	452.640	653.991	935.836	1,374.413	2,099.229	3,371.619		
Kab. Majene	156.354	197.009	281.912	414.030	632.374	1,015.670		
Kab. Mamuju	242.792	350.795	501.974	737.224	1,126.010	1,808.510		
Kod. Ujung Pandang	1,231.915	1,779.915	2,546.989	3,740.631	5,713.307	9,176.271		
Kod. Pare-Pare	112.470	162.501	232.533	341.509	521.607	837.766		
South Sulawesi	8,067.367	11,656.020	16,679.313	24,496.039	37,414.378	60,092.075		

Source: JICA Study Team



Table 3-2-15 Future GRDP Per Capita in North and South Sulawesi, 1998 - 2018

Province	Kabupaten	GRDP per Capita (1993 Rp.)					
		1998	2003	2008	2013	2018	
North Sulawesi	Kab. Bolang Mongondow	911.802	1.301.014	1.739.561	2.402.909	3.472.356	
	Kab. Gorontalo	665.007	958.592	1.293.653	1.802.091	2.624.178	
	Kod. Gorontalo	1.156.322	1.654.400	2.217.548	3.070.070	4.445.533	
	Kod. Manado	1.415.835	1.945.789	2.514.342	3.366.901	4.729.807	
	Kab. Minahasa	1.228.986	1.813.561	2.499.644	3.549.858	5.260.666	
	Kab. Sangihe Talaut	835.887	1.226.648	1.682.536	2.378.719	3.510.722	
	Kod. Bitung	1.568.201	2.313.004	3.187.298	4.525.029	6.703.923	
	North Sulawesi	1.059.474	1.501.472	2.024.469	2.816.656	4.095.525	
	Kab. Selayar	1.080.709	1.550.927	2.213.517	3.253.655	4.988.018	
	Kab. Bulukumba	1.061.410	1.474.176	2.041.787	2.919.808	4.364.783	
South Sulawesi	Kab. Bantaeng	1.021.317	1.350.940	1.789.198	2.455.686	3.535.320	
	Kab. Jenepono	1.020.094	1.367.314	1.833.028	2.544.052	3.700.192	
	Kab. Takalar	1.032.722	1.390.038	1.870.653	2.605.423	3.801.706	
	Kab. Gowa	1.025.829	1.372.116	1.835.923	2.543.568	3.693.493	
	Kab. Sinjai	1.046.297	1.440.195	1.973.171	2.793.720	4.138.327	
	Kab. Bone	1.097.059	1.586.044	2.279.030	3.370.818	5.197.130	
	Kab. Maros	1.032.630	1.390.234	1.871.311	2.606.843	3.804.451	
	Kab. Pang. Kepulauan	1.053.617	1.462.189	2.023.708	2.892.022	4.320.597	
	Kab. Barru	1.068.271	1.507.115	2.117.581	3.068.297	4.642.409	
	Kab. Soppeng	1.079.870	1.552.937	2.220.331	3.269.186	5.019.597	
South Sulawesi	Kab. Wajo	1.040.958	1.497.067	2.140.829	3.152.452	4.840.813	
	Kab. Sid. Rappang	1.062.625	1.480.757	2.057.132	2.949.945	4.421.093	
	Kab. Pinrang	1.061.736	1.481.980	2.061.976	2.961.031	4.443.403	
	Kab. Enrekang	1.049.704	1.457.577	2.018.361	2.885.740	4.313.070	
	Kab. Luwu	959.689	1.208.785	1.530.583	2.015.851	2.794.310	
	Kab. Tana Toraja	1.067.761	1.496.538	2.090.105	3.011.828	4.533.989	
	Kab. Pole. Mamasa	1.046.960	1.458.231	2.024.953	2.902.635	4.348.588	
	Kab. Majene	999.394	1.407.981	1.975.772	2.859.476	4.321.824	
	Kab. Mamuju	794.517	872.496	973.892	1.142.293	1.423.438	
	Kod. Ujung Pandang	900.097	1.147.836	1.470.012	1.956.375	2.737.956	
South Sulawesi	Kod. Pare-Pare	1.041.502	1.409.825	1.907.168	2.668.976	3.911.503	
	South Sulawesi	1.006.351	1.349.469	1.803.348	2.487.468	3.586.968	

Source: JICA Study Team

### 3.3 Review of Future Socio-Economic Framework

Indonesia has been affected by Asian economic crisis, starting August, 1997. The country's economic growth rate has been reduced rapidly since the time, which requires the revision of the above. The revision for Indonesian economy has been considered as shown below based on the Base Case (see Table 3-2-1);

- The economic growth rate of year 1998 will be negative ten (10) to twelve (12) percent;
- The economic level of year 1997 will be attained at the end of year 2003; and
- The economic growth rate of year 2003 will be six point six (6.6) percent.

In this review the base case of provincial GRDP growth rates was adopted for the future socio-economic framework as mentioned in the section of 3.2.

Then, the base case has been updated as shown Table 3-3-1 based on the above assumption.

**Table 3-3-1 Updated Provincial GRDP Growth Rates (Base Case)**

	GRDP Growth (% p.a.)									
	5 Year Development Plan Period									
	VII							VIII	IX	X
	1997	1998	1999	2000	2001	2002	2003	2004 - 2008	2009 - 2013	2014 - 2018
Central Sulawesi	-	-9.40	-2.35	1.67	2.68	5.10	7.31	7.68	7.92	8.87
Southeast Sulawesi	-	-9.06	-1.99	2.05	3.06	5.49	7.71	8.06	8.84	9.50
Indonesia	-	-10.0 ~-12.0	-3.0 ~ -4.0	1.0 ~ 2.0	2.0 ~ 4.4	4.4	6.6	7.10	7.80	8.70

Source: JICA Study Team

## **Chapter 4**

# **Transport Demand Forecast**

## Chapter 4 TRANSPORT DEMAND FORECAST

### 4.1 Introduction

#### 4.1.1 Zoning

The study area consists of 9 regencies (kabupatens) and 128 subregencies (kecamatan), cities (kotamadyas). These kecamatan/ kotamadyas in the two provinces of Central and Southeast Sulawesi are aggregated into 45 traffic zones to meet with the relatively coarse road network. Table 4-1-1 and Figure 4-1-1 show the relationship between kecamatan/kotamadyas and the traffic zones. North Sulawesi is aggregated into one traffic zone and the South Sulawesi is aggregated into two zones of eastern and western South Sulawesi.

**Table 4-1-1 Traffic Zone Code (1)**

Province	Kabupaten	Kecamatan	Capital	BPS Code	Zone
72 Central	1 Luwuk	10 Lobang Kurung	Mansalean	7201010	1
72 Central	1 Luwuk	20 Banggai	Banggai	7201020	1
72 Central	1 Luwuk	30 Totikum	Sambut	7201030	1
72 Central	1 Luwuk	40 Tinangkung	Salakan	7201040	1
72 Central	1 Luwuk	50 Liang	Liang	7201050	1
72 Central	1 Luwuk	60 Bulagi	Bulagi	7201060	1
72 Central	1 Luwuk	70 Buko	Tataba	7201070	1
72 Central	1 Luwuk	80 Batui	Batui	7201080	2
72 Central	1 Luwuk	90 Bunta	Bunta	7201090	3
72 Central	1 Luwuk	100 Kintom	Kintom	7201100	2
72 Central	1 Luwuk	110 Luwuk	Luwuk	7201110	4
72 Central	1 Luwuk	120 Lamala	Bone Babakal	7201120	4
72 Central	1 Luwuk	130 Blantak	Balantak	7201130	4
72 Central	1 Luwuk	140 Pagimana	Pagimana	7201140	5
72 Central	2 Poso	10 Menui Kepulauan	Uluambo	7202010	6
72 Central	2 Poso	20 Bungku Selatan	Kaleroang	7202020	6
72 Central	2 Poso	30 Bungku Tengah	Bungku	7202030	6
72 Central	2 Poso	40 Lembo	Beteleme	7202040	7
72 Central	2 Poso	50 Mori Atas	Tomata	7202050	7
72 Central	2 Poso	60 Pamona Selatan	Pendolo	7202060	7
72 Central	2 Poso	70 Pamona Utara	Tentana	7202070	7
72 Central	2 Poso	80 Lore Selatan	Gintu	7202080	8
72 Central	2 Poso	90 Lore Utara	Wuasa	7202090	8
72 Central	2 Poso	100 Poso Pesisir	Kasiguncu	7202100	9
72 Central	2 Poso	110 Poso Kota	Poso	7202110	9
72 Central	2 Poso	120 Lage	Tagolu	7202120	9
72 Central	2 Poso	130 Tojo	Uwekuli	7202130	9
72 Central	2 Poso	140 Petasia	Kolonadale	7202140	10
72 Central	2 Poso	150 Bungku Utara	Baturube	7202150	10
72 Central	2 Poso	160 Ulu Bongka	Marowo	7202160	11
72 Central	2 Poso	170 Ampana Tete/Borone	Barone	7202170	11
72 Central	2 Poso	180 Ampana Kota	Utentannga	7202180	11
72 Central	2 Poso	190 Una Una	Wakai	7202190	11
72 Central	2 Poso	200 Walea Kepulauan	Popoli	7202200	11
72 Central	3 Donggala	10 Kulawi	Kulawi	7203010	12
72 Central	3 Donggala	20 Dolo	Dolo	7203020	13
72 Central	3 Donggala	30 Sigi Biromaru	Biromaru	7203030	13

Source: Study Team

**Table 4-1-1 Traffic Zone Code (2)**

Province	Kabupaten	Kecamatan	Capital	BPS Code	Zone
72 Central	3 Donggala	40 Parigi	Parigi	7203040	14
72 Central	3 Donggala	50 Marawola	Binangga	7203050	13
72 Central	3 Donggala	60 Banawa	Donggala	7203060	15
72 Central	3 Donggala	70 Tawaeli	Tawaeli	7203070	16
72 Central	3 Donggala	80 Ampibabo	Ampibabo	7203080	14
72 Central	3 Donggala	90 Sindue	Toaya	7203090	16
72 Central	3 Donggala	100 Sirenja	Tompe	7203100	16
72 Central	3 Donggala	110 Balaesang	Tambu	7203110	16
72 Central	3 Donggala	120 Dampas/Sojol	Sabang	7203120	17
72 Central	3 Donggala	130 Tinomba	Tinombo	7203130	18
72 Central	3 Donggala	140 Tomini	Tomini	7203140	19
72 Central	3 Donggala	150 Moutong	Moutong	7203150	19
72 Central	4 Boul Toli Toli	10 Dampal Selatan	Bangkir	7204010	20
72 Central	4 Boul Toli Toli	20 Dampal Utara	Ogotua	7204020	20
72 Central	4 Boul Toli Toli	30 Dondo	Tinabogan	7204030	20
72 Central	4 Boul Toli Toli	40 Baolan	Toli Toli	7204040	21
72 Central	4 Boul Toli Toli	50 Galang	Lalos	7204050	21
72 Central	4 Boul Toli Toli	60 Urara Toli Toli	Laulalang	7204060	21
72 Central	4 Boul Toli Toli	70 Biau	Kali	7204070	22
72 Central	4 Boul Toli Toli	80 Momunu	Lamadong	7204080	22
72 Central	4 Boul Toli Toli	90 Bokat	Bokat	7204090	23
72 Central	4 Boul Toli Toli	100 Bunobogu	Bunobogu	7204100	23
72 Central	4 Boul Toli Toli	110 Paleleha	Paleleha	7204110	23
72 Central	71 Palu	40 Palu Selatan		7271040	24
72 Central	71 Palu	710 Palu Barat		7271710	24
72 Central	71 Palu	720 Palu Timur		7271720	24
72 Central	71 Palu	721 Palu Utara		7271721	24
74 Southeast	1 Buton	10 Binongko	Palahidu	7401010	25
74 Southeast	1 Buton	20 Tomia	Waha	7401020	25
74 Southeast	1 Buton	30 Kaledupa	Ambeua	7401030	25
74 Southeast	1 Buton	40 Wangi Wangi	Wanci	7401040	25
74 Southeast	1 Buton	50 Lasalimu	Kamaru	7401050	26
74 Southeast	1 Buton	60 Pasar Wajo	Pasar Wajo	7401060	27
74 Southeast	1 Buton	70 Sampolawa	Mambulu	7401070	28
74 Southeast	1 Buton	80 Batauga	Laompo	7401080	28
74 Southeast	1 Buton	90 Sorowalio	Sorowalio	7401090	27
74 Southeast	1 Buton	100 Bungi	Liabuku	7401100	27
74 Southeast	1 Buton	110 Kapontori	Mataumpana	7401110	26
74 Southeast	1 Buton	120 Gu	Lombe	7401120	29
74 Southeast	1 Buton	130 Lakudo	Lakudo	7401130	29
74 Southeast	1 Buton	140 Mawasangka	Mawasangka	7401140	29
74 Southeast	1 Buton	150 Kabaena Timur	Dongkala	7401150	30
74 Southeast	1 Buton	160 Kabaena	Teomokole	7401160	30
74 Southeast	1 Buton	170 Paleang Timur	Bambnea	7401170	31
74 Southeast	1 Buton	180 Paleang	Boepinang	7401180	31
74 Southeast	1 Buton	190 Rumbia	Kasipute	7401190	31
74 Southeast	1 Buton	710 Wolio	Bau Bau	7401710	27
74 Southeast	1 Buton	720 Beto Ambari	Kato Bengke	7401720	27
74 Southeast	2 Muna	10 Tongkuno	Wakuru	7402010	32
74 Southeast	2 Muna	20 Parigi	Wasolangka	7402020	32
74 Southeast	2 Muna	30 Kabawo	Laschao	7402030	32
74 Southeast	2 Muna	40 Tiworo Kepulauan	Kambara	7402040	32

Source: Study Team

**Table 4-1-1 Traffic Zone Code (3)**

Province	Kabupaten	Kecamatan	Capital	BPS Code	Zone
74 Southeast	2 Muna	50 Lawa	Lambubalano	7402050	32
74 Southeast	2 Muna	60 Kusambi	Konawe	7402060	33
74 Southeast	2 Muna	70 Katobe	Katobe	7402070	33
74 Southeast	2 Muna	80 Napabalano	Napabalano	7402080	33
74 Southeast	2 Muna	90 Wakorumba Selatan	Labunia	7402090	34
74 Southeast	2 Muna	100 Bonegunu	Bonegunu	7402100	34
74 Southeast	2 Muna	110 Wakorumba	Labuatobelo	7402110	34
74 Southeast	2 Muna	120 Kalisusu	Ereke	7402120	34
74 Southeast	3 Kendari	10 Tinanggea	Tinanggea	7403010	35
74 Southeast	3 Kendari	20 Palangga	Palangga	7403020	35
74 Southeast	3 Kendari	30 Konda	Konda	7403030	36
74 Southeast	3 Kendari	40 Lainca	Punggaluku	7403040	36
74 Southeast	3 Kendari	50 Moramo	Lapuko	7403050	36
74 Southeast	3 Kendari	60 Wawonii	Langara	7403060	37
74 Southeast	3 Kendari	70 Waworete	Munse	7403070	37
74 Southeast	3 Kendari	80 Soropia	Toronipa	7403080	38
74 Southeast	3 Kendari	90 Sampara	Pohara	7403090	38
74 Southeast	3 Kendari	100 Ronometo	Ronometo	7403100	39
74 Southeast	3 Kendari	110 Landono	Landono 1	7403110	39
74 Southeast	3 Kendari	120 Lambuya	Lambuya	7403120	39
74 Southeast	3 Kendari	130 Pondidaha	Pondidaha	7403130	40
74 Southeast	3 Kendari	140 Wawotobi	Wawotobi	7403140	40
74 Southeast	3 Kendari	150 Lasolo	Tinobu	7403150	41
74 Southeast	3 Kendari	160 Unaaha	Unaaha	7403160	40
74 Southeast	3 Kendari	170 Abuki	Abuki	7403170	40
74 Southeast	3 Kendari	180 Asera	Andowia	7403180	41
74 Southeast	3 Kendari	710 Mandonga	Puwatu	7403710	38
74 Southeast	3 Kendari	720 Poasia	Andonohu	7403720	38
74 Southeast	3 Kendari	730 Kendari	Kendari	7403730	38
74 Southeast	4 Kolaka	10 Watubangga	Watubangga	7404010	42
74 Southeast	4 Kolaka	20 Pomalaa	Pomalaa	7404020	42
74 Southeast	4 Kolaka	30 Wundulako	Wundulako	7404030	42
74 Southeast	4 Kolaka	40 Ladongi	Ladongi	7404040	43
74 Southeast	4 Kolaka	50 Tirawuta	Tirawuta	7404050	43
74 Southeast	4 Kolaka	60 Kolaka	Kolaka	7404060	44
74 Southeast	4 Kolaka	70 Wolo	Wolo	7404070	44
74 Southeast	4 Kolaka	80 Mowewe	Mowewe	7404080	45
74 Southeast	4 Kolaka	90 Lasusua	Lasusua	7404090	44
74 Southeast	4 Kolaka	100 Pakuc	Olo Oloho	7404100	44
71 North	99	999	Menado		46
73 South	99 Eastern	999	Ujung Pandang		47
73 South	99 Western	999	Mamuju		48

Source: Study team

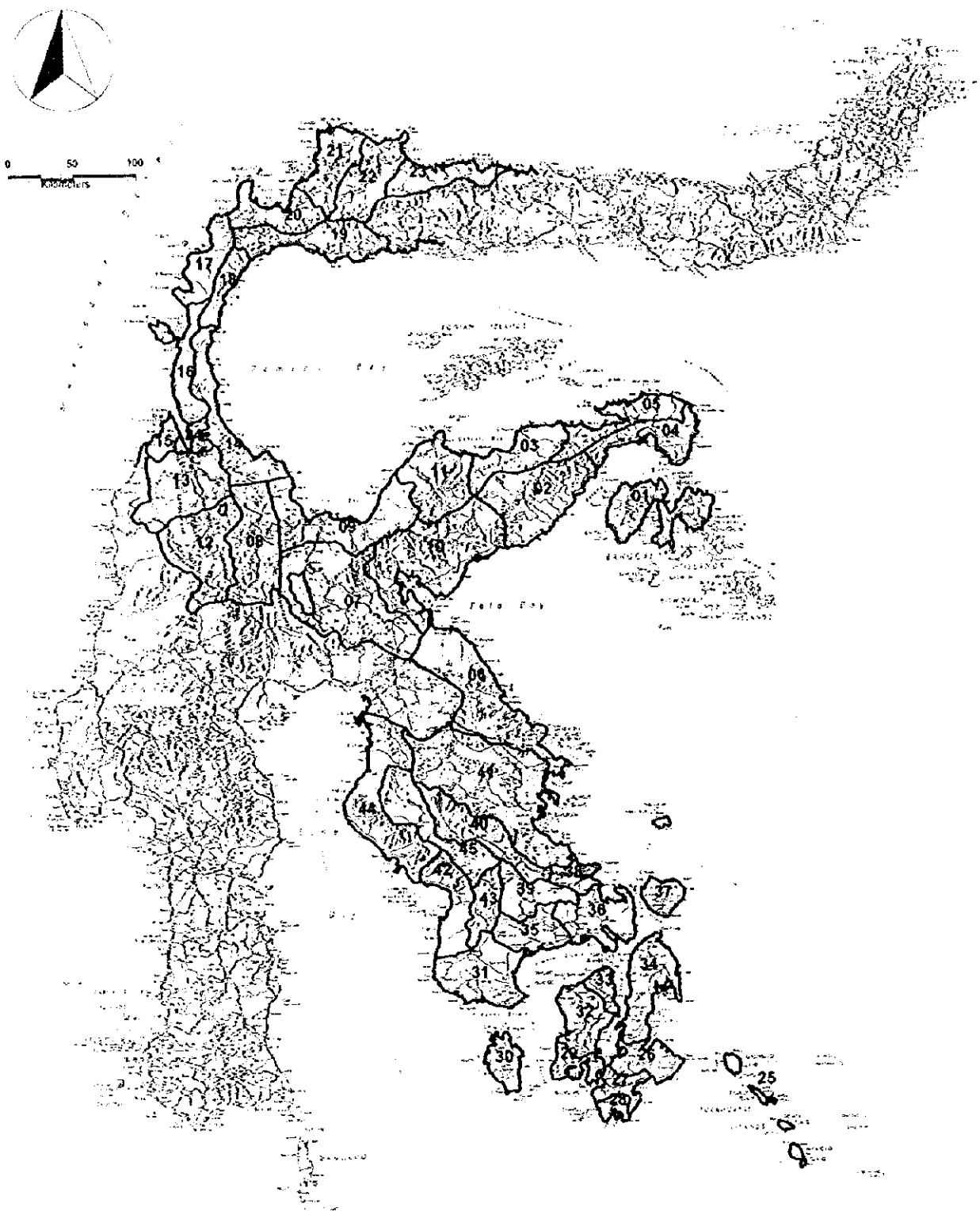


Figure 4-1-1 Traffic Zone

Source: Study Team

#### **4.1.2 Definition of Trips**

The intention of the study is to forecast the road transport demand in order to evaluate the cost performance of road network improvement projects, therefore the study focused on vehicle trips by vehicle classification. Passenger and freight movements were considered when they shift from the modes other than road transport such as ferry or air transport, or when new road transport demand was generated from new economic and social development projects such as mining developments or new settlements as a result of road network development.

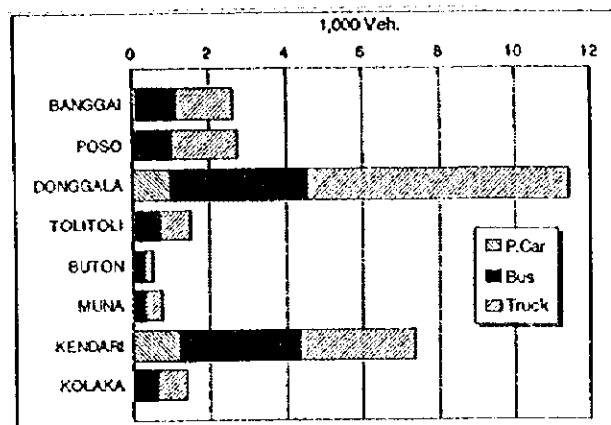
Also the study focused on inter-zone traffic movements. Therefore, the road transport demand, which was forecast in the study did not include local or urban traffic movements (intra-zone movements). They were considered as the background flow of links.



## 4.2 Overview of Existing Transport Conditions

### 4.2.1 Vehicle Registration

The vehicles registered in each kabupaten (Regency) in 1995 are summarized in Figure 4-2-1. The total registered vehicles in 1995 in the two provinces of Central and Southeast Sulawesi are 28,351 Vehicles, of which almost two-thirds are concentrated in the provincial capitals of Palu (Kabupaten Donggala) and Kendari (Kabupaten Kendari).



Source: Annual Statistics of Provinces and Kabupatens

Figure 4-2-1 Registered Vehicles in 1995

Reflecting the topographic features of the study area, trucks have the highest share of 55.0%, followed by buses (36.5%) and passenger cars (8.5%). The car ownership is calculated at 9.7 and 6.9 vehicles/1,000 inhabitants in Central and Southeast Sulawesi Provinces respectively. The highest rate of ownership is seen in Kabupaten Kendari (13.8), followed by Kabupaten Donggala (13.1), and the lowest is in Kabupaten Buton (1.3) followed by Kabupaten Muna (3.0).

Based on the information in the three Kabupatens of Buton, Muna and Kendari, the registered motor cycles in Southeast Sulawesi in 1995 was estimated at about 24,000, or 16.5 motor cycles/1,000 inhabitants, which is about 2.4 times higher than the vehicle ownership.

Figure 4-2-2 shows the relationship between car ownership (vehicles/1000 inhabitants) and per capita GRDP (Million Rp./person) in terms of 1993 constant price by kabupaten in the study area. Kabupaten Kolaka shows the extremely high per capita GRDP compared with its vehicle ownership. A linear regression analysis, excluding Kolaka, gives the following relation;

$$V = a \times GRDP + b$$

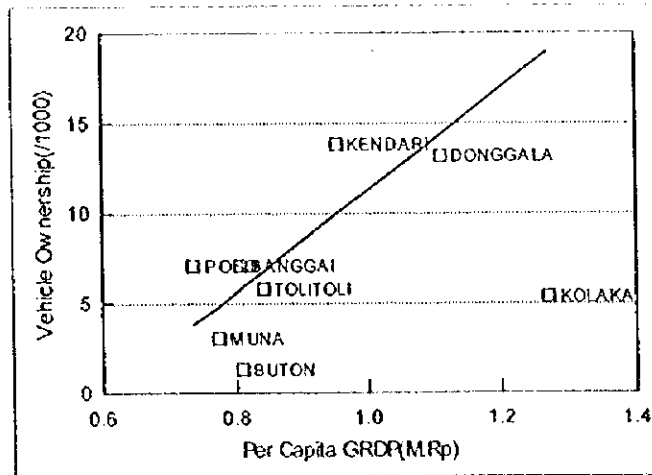
where,  $V$ ; Vehicle Ownership (Vehicles/1000 inhabitants)

$GRDP$ ; (Per Capita GRDP in M.Rp.)

$$a=3.2813$$

$$b=-17.139$$

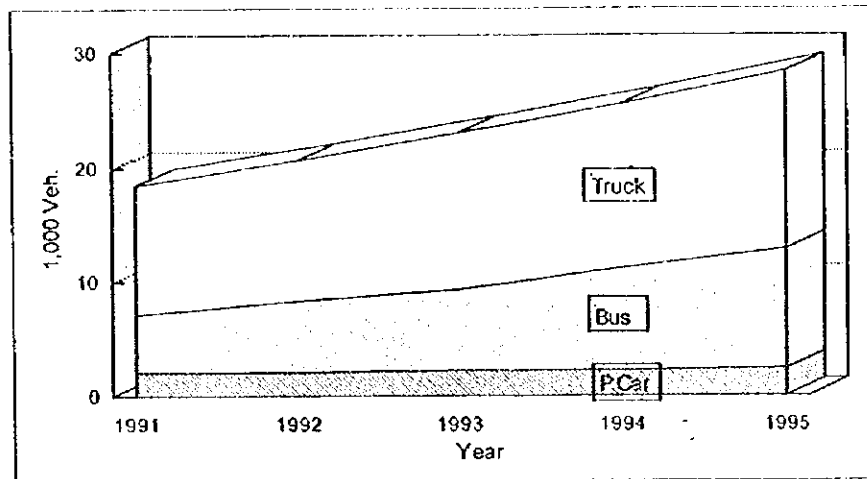
$$(r^2=0.597)$$



Source: Study Team

**Figure 4-2-2 Vehicle Ownership and Per Capita GRDP**

Figure 4-2-3 shows the trend of the registered vehicles in Central and Southeast Sulawesi Provinces. The average annual growth rate between 1992 and 1995 in the study area is calculated at 11.08%. The average annual growth rate in Southeast Sulawesi is as high as 17.88% in the same period. Among vehicle classifications, the average annual growth rate of buses in Southeast Sulawesi records the highest at 24.82%, while that of passenger cars in Central Sulawesi records the lowest at 2.21%.



Source: Annual Statistics of Provinces and Kabupatens

**Figure 4-2-3 Trend of Registered Vehicles in the Study Area**

#### 4.2.2 Traffic Flow

Figure 4-2-4 shows the 4 wheel traffic flow based on the 1991 National OD at kabupaten level assigned onto the spider network. The highest flow of 476 vehicles/day is seen between Kabupaten Donggala/Palu and Poso.

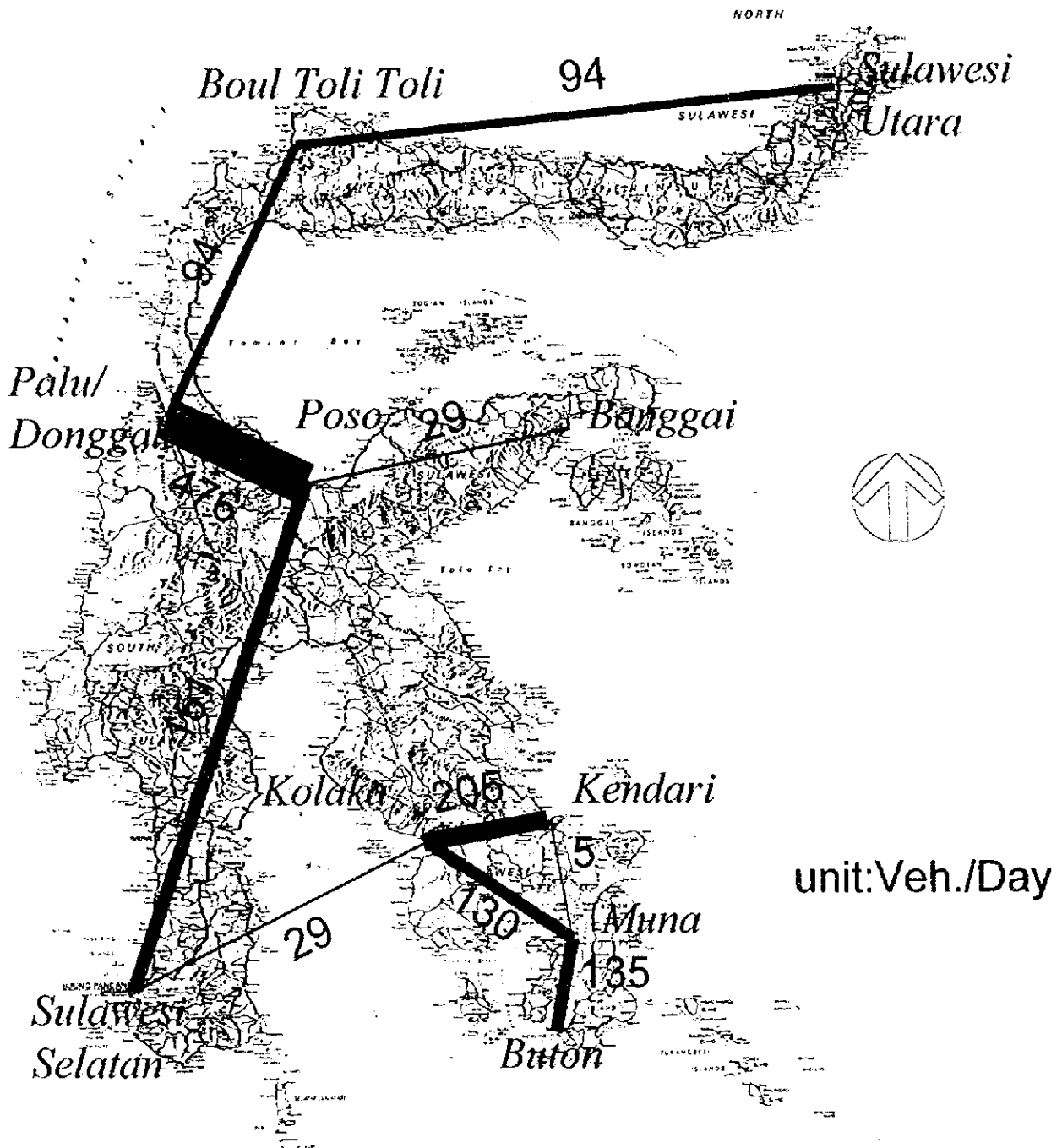


Figure 4-2-4 1991 Traffic Flow Assigned on Spider Network



#### 4.2.4 Sea Transport

##### (1) Ferry Route

A total of five ferry routes are registered in the study area at present. They are;

- 1) Torobulu(main Island in Southeast Sulawesi)-Tampo(Muna Island)
- 2) Kolaka(main Island in Southeast Sulawesi)-Bajoe(main Island in South Sulawesi)
- 3) Tolandona(Muna Island)-Bau Bau(Buton Island)
- 4) Luwuk(main Island in Central Sulawesi)-Sabang and Salakan (Banggai Island)
- 5) Pagimana(main Island in Central Sulawesi)-Gorontalo(Main Island in North Sulawesi)

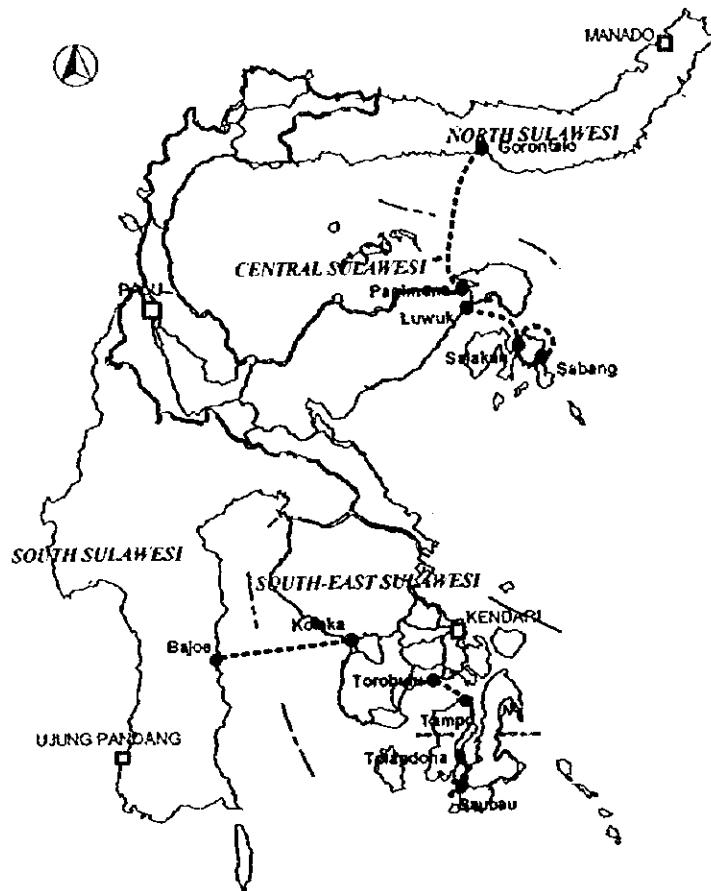


Figure 4-2-6 Ferry Routes in the Study Area

The annual transported passengers, motorcycles, 4-wheel vehicles, and freight volumes from 1990 to 1996 are shown in Table 4-2-1. The ferry route between Kolaka in Southeast Sulawesi and Bajoe in South Sulawesi, both cities which are located in the main island of Sulawesi, shows the highest traffic flow of about 1,000 passengers, 100 vehicles and 300 tons of freight per day in 1996, due to the lack of a comparable land transport route between the two peninsulas which would be reliable throughout the year and the large difference in travel time at present, also due to the relationship between Ujung Pandang, which can be accessed from Bajoe, and Kolaka/Kendari in Southeast Sulawesi. Ujung Pandan is the largest and leading city in terms of economy and culture and is the hub-city in Sulawesi island.

On the other hand, the ferry route between Pagimana in Central Sulawesi and Gorontalo in North Sulawesi, which connects the two towns located on the main island of Sulawesi, shows a low traffic flow of about 100 passengers, 1.4 vehicles, and 23 tons of freight per day in 1995, due to the existence of reliable and convenient land transport route and smaller difference of travel times of the two modes, as well as the weak economic and cultural relationship between two towns.

The other three ferry routes connect the main island of Sulawesi with sub- islands of Buton, Muna and Banggai. The routes between Torobulu (main island)-Tampo (Muna Island) and Tolandona (Muna Island)-Bau Bau (Buton Island) show almost the same flows in terms of passenger, vehicle and freight in recent years, having yearly fluctuations. No other scheduled ferry connecting such islands having kecamatan capitals as Kabena, Wowoni, Manul, Togian and Tukangbesi islands is registered.

**Table 4-2-1 Transport Volume on Ferry Routes**

Route	Passenger (Pass.)	M.Cycle (Unit)	Vehicles (Veh.)	Freight (Ton)
<b>1. Torobulu-Tampo</b>				
1991	37,886		3,255	2748.00
1992	31,212		3,899	2255.00
1993	55,750		5,442	3468.00
1994	78,227		6,129	4212.00
1995	85,400		4,011	5972.00
1996	67,953		5,108	4496.00
<b>2. Kolaka-Bajoe</b>				
1991	323,488		16,204	47658.00
1992	308,255		22,129	52740.00
1993	347,145		22,377	52615.00
1994	379,499		26,624	72778.00
1995	396,245		29,962	79375.00
1996	371,672		32,448	92831.00
<b>3. Tolandona-Bau Bau</b>				
1991	25,911		4,251	1620.00
1992	64,906		4,361	2558.00
1993	93,675		2,599	4291.00
1994	71,286		6,018	4088.00
1995	90,305		3,508	3982.00
1996	65,528		6,909	4049.00
<b>4. Luwuk-Banggai(Sabang/Salakan)</b>				
1990	14,991	338	194	1112.75
1991	6,057	229	158	1563.29
1992	12,117	404	302	1812.41
1993	18,217	748	573	1351.12
1994	16,746	787	459	4165.04
1995	18,943	1,053	727	5652.46
<b>5. Pagimana-Gorontalo</b>				
1993	18,431	115	164	7472.60
1994	30,584	388	370	10171.00
1995	38,853	547	480	7286.00

Source: Ministry of Transport, Palu and Kendari

The average annual growth rates of passengers, vehicles and freight transported by the three main ferry routes are listed in Table 4-2-2. The inter-provincial ferry route of Kolaka - Bajoe shows the low passenger growth rate, while the inter-kabupaten ferry routes of Torobulu - Tampo and Tolandone - Bau Bau show high passenger and freight growth rates. On the other hand, Kolaka - Bajoe shows the high vehicle growth rate, mainly because of the lack of land transport route despite of the economic relationship between two provinces.

**Table 4-2-2 Average Annual Growth Rates of Main Ferry Routes**

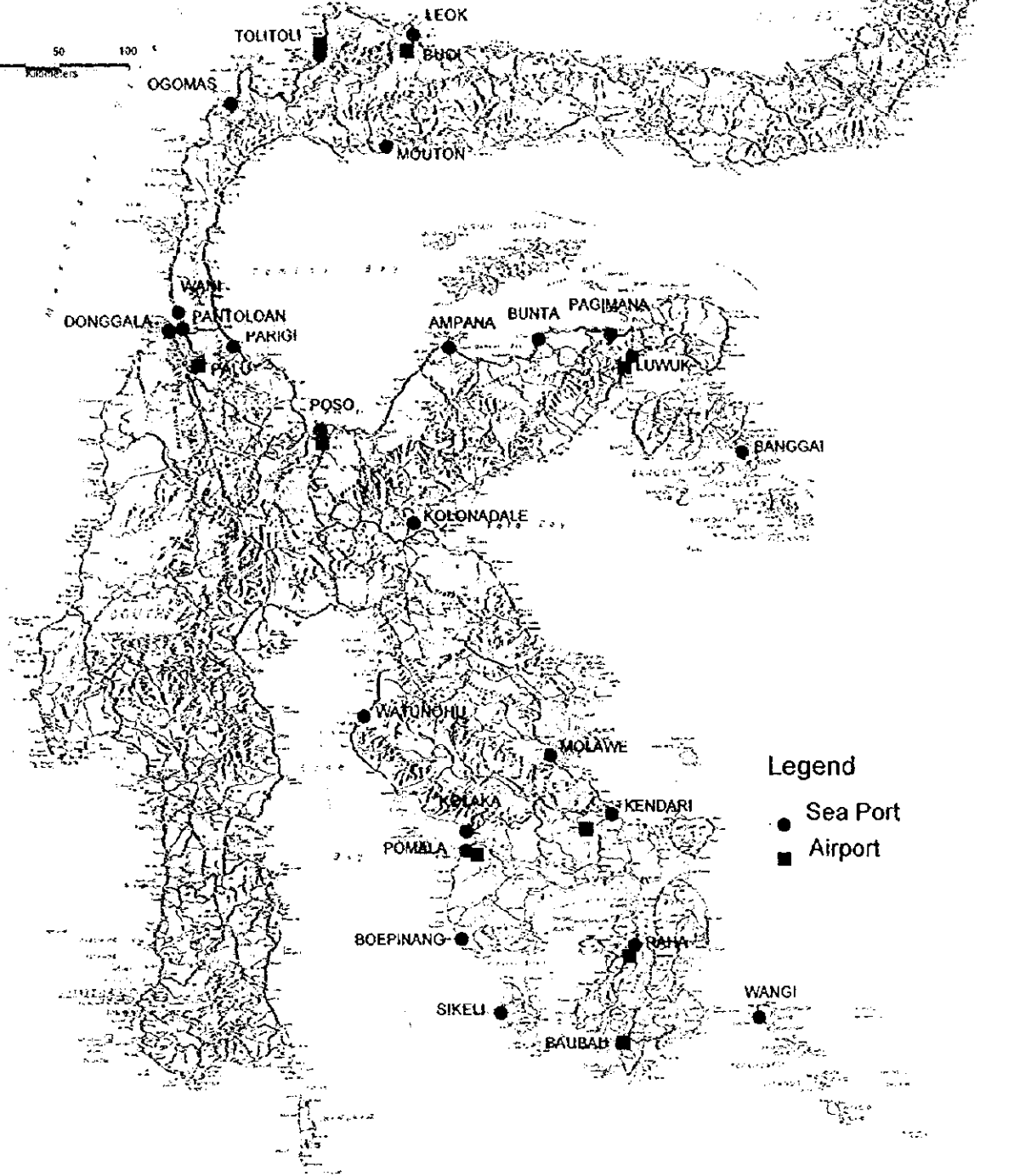
Route	Passenger	Vehicle	Freight
Torobulu-Tampo	12.39	9.43	10.35
Kolaka-Bajoe	2.82	14.90	14.26
Tolandona-Bau Bau	20.39	10.20	20.11

Source: Ministry of Transport

Besides these ferry routes, sea ports which handle passengers and freight are shown in Figure 4-2-6. However, their operations are on ad-hoc bases.



0 50 100  
Kilometers



**Legend**

- Sea Port
- Airport

**Figure 4-2-7 Locations of Sea Ports and Airports**



#### 4.2.5 Air Transport

Table 4-2-3 and Figure 4-2-6 shows the airports in the Study area. At Palu and Kendari airports, jet liners are operating while turbo-propeller liners are operating at other airports.

**Table 4-2-3 Airports in the Study Area**

Name	Location	Category	Runway (m)
1. Palu	Central/Palu	II	2067
2. Poso	Central/Poso	IV	1117
3. Luwuk	Central/Banggai	III	1300
4. Tolitoli	Central/Tolitoli	IV	811
5. Buoi	Central/Tolitoli	V	750
6. Kendari	Southeast/Kendari	II	1850
7. Pomala	Southeast/Kolaka	IV	830
8. Raha	Southeast/Muna	V	750
9. Baubau	Southeast/Buton	IV	821

*Source: Ministry of Transport*

## 4.3 Traffic Survey

### 4.3.1 Introduction

The following traffic surveys were carried out in the study area.

- Traffic Counting at 10 stations (Sta.101 - 110)
- Road Side OD Survey at 7 stations (Sta. 201 - 207)

Their locations are shown in Figure 4-3-1 and the link codes are listed in Table 4-3-1. The limited surveys cannot cover all the road links in the study area, however these survey stations were located to cover the main links and the traffic movements between traffic zones, supplementing the information on traffic OD movements in 1991.

**Table 4-3-1 Traffic Survey Stations**

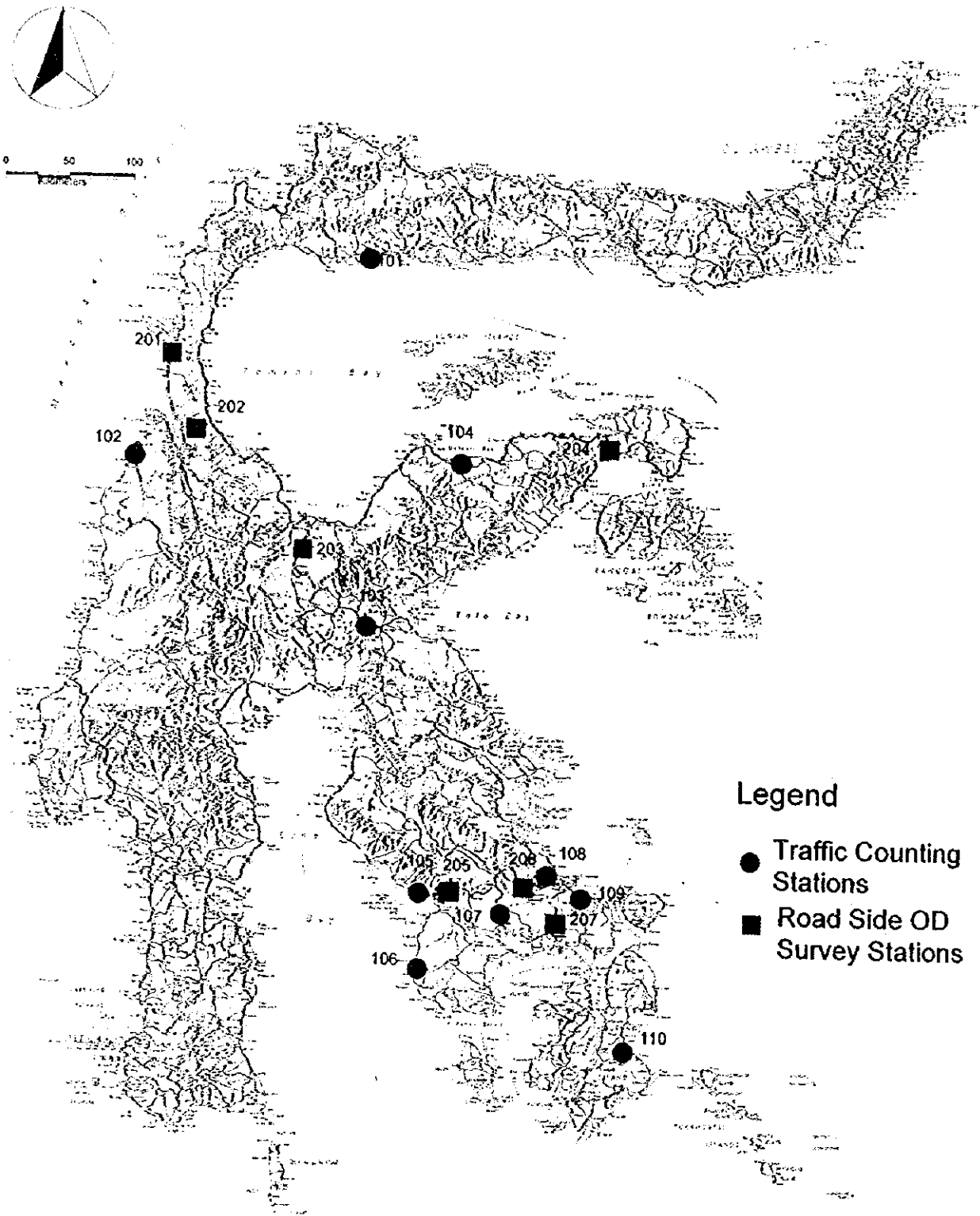
Code	Survey Station			Link Code	Direction Code 1	
	Province	Kabupaten	Kecamatan		From	To
101	Central	Donggala	Moutong	52024-2	Gorontalo	Palu
102	Central	Donggala	Donggala	52033	Donggala	Surumana
103	Central	Poso	Lembo	52021-1	Kolonadale	Tomata
104	Central	Poso	Ampana Tete	52034-1	Bunta	Ampana
105	Southeast	Kolaka	Kolaka	56014	Wolo	Kolaka
106	Southeast	Kolaka	Watubangga	56013-2	Watu Bangga	Kolaka
107	Southeast	Kendari	Lambuya			
108	Southeast	Kendari	Sampara	56018-1	Laosu	Pohara
109	Southeast	Kendari	Poasia	56025	Moramo	Kendari
110	Southeast	Buton	Pasar Wajo	56007-2	Bau Bau	Matanoue
201	Central	Donggala	Baracsang	52010-2	Sabang	Palu
202	Central	Donggala	Tawaeli	52004	Toboli	Tawaeli
203	Central	Poso	Lage	52007-1	Poso	Tentena
204	Central	Banggai	Luwuk	52034	Luwuk	Bunta
205	Southeast	Kolaka	Mowewe	56001-3	Kolaka	Kendari
206	Southeast	Kendari	Pondihara	56001-1	Kolaka	Kendari
207	Southeast	Kendari	Konda	56004-1	Punggaluku	Kendari

*Source: Study Team*

### 4.3.2 Traffic Counting

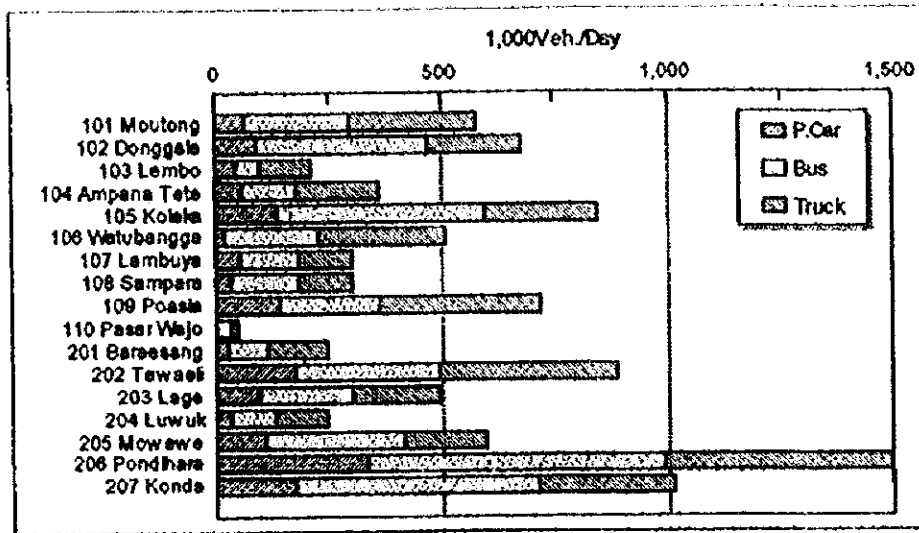
Figure 4-3-2 shows the 24-hours traffic flows at the 17 survey locations. The highest flow of about 1,500 vehicles/day is seen at survey station No. 206, at Pondihara in Southeast Sulawesi, on National Highway 001. At eight stations out of 17, the 24-hours traffic flows were less than 500, and 500 - 1,000 at six stations. The lowest flow of 51 vehicles/day is seen at the station No. 110 at Pasar Wajo in Buton Island.

On the Tawaeli - Toboli road (Sta. 202), the flow was 886 vehicles/day, which is the same level as the counting results of 802 vehicles/day in November 1995.



**Figure. 4-3-1 Traffic Survey Locations**

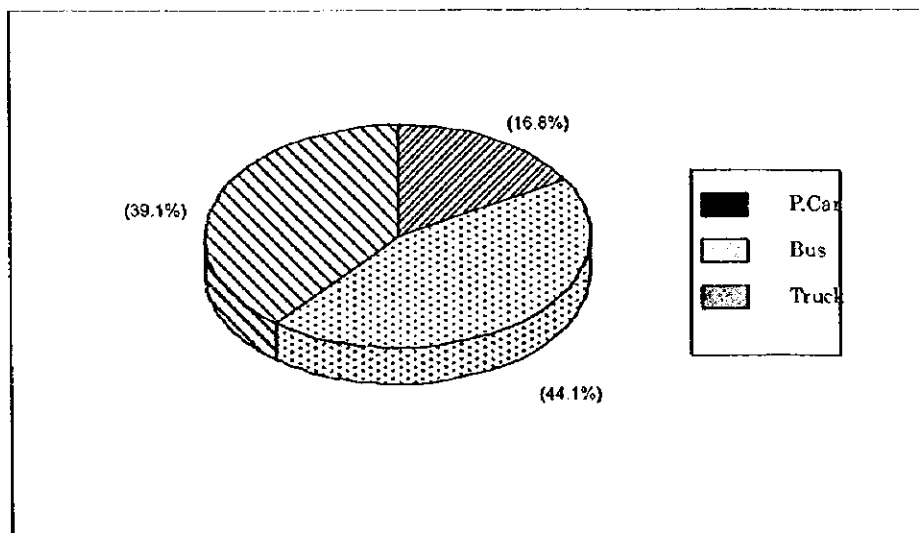
*Source: Study Team*



Source: Study Team

Figure 4-3-2 1997 Traffic Counting Results

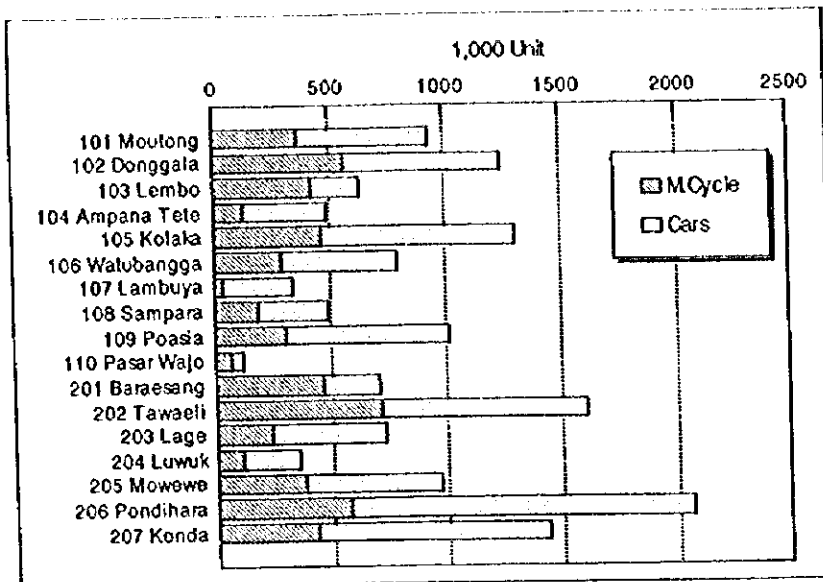
Figure 4-3-3 shows the average vehicle composition of all the survey stations. The buses, including microlet (micro-bus) shows the highest share of 44.1%, followed by trucks (39.1%).



Source: Study Team

Figure 4-3-3 Vehicle Composition

Figure 4-3-4 shows the share of Motorcycles at the survey stations. The overall average is 37.2% of the total of 4-wheel vehicles and motorcycles. The highest motorcycle share of 65.1% was observed at the survey station No. 201, Baraesang at the west coast of the Central Sulawesi, while the lowest share of 25.4% was observed at the survey station No. 104, Ampana Tete at the border of Poso and Banggai Kabupatens in Central Sulawesi.



Source: Study Team

Figure 4-3-4 Share of Motorcycles

### 4.3.3 Road Side OD Survey

#### (1) Sample Rate

The road side OD interview surveys were carried out at the seven survey stations at the points where road links cross the traffic zones to supplement the OD movements of the Kabupaten level OD matrix in 1991. Almost all the vehicles were interviewed. Table 4-3-2 shows the interviewed sample rates of each survey station by vehicle classification. The overall average sample rate was calculated at 0.771. The data collected from the road side OD surveys are expanded to the full size information based on these sample rates by station and by vehicle classification.

**Table 4-3-2 Interview Sample Rate**

Station	M.Cycle	P.Car	Bus	Truck	Total
<b>Traffic Count (Veh./day)</b>					
201	463	27	90	131	711
202	716	177	319	390	1,602
203	236	95	208	195	734
204	108	33	102	111	354
205	375	110	307	179	971
206	576	335	657	506	2,074
207	425	177	537	298	1,437
Total	2,899	954	2,220	1,810	7,883
<b>Interviewed Sample (Veh./day)</b>					
201	409	14	86	118	627
202	430	128	253	299	1,110
203	228	98	157	180	663
204	110	30	93	106	339
205	235	91	275	127	728
206	453	231	499	276	1,459
207	330	157	445	220	1,152
Total	2,195	749	1,808	1,326	6,078
<b>Sample Rate</b>					
201	0.883	0.519	0.956	0.901	0.882
202	0.601	0.723	0.793	0.767	0.693
203	0.966	1.032	0.755	0.923	0.903
204	1.019	0.909	0.912	0.955	0.958
205	0.627	0.827	0.896	0.709	0.750
206	0.786	0.690	0.760	0.545	0.703
207	0.776	0.887	0.829	0.738	0.802
Total	0.757	0.785	0.814	0.733	0.771

Source: Study Team

#### (2) Interview Items and Data Processing

The drivers were interviewed according to the following items;

- Vehicle classification (11 categories)
- Number of passengers including driver
- Trip origin and destination at Kecamatan level
- Trip direction (To residence or from residence)
- Trip purpose (14 categories)

- Commodity classification (for freight vehicles)
- Dead weight and pay load capacity (for freight vehicles)
- Loading level (for freight vehicles, 7 categories)

All the information was converted into codes. After input of codes into files, the three following error check processes were carried out and the final results were compiled in a master file in ASCII.

- Format error check
- Range error check
- Logic error check

### (3) Characteristics of Traffic Flow

The surveyed traffic flows are characterized by the high shares of short distance trips. Table 4-3-3 shows the intra-zone and intra-kabupaten flow rates at each survey station. Almost all the motorcycles (93.1%) are the intra-kabupaten movements, while passenger cars (71.5%) and trucks (70.3%) show relatively low rates. However, intra-zone rates show the significantly low rates comparing to the intra-Kabupaten rates, because of the survey locations, which were mostly located at the traffic zone borders except for the station No. 201, which was intentionally located within a zone to check the intra-zone rate in a link flow.

**Table 4-3-3 Intra-Kabupaten and Intra-Zone Rates**

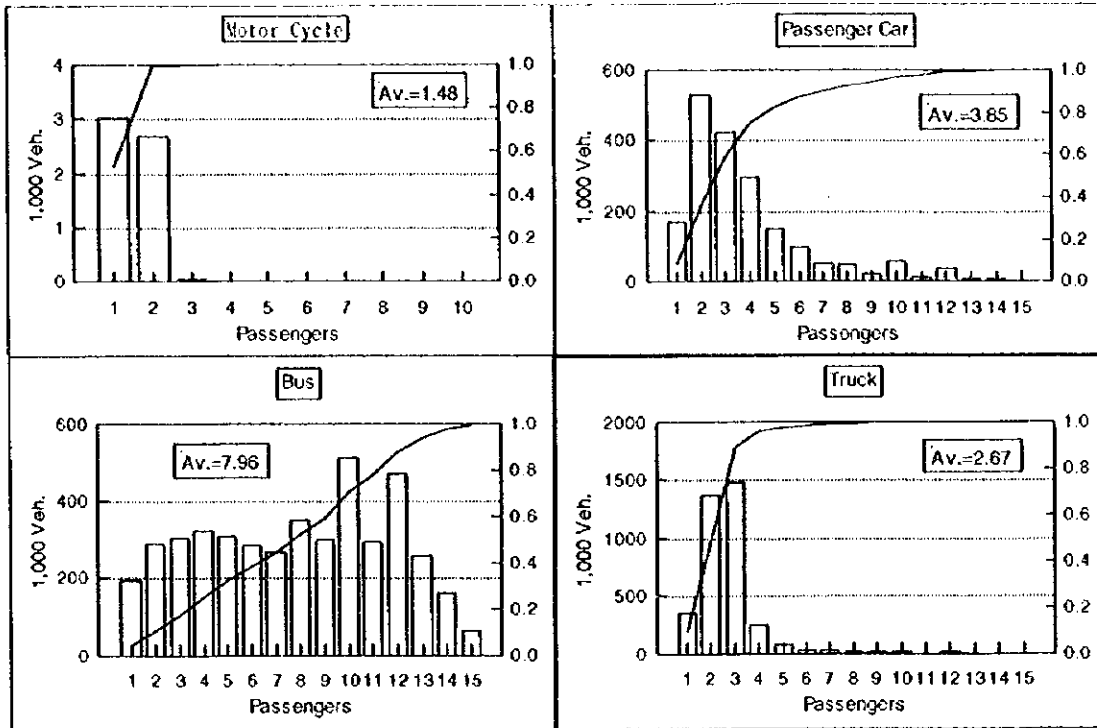
Station	M.Cycle	P.Car	Bus	Truck
<b>Intra-Zone Flow Rate</b>				
201	0.671	0.194	0.279	0.335
202	0.218	0.042	0.051	0.040
203	0.225	0.118	0.409	0.048
204	0.055	0.000	0.006	0.053
205	0.218	0.075	0.136	0.179
206	0.160	0.044	0.063	0.169
207	0.237	0.167	0.116	0.105
Average	0.255	0.091	0.151	0.133
<b>Intra-Kabupaten Flow Rate</b>				
201	0.994	0.821	0.989	0.969
202	0.906	0.680	0.896	0.649
203	0.932	0.740	0.885	0.367
204	0.936	0.625	0.980	0.766
205	0.862	0.444	0.441	0.480
206	0.916	0.731	0.717	0.721
207	0.972	0.961	0.977	0.966
Average	0.931	0.715	0.841	0.703

Source: Study Team

Therefore, when comparing the survey results with the flows in 1991 OD matrix (inter-Kabupaten OD matrix) or Bina Marga road inventory data, attention was paid to these intra-kabupaten and intra-zone flows.

#### (4) Passenger Occupancy

Figure 4-3-5 often carry inter-settlement passengers because of the narrow road width in the study area. The occupancy of passenger cars is rather high, which reflects the low car ownership. Most buses operating in the study area are mini-buses (microlette) having a seat capacity of about eight passengers.



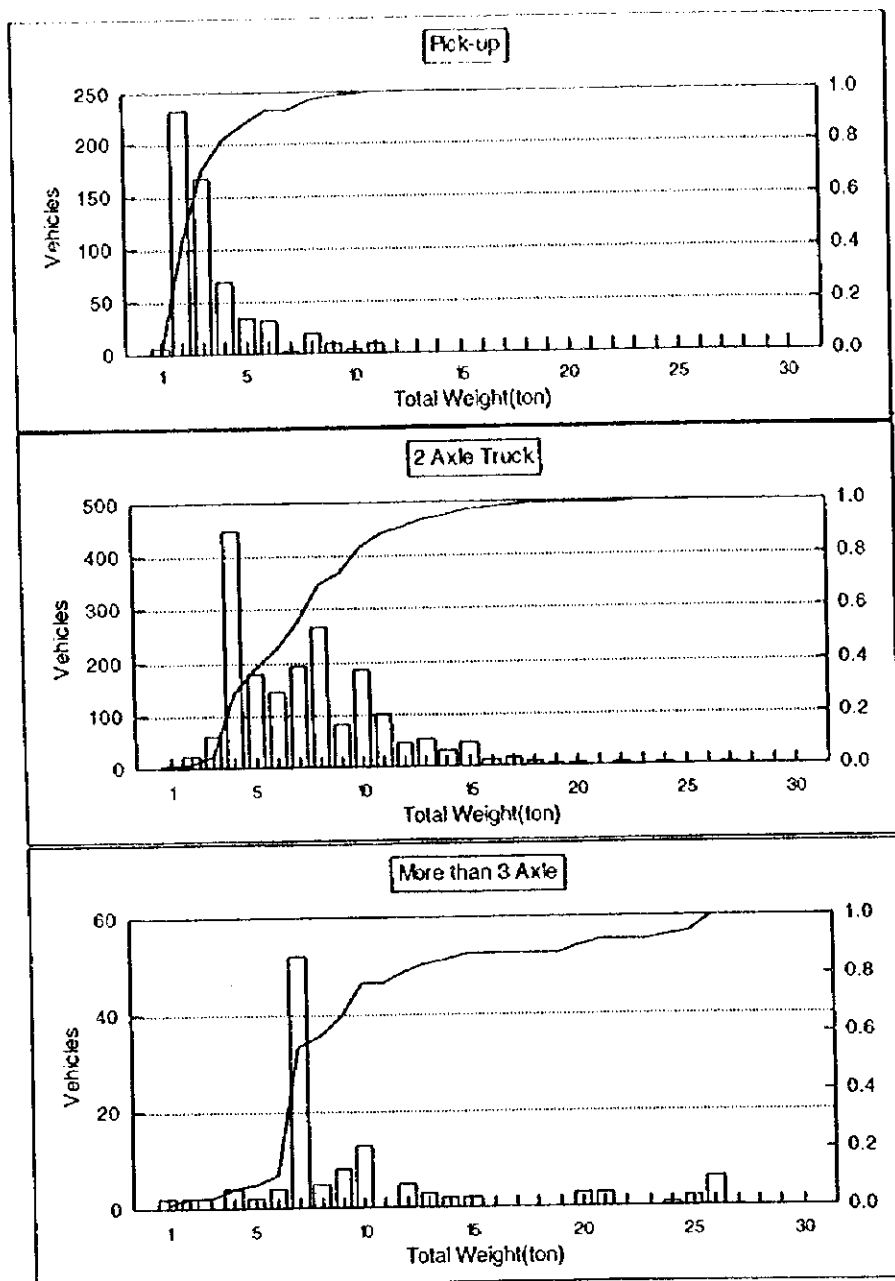
Source: Study Team

**Figure 4-3-5 Passenger Occupancy Distribution**

#### (5) Axle Load Distribution

Figure 4-3-6 shows the total weight distribution of trucks by axle numbers. The most frequent weights are 1-2 tons for pick-ups, 3-4 tons for 2 axle trucks, and 7-8 tons for trucks with 3 axles or more, including trailers.



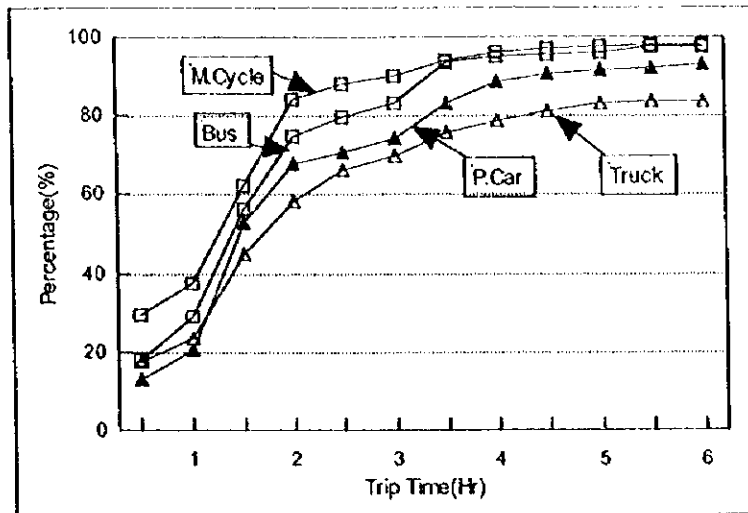


Source: Study Team

**Figure 4-3-6 Weight Distribution of Trucks**

**(6)Trips Length Distribution**

Figure 4-3-7 shows the trip length distribution in accumulative curve by vehicle classification. Motorcycles show the shortest trip distance, while trucks have the longest. 50% of motorcycles, passenger cars and buses have a trip length of about 1.5 hours, which implies that half of these vehicles make trips between neighboring zones.



Source: Study Team

Figure 4-3-7 Trip Length Distribution by Vehicle Classification

#### 4.4 Present Car OD Matrix Development

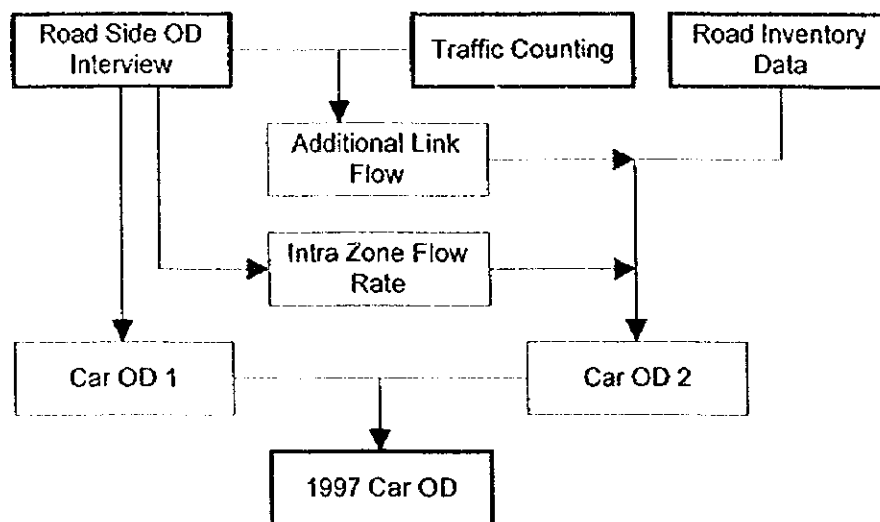
##### 4.4.1 Development Procedure

To develop OD matrix from the road side OD survey, logically inter-zone movements should be interviewed at all the links which cross the zone borders. To cover all the zone borders in the study area, a total of 61 survey stations, including 5 ferry links, needs to be surveyed. However, the traffic survey was carried out at 7 road side interview stations and 10 traffic counting stations, therefore the traffic movements which will not appear in the survey results should be covered in other ways.

Figure 4-4-1 shows the OD matrix development process in the study. The present car OD was estimated by two processes;

- A. Pick up the maximum OD trips among interview stations (Car OD 1)
- B. Estimate OD matrix from observed link traffic flows (Car OD 2)

The first process gives some of the precise OD movements, if all the movements of an OD pair were covered by the survey stations. However, the raw total of OD pairs (generating traffic) or column total (attracting traffic) could not be covered due to lack of other OD movements. On the other hand, the second process gives the most likely OD movements for all the OD pairs, although they may not meet with the results of the road side interview. Therefore, the results of two processes were finally compared and the final OD matrix was developed by picking up the higher OD movements.



Source: Study Team

**Figure 4-4-1 OD Matrix Development Process**

The second process used the Entropy Maximization (EM) method, in which the probability of the trip matrix  $\{X_{ij}\}$  is given as follows;

$$P(X_{ij}) = \frac{X!}{\prod_y X_{ij}!} \prod_y (p_{ij})^{X_{ij}}$$

The OD volume  $X_{ij}$  is calculated to minimize the probability under the constraint formula;

$$\sum_a X_{ij} \cdot p_{ija} = V_a$$

Where,  $X_{ij}$  :OD Volume  
 $p_{ija}$  :Probability of OD pair i and j on (a) link  
 $p_{ij}$  :Probability of OD pair i and j  
 $V_a$  :Link flow of (a) link

Because all the links in the study area have little traffic and sufficient capacity, the probability of OD pairs on a link (Link OD) is determined by the minimum path search in terms of travel time on the present road network, including some ferry links. The 35 link flows from the BINA MARGA 1996 road inventory data, deducting intra-zone movements, and the information on ferry transport were added to the link flows from the 17 traffic survey stations to cover all the OD pairs in the study area.

#### 4.4.2 1997 Car OD

The desire lines of 1997 car OD matrices developed in the study by vehicle classification are shown in Figure. 4-4-2 through 4-4-5. The lines show the OD flows of more than ten vehicles/day. The two provinces of Central and Southeast Sulawesi are not directly connected by the desire lines at present, because of lack of direct land transport route. Also, no desire lines are seen between Toli Toli and Kota Raya in the north of Central Sulawesi, due to the poor road condition.

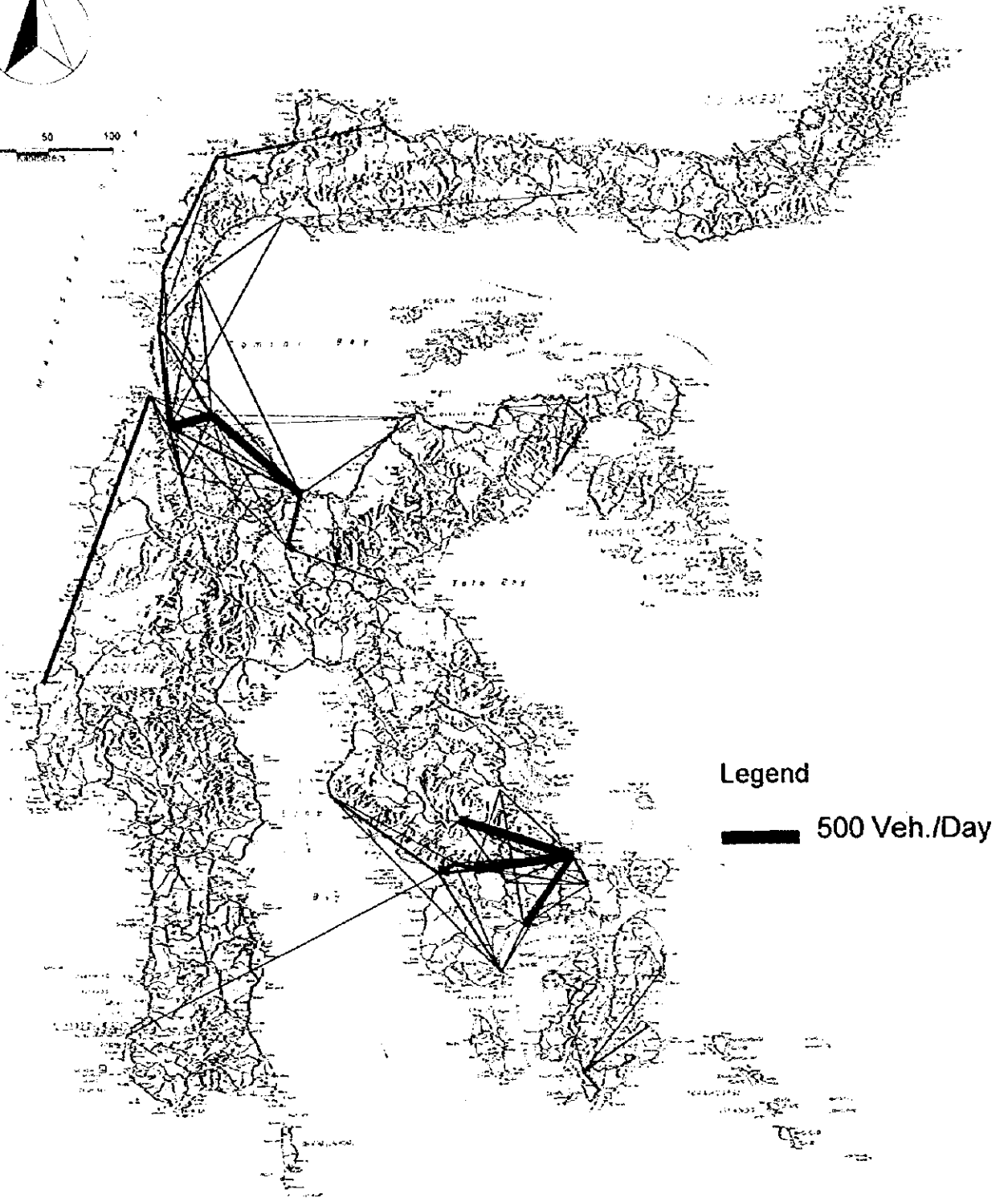
The flows of motor cycles and 4-wheel vehicles, which was estimated by assigning the estimated present OD to the present road network are given in Figure 4-4-6 and 4-4-7 respectively. The OD matrices are given in Annex.

Comparing the two flows of motor cycles and 4-wheel vehicles, the following are characterized;

- In the both flow maps, the high flows are seen between Palu and Poso.
- High motorcycle flows are seen on the west coast of Central Sulawesi, which implies that the residents in this area usually take motorcycles due to the narrow road width. The 4-wheel vehicles take the route along the east coast to go up to the North Sulawesi.
- The flows in sub-islands of Banggai, Muna and Buton are relatively low.



0 50 100  
Kilometers



Legend


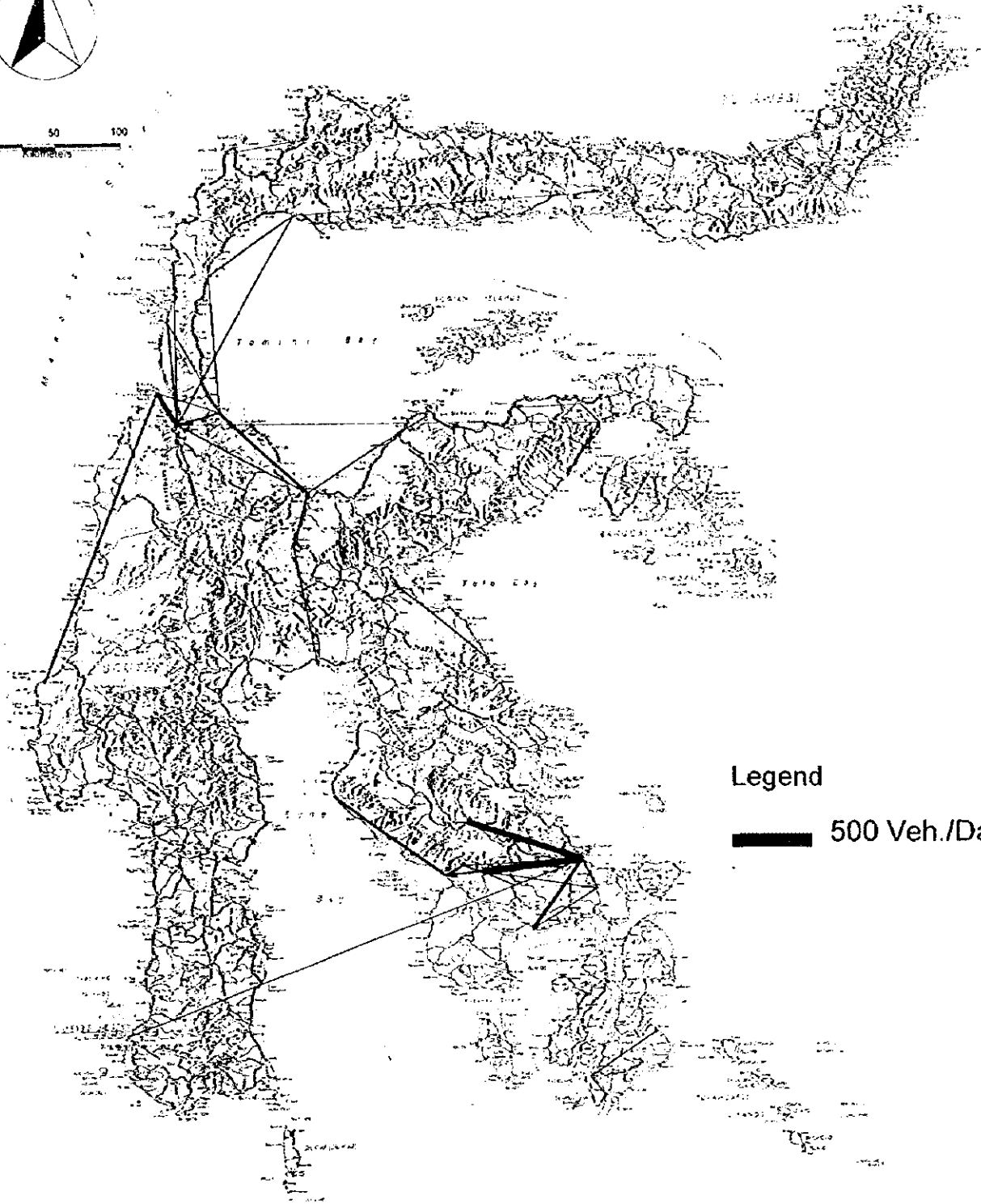
 500 Veh./Day

Figure 4-4-2 Desire Line for Motorcycles

Source: Study Team



0 50 100  
Kilometers



Legend

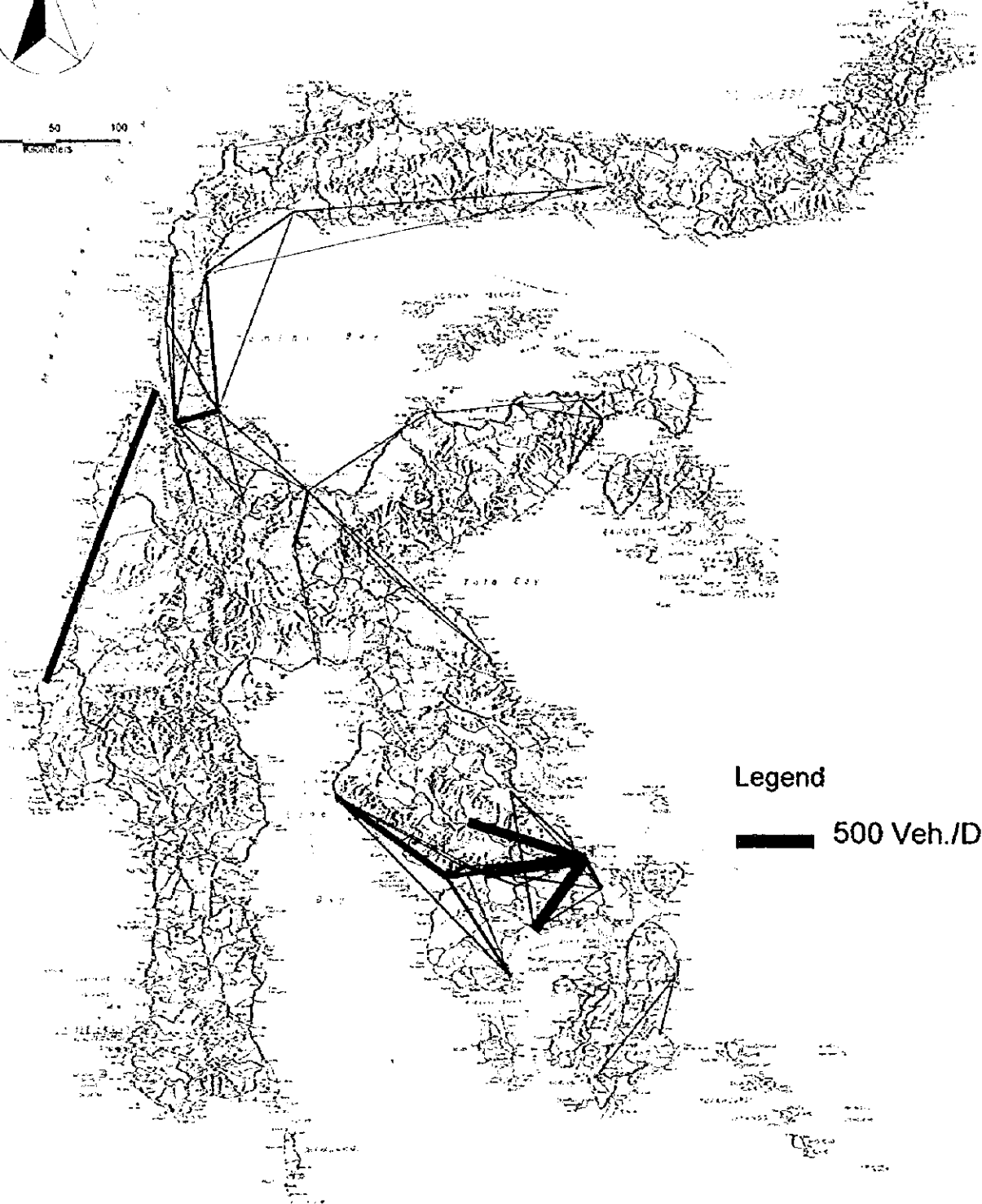
 500 Veh./Day

**Figure 4-4-3 Desire Line for Passenger Cars**

*Source: Study Team*



0 50 100  
Kilometers



Legend


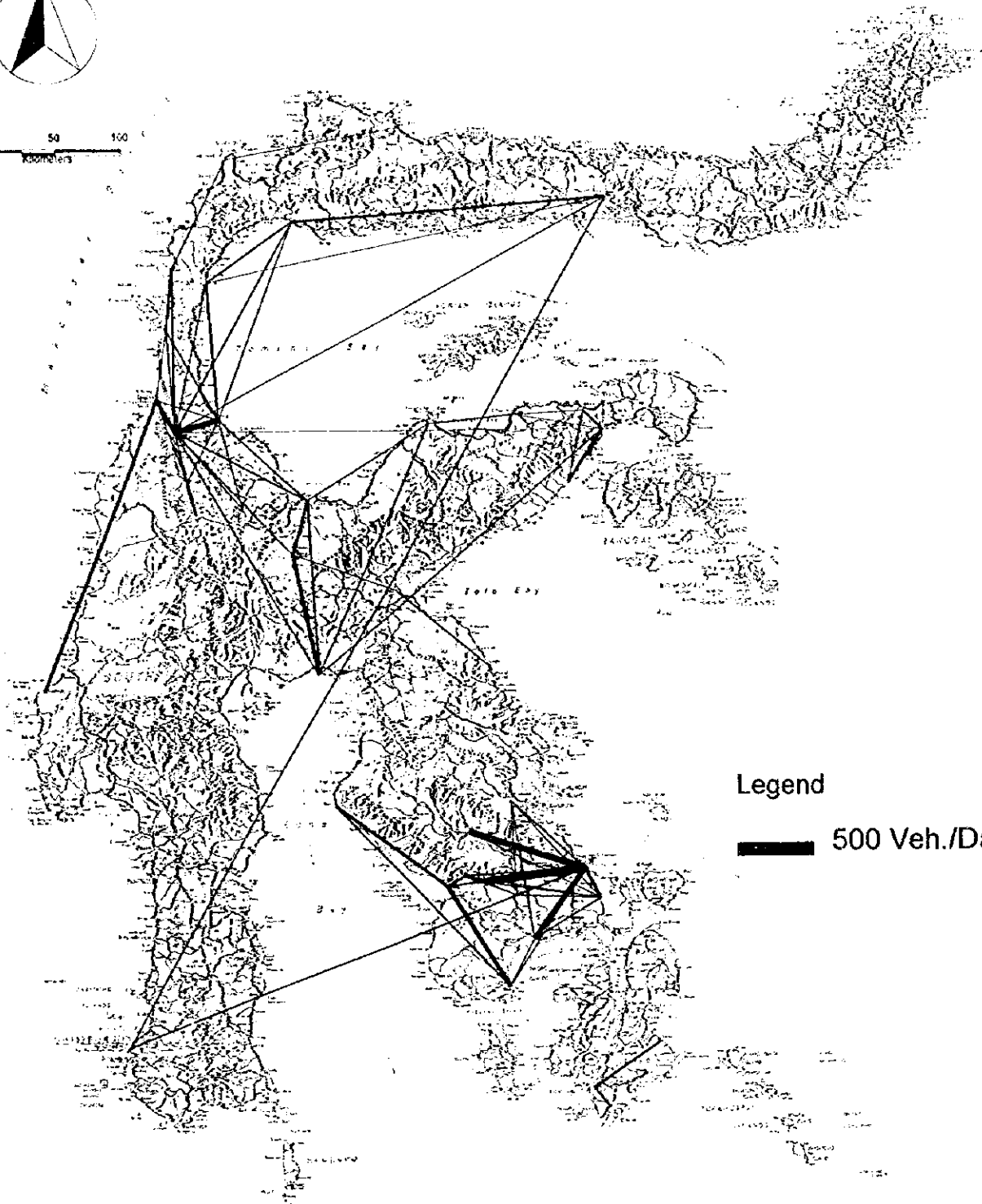
 500 Veh./Day

Figure 4-4-4 Desire Line for Buses

Source: Study Team



0 50 100  
Kilometers



Legend


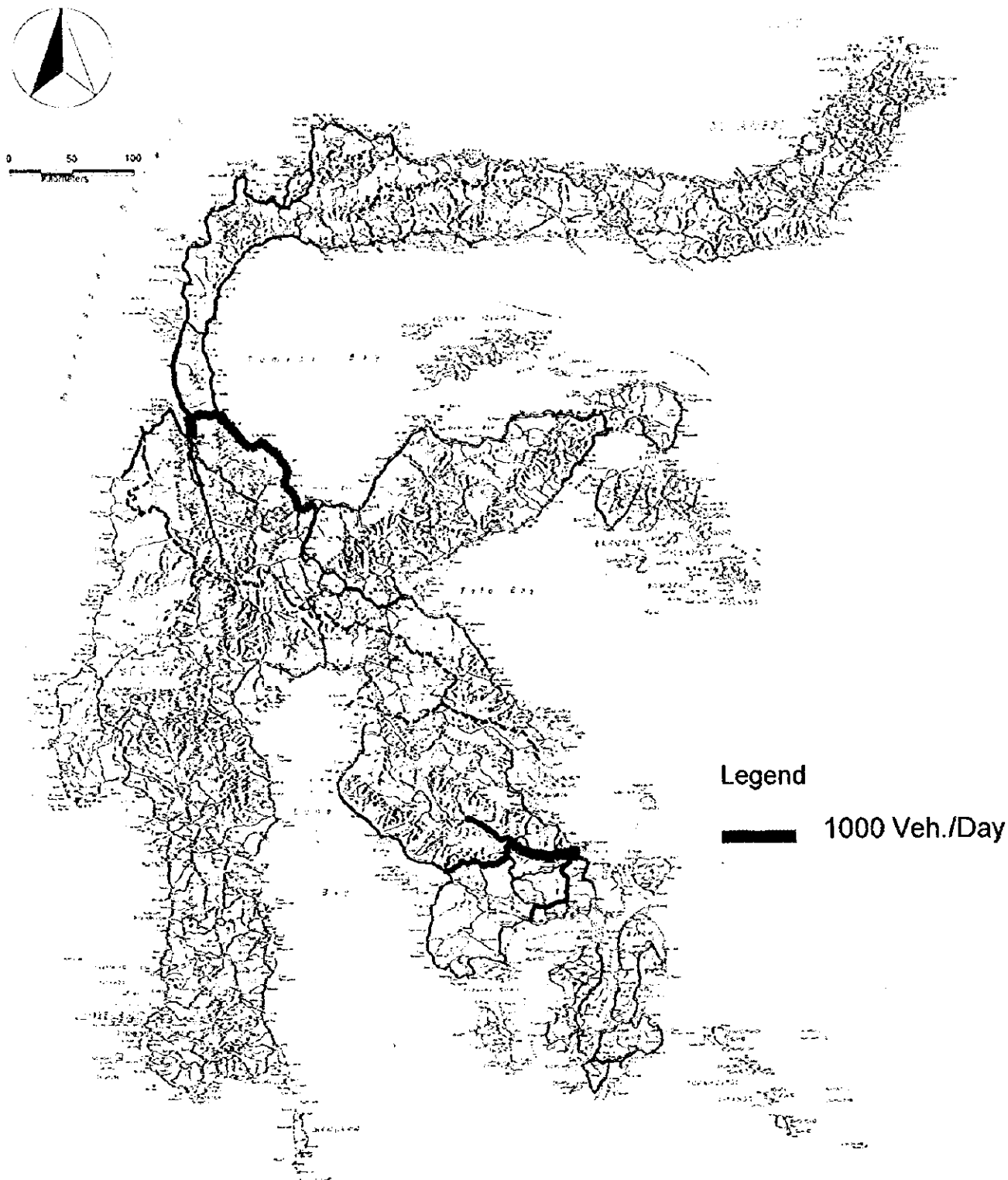
 500 Veh./Day

Figure 4-4-5 Desire Line for Trucks

Source: Study Team



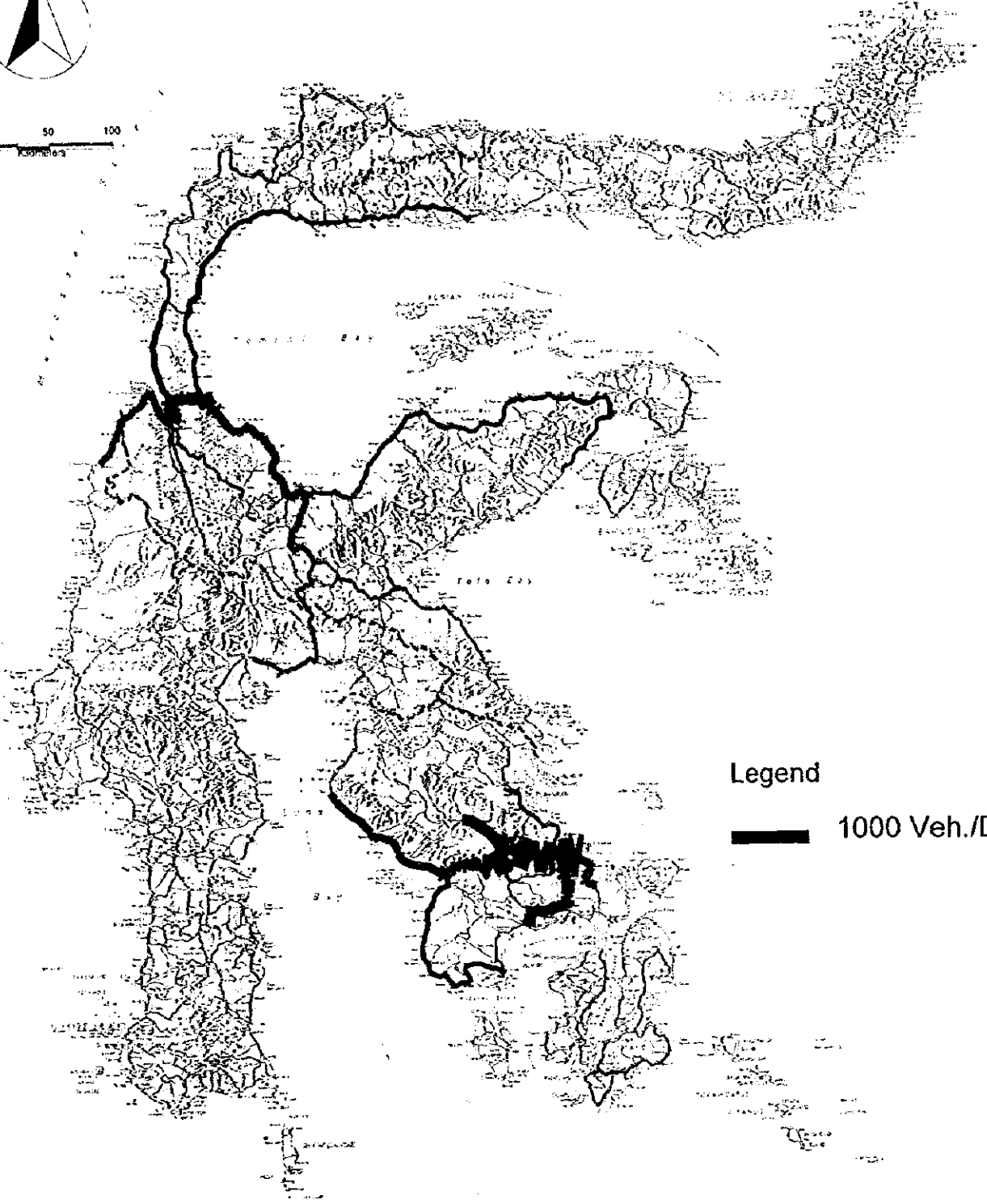


**Figure 4-4-6 1997 Motorcycle Flow**

*Source: Study Team*



0 50 100  
Kilometers



Legend


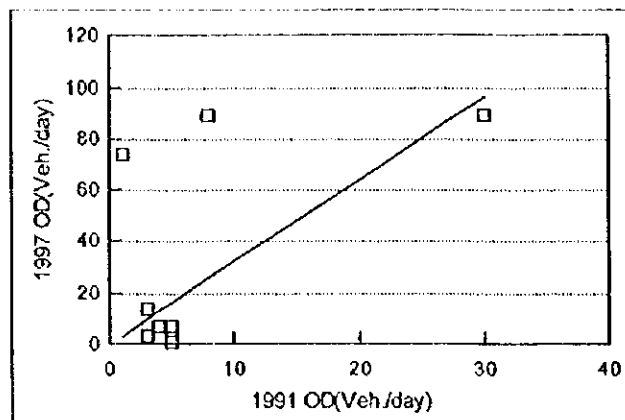
 1000 Veh./Day

Figure 4-4-7 1997 4-Wheel Vehicle Flow

Source: Study Team

Figure 4-4-8 shows the comparison of 1991 and 1997 Inter-Kabupaten OD flows excluding motor cycles and intra-zone movements.



Source: Study Team

Figure 4-4-8 Comparison of Inter Kabupaten OD in 1991 and 1997

The regression analysis of OD flows, with the enforced intercept of zero, gives the six years growth factor of 3.192 ( $r^2=0.558$ ), which corresponds to the average annual growth rate of 21.3%.

#### 4.4.3 Trip Generation and Attraction

Table 4-4-1 shows the Trip Generation/Attraction by zone.

Table 4-4-1 Present Generating/Attracting Inter-Zone Trips

Zone	M.Cycle	P.Car	Bus	Truck	Zone	M.Cycle	P.Car	Bus	Truck
1 Banggai	0	1	0	1	25 Wangi Wangi	2	0	0	0
2 Batui	42	26	25	54	26 Kamaru	37	12	9	44
3 Bunta	30	19	46	51	27 Bau Bau	66	22	13	62
4 Luwuk	75	35	74	105	28 Batanga	36	10	3	25
5 Pagimana	71	26	62	57	29 Lombe	15	7	0	3
6 Bungku	19	21	18	29	30 Kabena	2	0	0	0
7 Beteleme	142	52	58	122	31 Kasipute	79	16	77	112
8 Wuasa	21	17	28	28	32 Raha	2	0	0	4
9 Poso	338	110	87	117	33 Tampo	10	5	0	4
10 Koolonadale	55	29	24	35	34 Lambare	12	0	11	8
11 Ampana	31	24	44	58	35 Tinanggea	160	69	236	136
12 Kulawi	48	21	7	44	36 Lapuko	76	57	90	120
13 Dolo	102	30	10	63	37 Wawonii	5	1	5	2
14 Parigi	432	111	209	203	38 Kendari	594	347	883	540
15 Donggala	139	123	144	176	39 Lambuya	56	28	63	71
16 Tompe	162	33	67	79	40 Pondidaha	185	112	185	117
17 Sabang	122	19	37	53	41 Andowia	48	13	56	48
18 Tinombo	85	32	103	66	42 Pomala	229	110	338	194
19 Kota Raya	76	41	79	100	43 Rate Rate	302	164	360	248
20 Ogotua	142	15	18	32	44 Kolaka	72	56	165	81
21 Toli Toli	93	9	14	24	45 Mowewe	187	58	177	124
22 Kali	55	6	8	14	46 N. Sualwesi	25	16	39	75
23 Bunobogu	25	4	0	7	47 S. Sulawesi-1	28	23	15	135
24 Palu	371	165	189	292	48 S. Sulawesi-2	91	34	136	66

Source: Study Team

Kendari shows the highest trips for motorcycles, passenger cars, buses and trucks while Palu shows the second highest in motorcycles, passenger cars and trucks, reflecting the topographic condition of the two cities. In the Central Sulawesi; Palu, Poso, Parigi and Donggala show the high trip generation. While Kendari, Tinannga, Pondihara, Rate Rate and Mowewe show the high generation in the Southeast Sulawesi. Most of these cities are located along Kendari-Kolaka highway, which was improved recently.