

CHAPTER 4

TRAFFIC AND LOGISTICS SURVEY

4.1 SURVEYS UNDERTAKEN

4.1.1 Type of Surveys Undertaken

In order to better understand the characteristics of the Study area, several types of survey were conducted as shown in **Table 4.1.1-1**. Traffic Count Survey was carried out to count and classify motor vehicles traversing a particular road section and recording the data to determine the present traffic volume and traffic composition. OD survey was conducted to establish the present OD matrices for the trips of passengers, commodities and vehicles. Interview Survey to logistics facilities such as ports, airports, agricultural processing plants and transport companies was also undertaken to capture freight movements in the study area.

TABLE 4.1.1-1 TYPES OF SURVEY

Survey Item	No. of Stations
(1) Traffic Count Survey	37 Stations
(2) Roadside OD Survey	9 Stations
(3) Interview Survey on Logistics Facilities/Plants	19 (total)
- Port	5
- Airport	1
- Agricultural Processing Plant	8
- Logistics Transport Company	5

4.1.2 Mobilization

Due to unfavorable peace and order condition in the study area, attention was given in the planning of activities of all the surveys. This means that broad consultations with different actors having particular roles in the area were undertaken as illustrated in **Figure 4.1.2-1**.

Initially, traffic survey stations were plotted in the map taking into account the study's objectives. After preparation of traffic survey map, meeting with GRP-MILF CCCH was sought to get their feedbacks on the potential security threats of each survey station. Recommendations from the both CCCH to defer survey activities or relocate survey station on risk-possible areas were taken into account were thus adjustment to the location of the survey stations and change of dates of survey are sometimes carried out.

Updated version of the traffic survey map reflecting CCCH recommendations with information on survey dates, surveyor names and contact information were communicated to CCCH a week prior to the conduct of the survey as security protocol and for ease of coordination. The same materials were also communicated to concerned Local Government Units (LGUs), Philippine National Police (PNP) and

District Engineering Offices (DEOs). The same procedure applied to the conduct of interview survey to the logistics facilities.

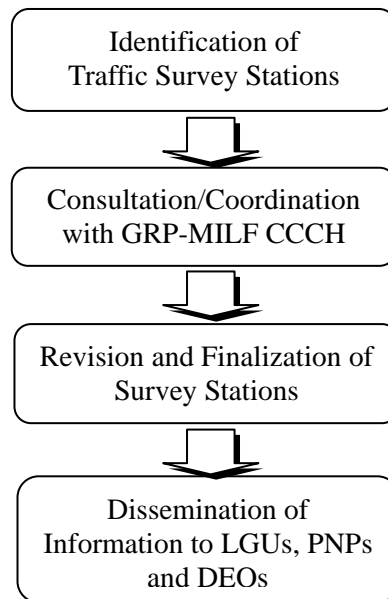


FIGURE 4.1.2-1 SURVEY PLANNING DIAGRAM

4.1.3 Traffic Count Survey

(1) Purpose

The purpose of this survey was to supplement and update the traffic volume data of the DPWH-National and to determine the distribution of vehicle categories in the traffic flow.

(2) Procedure

The survey period at each station was one-day twelve-hours (06:00-18:00) on weekdays only. Special days such as holidays which are characterized by abnormal traffic were also avoided. Vehicles were classified in the following categories:

- Car/Taxi/Jeep
- Jeepney
- Pick-up/Van
- Mini Bus
- Large Bus
- Special
- Truck 2-Axle
- Truck 3-Axle
- Truck 4- or more Axle
- Motor Tricycle
- Motorcycle

(3) Location of Survey Stations

The survey stations were selected taking into account the existing data of DPWH-National. The idea was to supplement the existing data by supplying missing data in other areas especially inside the ARMM. Further, collected data from stations where DPWH-National data exist were served as counter-check.

A total of thirty-eight (38) survey stations were selected for the conduct of the survey; 31 of which are located in the Mainland provinces while the remaining 7 are on the Island provinces of Basilan, Sulu and Tawi-Tawi. **Figure 4.1.3-1** presents the location of the survey stations while details of each station are given in **Table 4.1.3-1**.

TABLE 4.1.3-1 LIST OF TRAFFIC SURVEY STATIONS

Station Number	Region	Province	City/Municipality	Barangay	Description
OD and Traffic Count Stations					
3, a	10	Lanao del Norte	Iligan City	Cristina	Iligan – Linamon Road
11, A	ARMM	S. Kabunsuan	Parang	Sarmiento	Cotabato- Parang Road
13, B	ARMM	S. Kabunsuan	Sultan Kudarat	Pigkalagan	Cotabato-Pigcawayan Road
16,D	ARMM	S. Kabunsuan	D.O. Sinsuat	Tenorio	Cotabato-Upi Road
18, C	ARMM	S. Kabunsuan	D.O. Sinsuat	Upper Capiton	Cotabato- DOS Road
23, c	12	N. Cotabato	Kabacan	Kayaga	Kabacan- Carmen Road
28, e	12	S. Cotabato	Polomolok	Magsaysay	Polomolok-Gen. Santos Road
29, d	12	N. Cotabato	Makilala	Poblacion	Makilala-Bansalan Road
OD and Traffic Count Stations					
1	10	M. Oriental	Villanueva	Katipunan	Villanueva-Jasaan Road
2	10	M. Oriental	Opol	Poblacion, Zone 5	Opol – El Salvador Road
4	10	Bukidnon	Tagoloan	Alae	Tagoloan-Manolo Fortich Road
5	ARMM	Lanao del Sur	Saguiaran	Poblacion	Marawi-Saguiaran Road
12	ARMM	S. Kabunsuan	Parang	Sarmiento	Cotabato-Polloc Road
14	12	N. Cotabato	Libungan	Upper Libungan	Libungan- Alamada Road
15	ARMM	S. Kabunsuan	D.O. Sinsuat	Semba	Cotabato-Kushiong Road
17	ARMM	S. Kabunsuan	North Upi	Borongotan	South Upi-Lebak Road
19	12	N. Cotabato	Midsayap	Agriculture	Midsayap- D. Piang Road
20	ARMM	Maguindanao	D. A. Sangki	Talisawa	Ampatuan- Esperanza Road
21	12	S. Kudarat	Lambayong	Grino	Lambayong – Tacurong Road
22	12	N. Cotabato	Kabacan	Kayaga	Pagalungan-Kabacan Road
24	10	Bukidnon	Kitaotao	Poblacion Kitaotao	Dangcagan-Kitaotao Road
25	10	Bukidnon	Quezon	San Jose	Valencia-Quezon Road
26	12	N. Cotabato	Kidapawan City	Baragay	Kidapawan-Magpet Road
27	ARMM	S. Kudarat	Pres. Quirino	San Pedro	Buluan-S.K. Pendatun Road
30	12	S. Cotabato	Gen. Santos City	Zone 3, Purok 19	Gen. Santos-Malungon Road
31	9	Basilan	Isabela	Begang	Isabela-Lamitan Road
32	9	Basilan	Isabela	Cabunbata	Isabela-Maluso Road
33	ARMM	Sulu	Patikul	Patikul	Pasiagan Road
34	ARMM	Sulu	Indanan	Kajatian	Jolo-Indanan-Parang Road
35	ARMM	Sulu	Indanan	Timbangan	Jolo-Talipao-Road (Jct. Timb.Romandier)
36	ARMM	Tawi-Tawi	Bongao	Nalil	Nalil Road
37	ARMM	Tawi-Tawi	Bongao	Sanga-Sanga	Sanga-Sanga Bridge Approach
38	10	Lanao del Norte	Iligan City	Fuentes	Linamon-Iligan Road

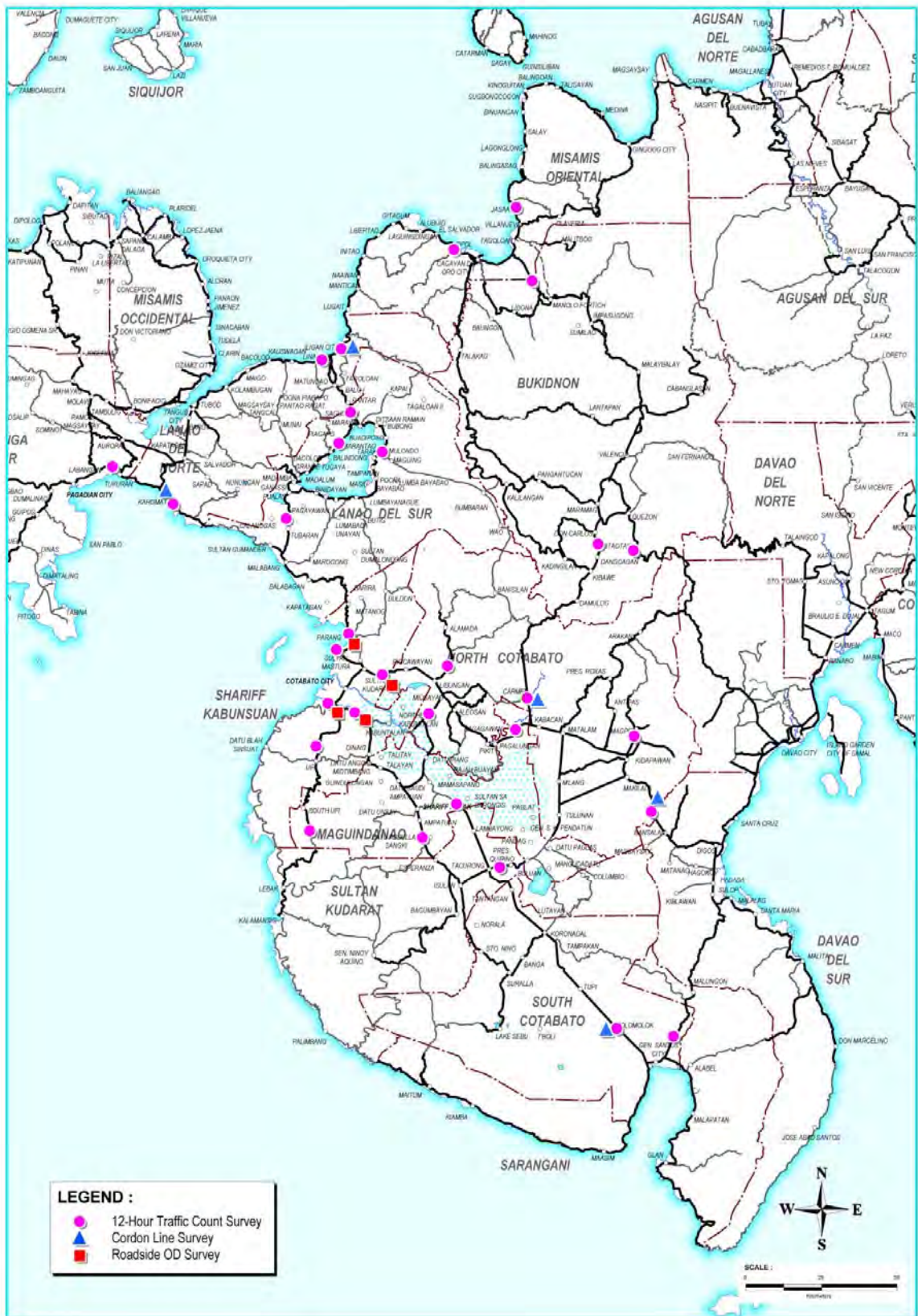


FIGURE 4.1.3-1 TRAFFIC SURVEY MAP (1/2)

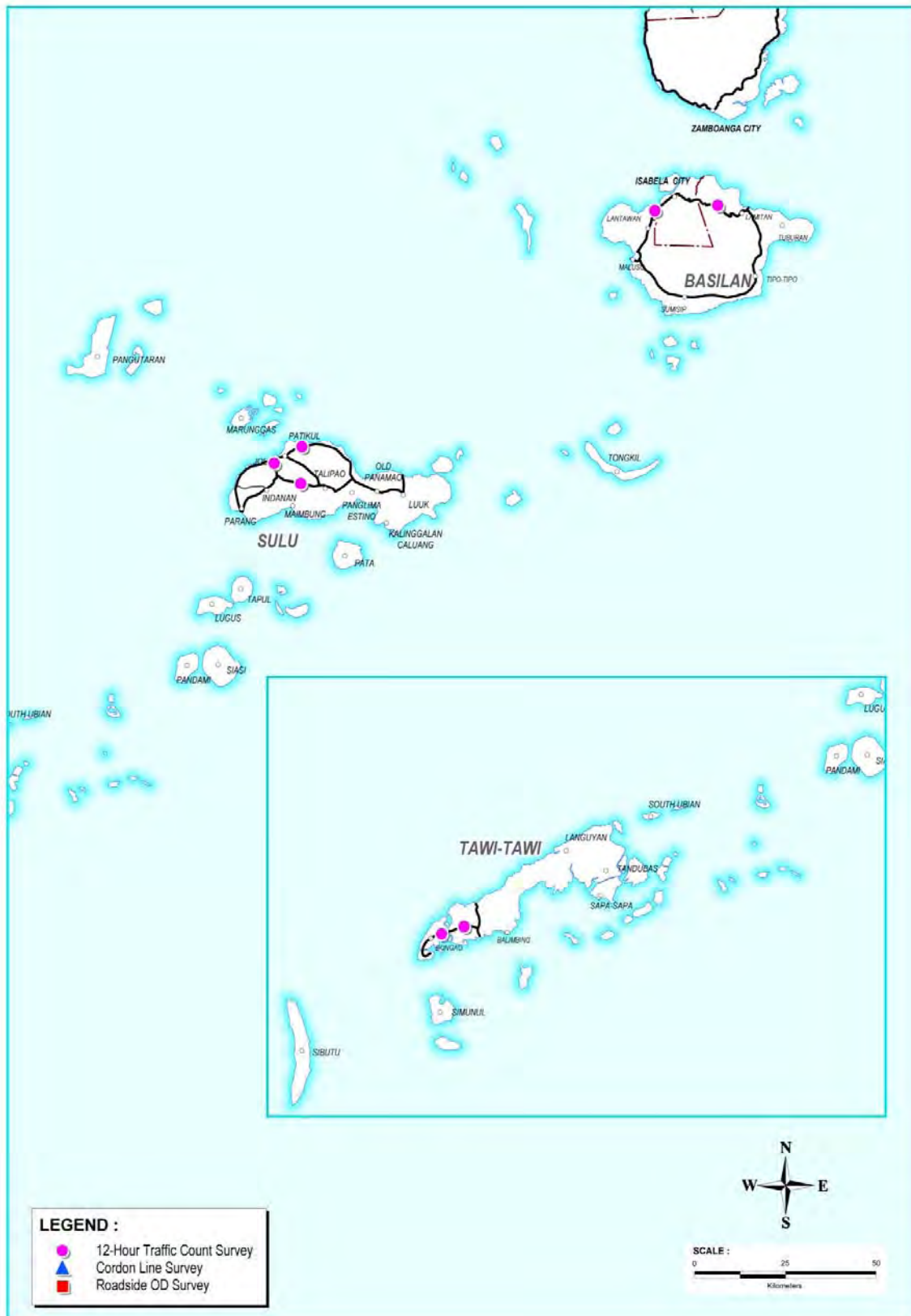


FIGURE 4.1.3-1 TRAFFIC SURVEY MAP (2/2)

4.1.4 Roadside OD Survey

(1) Purpose

Roadside OD survey was conducted on the national road network in order to prepare the present OD tables, forecast the future OD tables and estimate the future traffic volumes on the road network. The OD survey stations are also presented in **Figure 4.1.3-1**.

(2) Zoning

The city/municipality name was used to identify origin and destination of trips during the OD survey thus OD data were collected on the administrative base in which each city/municipality was considered as one zone. Outside the study area, instead of city/municipality, each province was labeled as one zone to reflect traffic movement in and outside the study area.

The total number of zone is 209. However, for the preparation of the present and future OD matrices, the number of zones was reduced to 115 zones by combining some zones into one. The zoning map is given in **Figure 4.1.4-1**.

(3) Survey Questions

Drivers of vehicles passing the station under study were interviewed and were briefly questioned to learn the origin and destination of their trip. Survey questionnaires were prepared to get related information for transport studies such as the following:

- Vehicle Type
- Origin (Province and City/Municipality)
- Type of Fuel
- Seat Capacity
- Commodity Weight
- Net Load Capacity
- Trip Purpose
- Number of Passengers
- Commodity Type
- Commodity Type

Although motorcycles and special vehicles were included in the traffic count, they were excluded in the OD survey. The types of vehicles included in the survey are as follows:

- Car/Taxi/Van/Jeep
- Jeepney/Public Occupancy Vehicles
- Mini Bus < 30 seats
- Large Bus > 30 seats
- Truck 2-Axle
- Truck 3-Axle
- Truck 4- or more Axle

(4) Procedure

Surveyors were trained before sending them to the field to conduct OD survey. Their absolute understanding of the survey questions in the prepared survey form was ensured prior to the survey periods. The form was designed in simple pattern to be easily understood and filled. Coding areas where the code for each item is to be written for quick survey time were also included as shown in **Figure 4.1.4-2**. Survey period (both directions) was from 6:00 to 18:00. It should be noted that during the OD surveys, assistance of PNPs were sought. Enforcing to stop selected vehicles for interview was handled by the participating members of the PNP.

STATION NO.:	_____	ROAD NAME:	_____
WEATHER:	_____	KM.:	_____
SURVEYOR:	_____	BARANGAY:	_____
TIME: FROM:	_____	TO:	_____
		CITY/MUN:	_____
		PROVINCE:	_____

DIRECTION: FROM _____ TO: _____

I. VEHICLE TYPE	<input type="checkbox"/> 1. CAR/TAXI/VAN	<input type="checkbox"/> 4. LARGE BUS	<input type="checkbox"/> 7. TRAILER	
	<input type="checkbox"/> 2. JEEPNEY	<input type="checkbox"/> 5. 2-AXL TRUCK		<input type="checkbox"/>
	<input type="checkbox"/> 3. MINI-BUS	<input type="checkbox"/> 6. 3-AXL TRUCK		
II. TYPE OF FUEL	<input type="checkbox"/> 1. GASOLINE	<input type="checkbox"/> 2. DIESEL		<input type="checkbox"/>
III. PURPOSE OF TRIP	<input type="checkbox"/> 1. TO/FROM WORK	<input type="checkbox"/> 3. BUSINESS	<input type="checkbox"/> 5. LEASURE/TOURISM	
	<input type="checkbox"/> 2. TO/FROM SCHOOL	<input type="checkbox"/> 4. PRIVATE	<input type="checkbox"/> 6. OTHERS	<input type="checkbox"/>
IV. NUMBER OF PASSENGERS (INCLUDING DRIVER AND CONDUCTOR)	_____			<input type="text"/> <input type="text"/>
V. ORIGIN	CITY/MUNICIPALITY _____			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	PROVINCE _____			
VI. DESTINATION	CITY/MUNICIPALITY _____			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	PROVINCE _____			
VII. COMMODITY TYPE	TYPE 1. _____			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	TYPE 2. _____			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	TYPE 3. _____			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	TYPE 4. _____			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	TYPE 5. _____			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
VIII. COMMODITY WEIGHT	TYPE 1. QUANTITY: / UNIT: / WEIGHT			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	TYPE 2. QUANTITY: / UNIT: / WEIGHT			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	TYPE 3. QUANTITY: / UNIT: / WEIGHT			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	TYPE 4. QUANTITY: / UNIT: / WEIGHT			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
	TYPE 5. QUANTITY: / UNIT: / WEIGHT			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
IX. TOTAL COMMODITY WEIGHT				<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
X. NET LOAD CAPACITY				<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>

FIGURE 4.1.4-2 OD SURVEY FORM

4.1.5 Logistics Facility Survey

(1) Purpose

The purpose of this survey was to capture freight movements in the study area and to identify influence area of logistics facilities such as port, airport, processing plants, and transport companies.

(2) Procedure

Different questionnaire forms were prepared depending on the type of facility as follows; Port and airport, agri-product processing plant, transport logistic company and for NFA official questionnaire forms.

After proper coordination with concerned authorities, e.g. CCCH, the process started by sending-out the survey questionnaires to the target respondent. Face to face interview was then executed based on the agreed time and date.

4.2 SURVEY RESULTS

4.2.1 Traffic Count Survey Results

(1) Traffic Volume

As mentioned earlier, the classified traffic count survey was just a 12-hour count. This was done because it was not practical to conduct a 24-hour count owing to security problems and limited number of vehicles in the evening. However, 24-hour count data is necessary input to project the future volume of traffic. In order to complete the 24-hour data, an expansion factor from the DPWH National was utilized.

Expansion factor at the DPWH National's nearest survey stations to the study's survey stations were used as basis to expand the 12-hour count to 24-count. **Table 4.2.1-1** shows the traffic volume in 12-hour count, 24-hour count and AADT (Average Annual Daily Traffic) of the study area. The traffic volume (AADT) per station is presented in **Figure 4.2.1-1**. Data of the DPWH National (2008) as well as JICA Study's data (2003) were also plotted in the map to appreciate traffic volume to other parts of the study area.

(2) Hourly Distribution of Traffic

In order to clarify the characteristics of traffic in the study area, it is necessary to examine the hourly distribution. The hourly distribution of traffic of selected stations is presented from **Figures 4.2.1-2 to Figure 4.2.1-7**. From these figures, peak hour volume can easily be spotted as well as particular time where a particular type of vehicles is high.

TABLE 4.2.1-1 TRAFFIC VOLUME IN THE STUDY AREA

Traffic Station No.	Road Direction	12-Hour Traffic Volume					24-Hour Traffic Volume					AADT				
		Car	Jeep	Bus	Truck	Total	Car	Jeep	Bus	Truck	Total	Car	Jeep	Bus	Truck	Total
1	Jasaan-Villanueva	2,133	1,399	239	935	4,706	3,055	1,770	328	1,462	6,615	2,918	1,727	352	1,205	6,202
2	Opol-El Salvador	3,368	1,099	249	1,082	5,798	4,829	1,390	343	1,689	8,251	4,611	1,356	367	1,412	7,746
3	Iligan - Linamon	3,167	1,636	101	636	5,540	4,159	2,082	248	1,120	7,609	3,943	1,666	243	945	6,797
4	Tagoloan-Manolo Fortich	1,879	411	287	1,175	3,752	2,694	520	395	1,852	5,461	2,573	507	433	1,772	5,285
5	Marawi-Saguiaran	2,491	684	0	193	3,368	3,336	918	0	319	4,573	3,163	734	0	259	4,156
6	Balindong-Marantao	1,351	920	0	78	2,349	1,822	1,179	0	137	3,138	1,728	944	0	109	2,781
7	Maguing-Molundo	300	539	0	86	925	402	723	0	142	1,267	381	579	0	113	1,073
8	Calanogas-Pagayawan	78	241	0	12	331	102	325	0	19	446	97	260	0	15	372
9	Tukuran - Karumatan	202	152	0	51	405	248	206	0	88	542	226	167	0	73	466
10	Labangan-Tukuran	289	155	4	106	554	341	199	6	134	680	378	208	5	110	701
11	Cotabato - Parang	561	437	1	156	1,155	652	539	1	192	1,384	783	432	1	153	1,369
12	Cotabato-Polloc	137	64	0	146	347	160	79	0	177	416	191	63	0	143	397
13	Pigcawayan - Cotabato	652	437	73	345	1,507	759	540	90	425	1,814	910	432	86	339	1,767
14	Libungan-Alamada	218	100	0	307	625	253	123	0	375	751	304	99	0	299	702
15	Cotabato-Kushiong	28	113	35	41	217	31	139	0	76	246	31	111	0	61	203
16	Cotabato - Upi	102	38	0	192	332	116	44	0	205	365	113	35	0	164	312
17	Upi-Lebak	55	2	0	50	107	62	2	0	50	114	61	2	0	40	103
18	Cotabato - DOS	814	619	39	177	1,649	902	761	45	194	1,902	891	609	38	155	1,693
19	Midsayap-Datu Piang	104	123	0	116	343	121	161	0	135	417	144	129	0	108	381
20	Ampatuan-Esperanza	555	363	31	154	1,103	625	418	33	171	1,247	611	334	29	136	1,110
21	Tacurong-Lambayong	443	162	0	209	814	500	186	0	216	902	488	149	0	172	809
22	Kabacan-Pagalungan	1,035	408	111	320	1,874	1,174	474	129	405	2,182	1,410	379	122	323	2,234
23	Carmen - Kabacan	506	516	32	279	1,333	575	599	37	352	1,563	689	480	35	282	1,486
24	Kitaotao-Dangcagan	628	224	89	299	1,240	747	280	128	517	1,672	897	233	129	420	1,679
25	Maramag-Quezon	689	78	48	317	1,132	830	98	69	528	1,525	997	81	70	469	1,617
26	Magpet-Kidapawan	504	111	1	192	808	595	130	1	243	969	715	104	216	29	1,064
27	Tacurong-Pres. Quirino	1,188	585	62	542	2,377	1,351	670	78	564	2,663	1,321	536	66	450	2,373
28	Gen. Santos - Polomolok	2,387	1,382	186	817	4,772	2,691	1,560	235	820	5,306	2,629	1,232	201	656	4,718
29	Bansalan - Makilala	1,387	1,094	134	864	3,479	1,988	1,293	148	1,145	4,574	2,386	1,034	140	915	4,475
30	Gen. Santos - Malungon	1,724	522	148	796	3,190	2,713	698	242	1,452	5,105	2,759	683	243	343	4,028
31	Isabela-Lamitan	1,138	299	305	528	2,270	1,386	430	386	848	3,050	1,208	345	309	677	2,539
32	Isabela-Maluso	870	270	119	402	1,661	1,059	396	147	653	2,255	923	317	117	522	1,879
33	Pasiagan-Patikul	515	359	0	434	1,308	627	517	0	740	1,884	546	414	0	592	1,552
34	Jolo-Indanan-Parang	107	395	0	288	790	130	569	0	490	1,189	114	455	0	391	960
35	Jolo-Talipao	75	598	0	95	768	91	861	0	159	1,111	80	689	0	127	896
36	Nalil-Bongao	79	89	0	31	199	96	128	0	52	276	84	103	0	41	228
37	Sanga Sanga-Bongao	104	81	0	38	223	126	117	0	64	307	110	93	0	52	255
38	Iligan - Linamon	2,375	1,498	164	597	4,634	3,119	1,906	254	1,052	6,331	2,957	1,525	248	892	5,622

Unit: Vehicles



FIGURE 4.2.1-1 TRAFFIC VOLUME IN THE STUDY AREA -AADT (1/2)

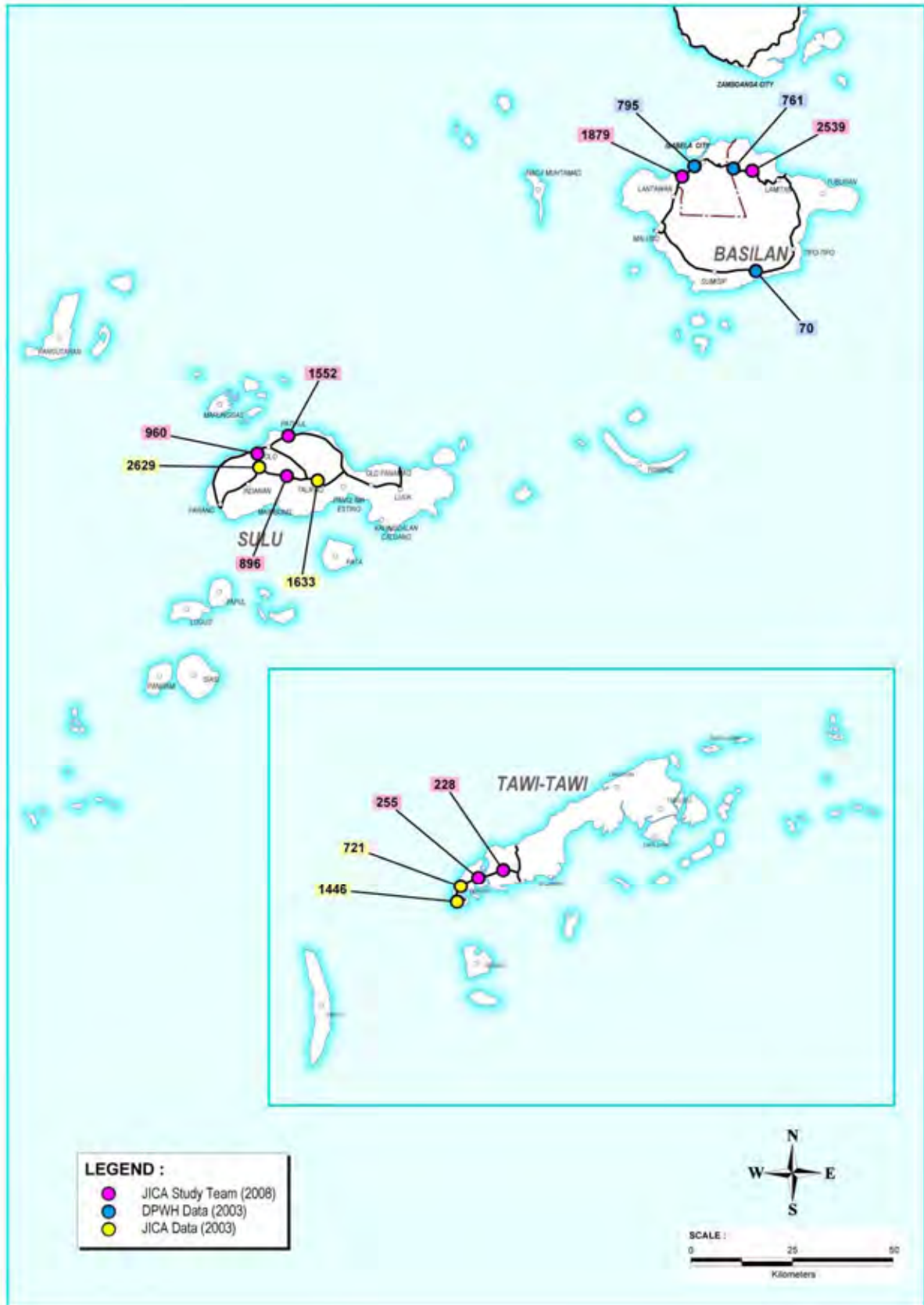


FIGURE 4.2.1-1 TRAFFIC VOLUME IN THE STUDY AREA - AADT (2/2)

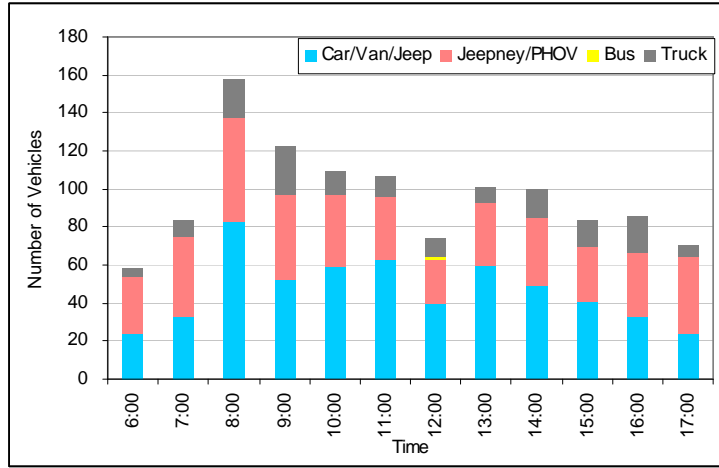


FIGURE 4.2.1-2 HOURLY DISTRIBUTION OF TRAFFIC AT COTABATO-PARANG (STATION NO. 11)

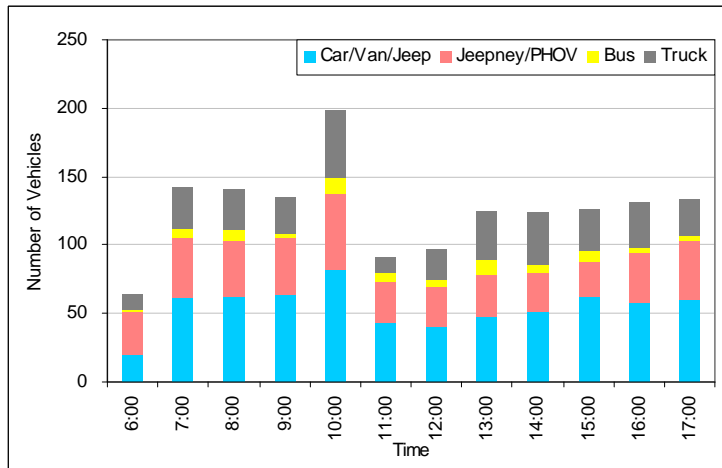


FIGURE 4.2.1-3 HOURLY DISTRIBUTION OF TRAFFIC AT COTABATO-PIGCAWAYAN (STATION NO. 13)

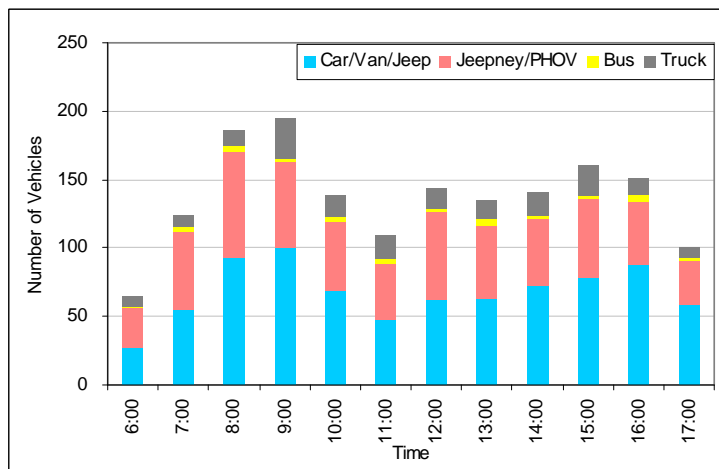


FIGURE 4.2.1-4 HOURLY DISTRIBUTION OF TRAFFIC AT COTABATO - DATU ODIN SIN SUAT (STATION NO. 18)

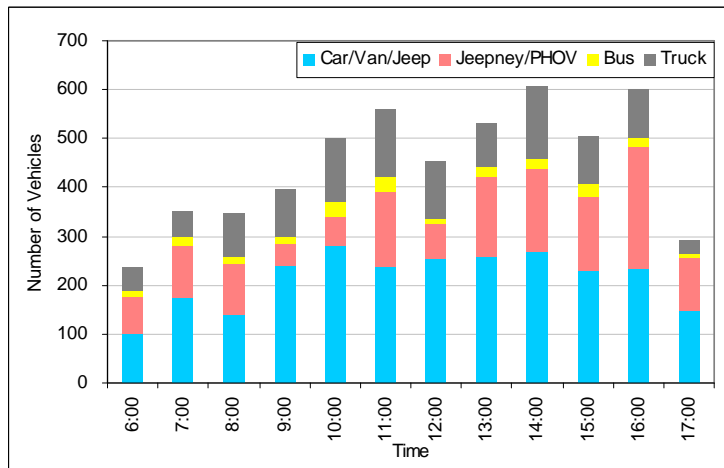


FIGURE 4.2.1-5 HOURLY DISTRIBUTION OF TRAFFIC AT GEN. SANTOS – POLOMOK (STATION NO. 28)

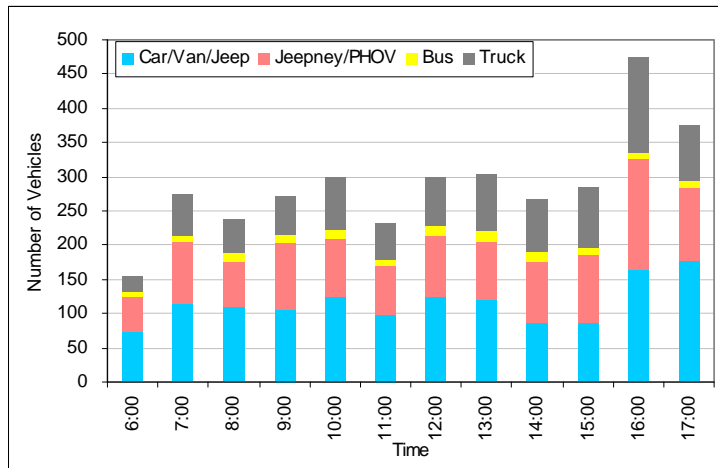


FIGURE 4.2.1-6 HOURLY DISTRIBUTION OF TRAFFIC AT MAKILALA – BANSALAN (STATION NO. 29)

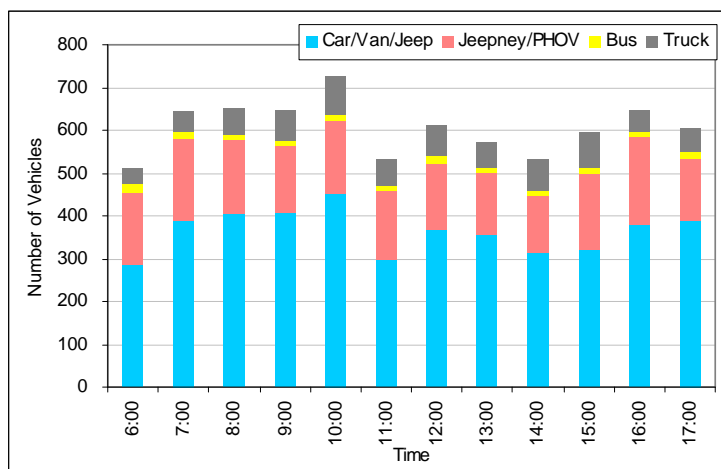


FIGURE 4.2.1-7 HOURLY DISTRIBUTION OF TRAFFIC AT ILIGAN – LINAMON (STATION NO. 3)

4.2.2 Roadside OD Survey Results

(1) Number of OD Samples

The number of OD samples is shown in Table 4.2.2-1

TABLE 4.2.2-1 NUMBER OF OD SAMPLES

Traffic Station No.	Road Direction	Traffic Volume (12-hr)	Number of OD Samples	Percentage (%)
3	Iligan - Linamon	5,600	1,274	23
9	Tukuran - Karumatan	405	399	99
11	Cotabato - Parang	1,155	592	51
13	Pigcawayan - Cotabato	1,507	200	13
16	Cotabato - Upi	332	328	99
18	Cotabato - DOS	1,649	200	12
23	Carmen - Kabacan	1,333	785	59
28	Gen. Santos - Polomolok	4,772	1,057	22
29	Bansalan - Makilala	3,479	1,936	56

(2) Classification of Vehicles

Representation to the OD sample of all type of vehicles is important since each vehicle type has particular characteristics. Thus, it is important to capture all types of vehicles plying a particular route to have a better understanding of their trip characteristics. As seen from **Figure 4.2.1-1**, all types of vehicles were captured in proportion to their total number in most stations. It should be noted that there are routes which are not accessible to some type of vehicles which could explain the lack of samples. For instance, station 16 (Cotabato – Upi) is accessible only to high powered motor vehicles like jeep and truck.

(3) Load of Commodity Vehicles

The weight and type of cargoes carried by the commodity vehicles were also recorded during the survey. Average load of each commodity type of vehicle, including empty vehicles, is shown in **Table 4.2.2-2**. Average load of 2-axle truck is 3.2 ton, 3-axle is 9.6 ton and 4-axle or more is 4.8 ton.

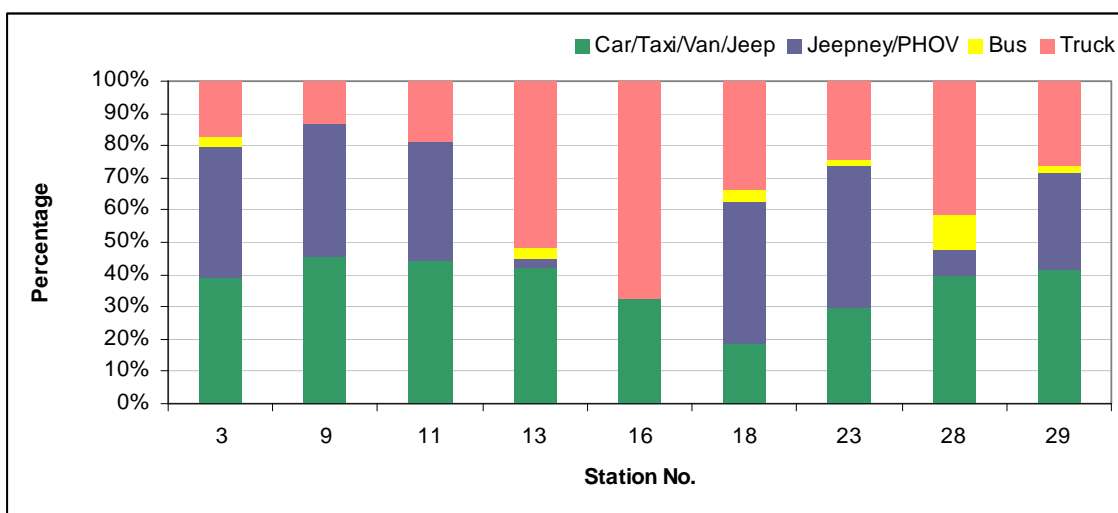


FIGURE 4.2.2-1 VEHICLE CLASSIFICATIONS

TABLE 4.2.2-2 AVERAGE LOAD

(unit: ton)

Station No.	Road Section	Vehicle Type		
		2-axle	3-axle	4-axle or more
3	Linamon-Iligan	2.9	9.3	5.9
9	Tukuran-Karomatan	3.8	4.0	-
11	Cotabato-Parang	2.9	10.4	13.0
13	Cotabato-Pigcawayan	2.4	11.7	18.0
16	Cotabato-Upi	2.0	0.9	-
18	Cotabato-DOS	3.6	8.0	4.9
23	Kabacan-Carmen	6.2	16.2	6.0
28	Gen.Santos-Polomoloc	3.7	9.1	7.2
29	Bansalan-Makilala	1.3	16.6	7.8
Total Average		3.2	9.6	7.0

TABLE 4.2.2-3 SHARE OF EMPTY COMMODITY VEHICLES

(unit: percentage)

Station No.	Road Section	Vehicle Type		
		2-axle	3-axle	4-axle or more
3	Lenamon-Iligan	57.0	52.2	50.0
9	Tukuran-Karomatan	73.4	25.0	-
11	Cotabato-Parang	24.2	-	-
13	Cotabato-Pigcawayan	34.9	37.5	-
16	Cotabato-Upi	48.8	51.6	-
18	Cotabato-DOS	22.6	25.0	-
23	Kabacan-Carmen	78.1	72.4	66.7
28	Gen.Santos-Polomoloc	40.2	37.1	38.1
29	Bansalan-Makilala	75.1	65.3	44.0
Total Average		50.5	45.8	49.7

(4) Empty Commodity Vehicles

The empty vehicles running through the survey stations were also captured. **Table 4.2.2-3** shows that around 50% of 2-axle trucks, 46% of 3-axle trucks, and around 50% of 4-axle trucks of interviewed commodity vehicles were running empty.

(5) Occupancy of Passenger Vehicles

Occupancy data of passenger vehicles provide input to person-kilometer of travel and modal choice models which are normally used in comprehensive transportation studies. The average value of each type of passenger vehicle was 6.2 for car/taxi/van, 11.3 for jeepney/HPOV, 14.5 for mini-bus and 30.4 for large bus.

TABLE 4.2.2-4 AVERAGE OCCUPANCY OF PASSENGER VEHICLES

Station No.	Road Section	Vehicle Type			
		Car/Taxi/Van	Jeepney/HPOV	Mini-bus	Large bus
3	Linamon-Iligan	5.9	12.0	20.0	28.7
9	Tukuran-Karomatan	6.0	9.0	-	-
11	Cotabato-Parang	7.2	13.9	10.0	-
13	Cotabato-Pigcawayan	7.6	8.8	-	39.5
16	Cotabato-Upi	3.3	10.8	-	-
18	Cotabato-DOS	7.1	18.6	3.0	2.0
23	Kabacan-Carmen	4.3	10.1	-	41.0
28	Gen.Santos-Polomoloc	8.7	11.7	24.9	38.3
29	Bansalan-Makilala	5.8	6.5	-	32.8
Total Average		6.2	11.3	14.5	30.4

(6) Present Trip Pattern

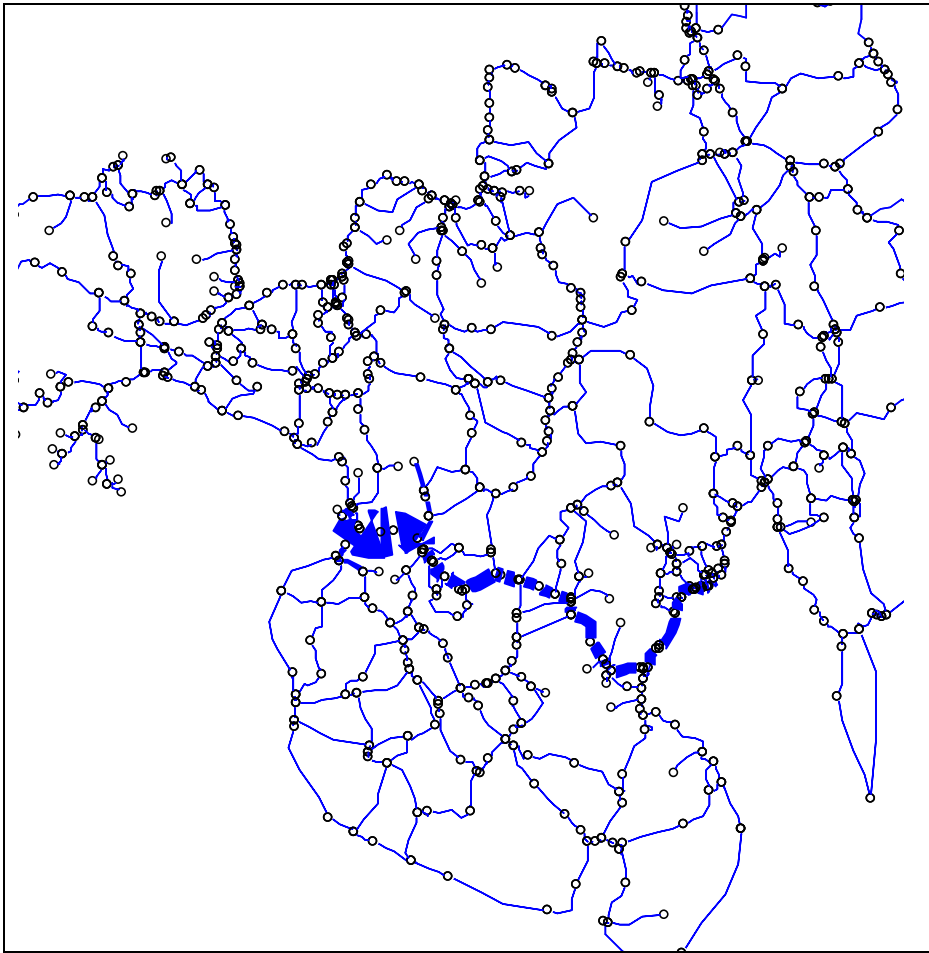
As mentioned earlier, the main purpose of the OD survey is to obtain information on passenger's trip characteristics as well as cargo movement so they can be used as reference to model projections of future travel demand. The output of travel demand projection is an important parameter in developing strategic plans and policies.

Out of nine (9) OD survey stations, captured trips at six (6) stations are graphically presented from **Figure 4.2.2-2** to **4.2.2-7**. These figures generally clarify trip direction, volume and distance. As seen from these figures, most of the trips are short-distance in nature and long-distance trips are rather limited.

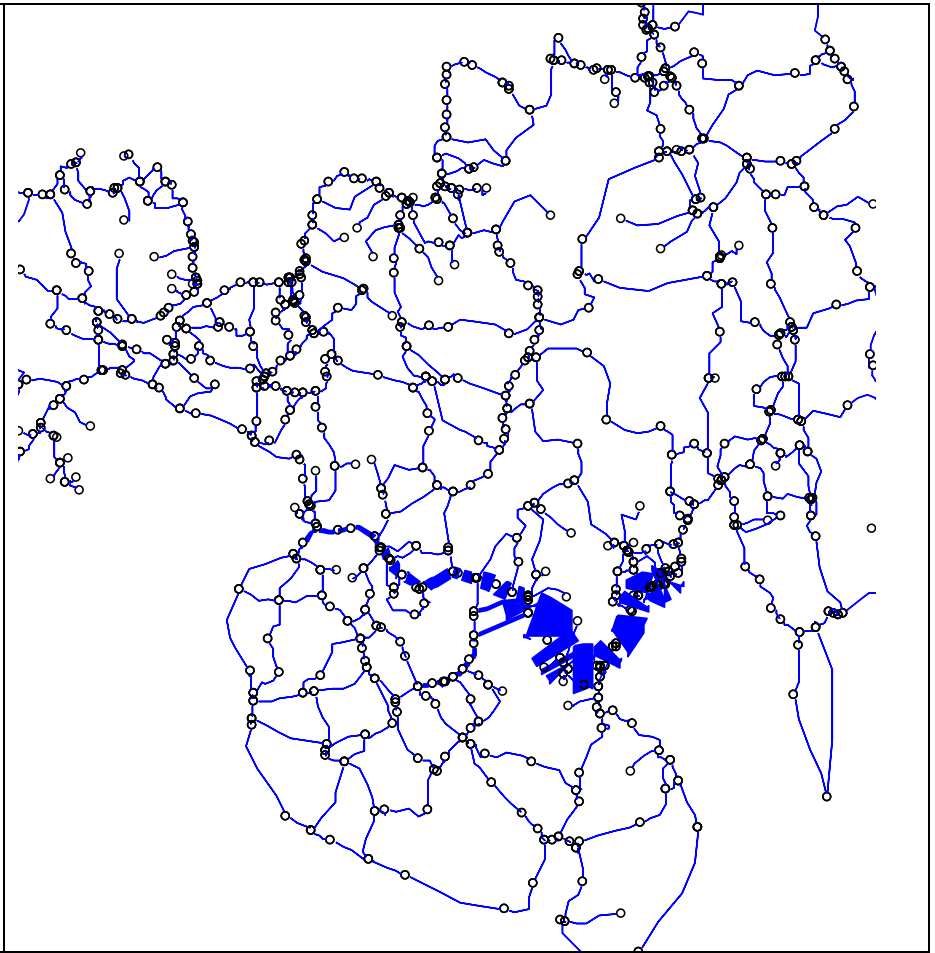
The captured OD trips at all stations are combined together and presented in **Figure 4.2.2-8**. Since not all trips are passing the OD survey stations, it is necessary to utilize entropy maximization method to estimate such trips. **Figure 4.2.2-9** shows the present OD trips estimated using the entropy maximization method.

4.2.3 Logistics Interview Results

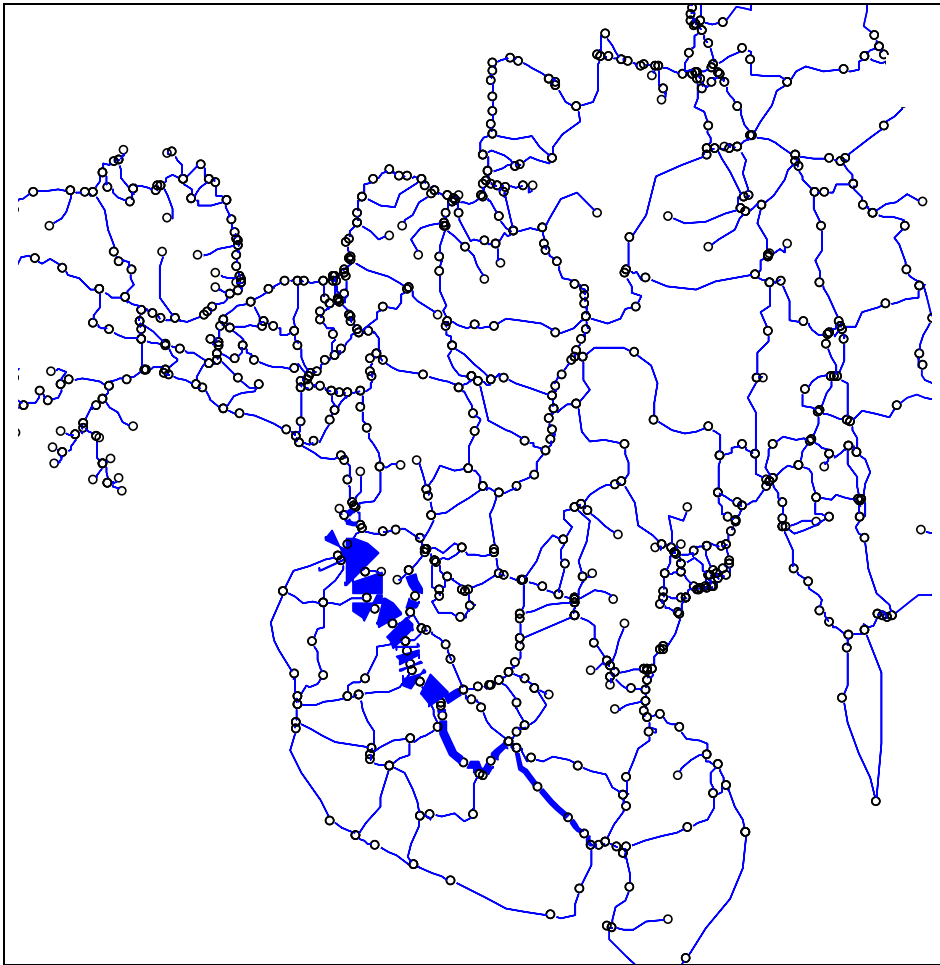
The results of the interview on the logistics facilities provide an interesting insight on freight movement. Interesting findings include influence area of each facility, origins of raw materials and destinations of finished products (**Figure 4.2.3-1** to **Figure 4.2.3-15**).



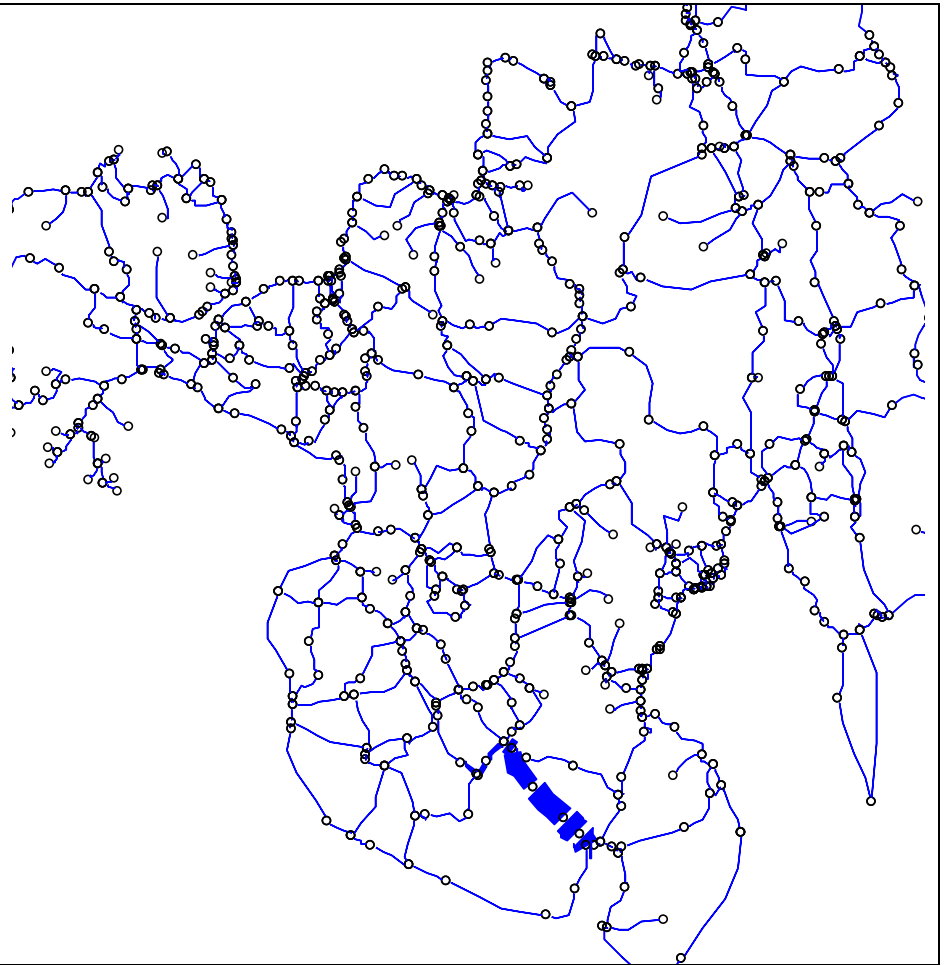
**FIGURE 4.2.2-2 OD TRIPS AT STATION 13
(COTABATO – PIGCAWAYAN)**



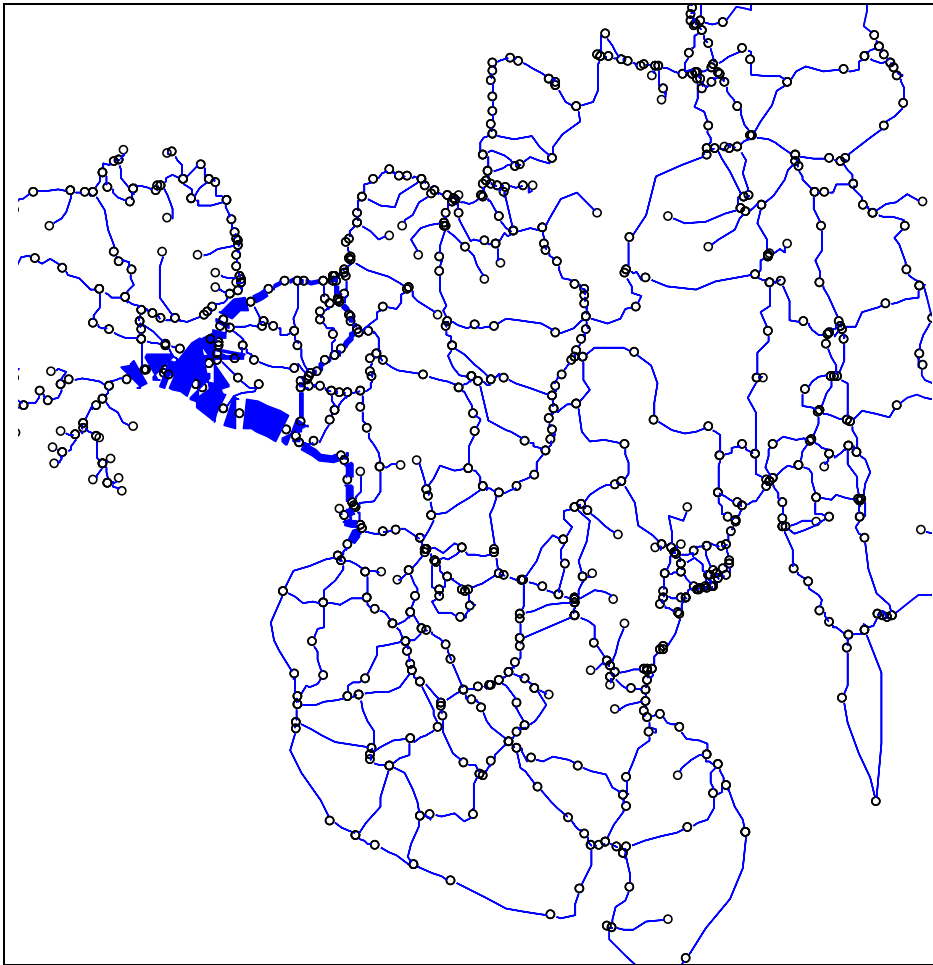
**FIGURE 4.2.2-3 OD TRIPS AT STATION 29
(MAKILALA – BANSALAN)**



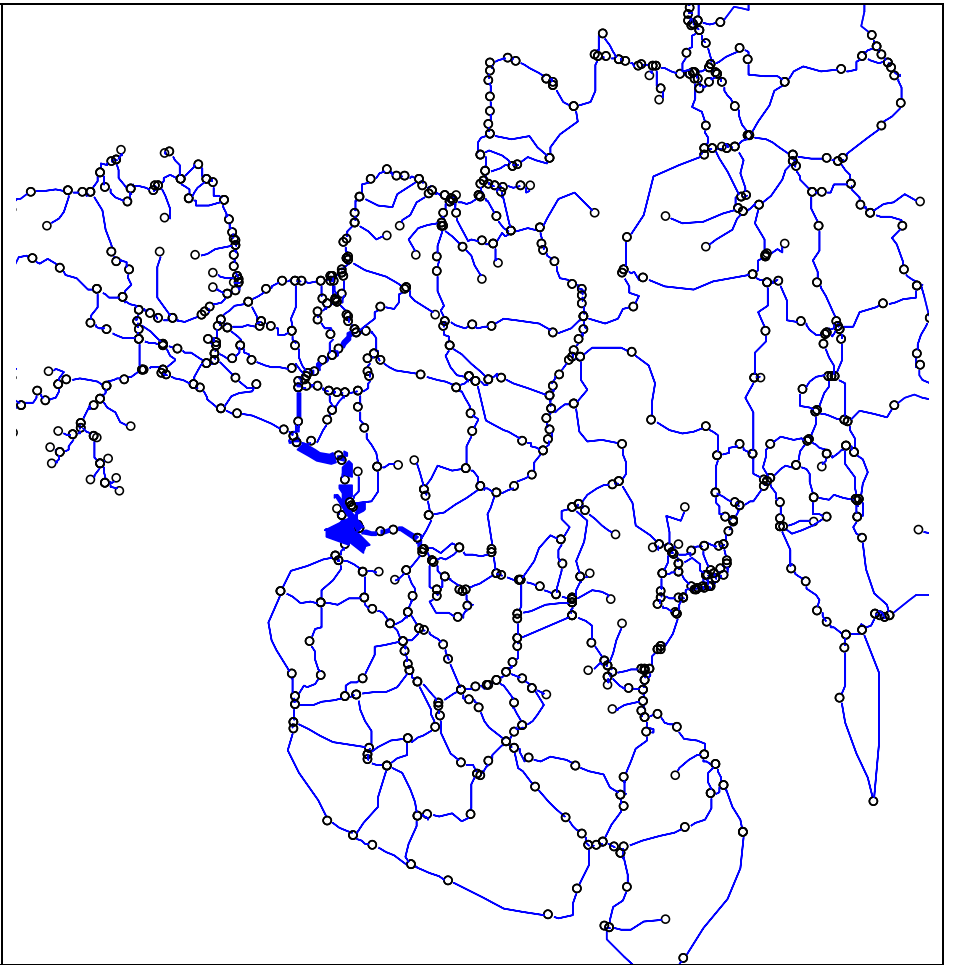
**FIGURE 4.2.2-4 OD TRIPS AT STATION 18
(COTABATO – DOS)**



**FIGURE 4.2.2-5 OD TRIPS AT STATION 28
(GEN. SANTOS - POLOMOLOK)**



**FIGURE 4.2.2-6 OD TRIPS AT STATION 9
(TUKURAN - KAROMATAN)**



**FIGURE 4.2.2-7 OD TRIPS AT STATION 11
(COTABATO - PARANG)**

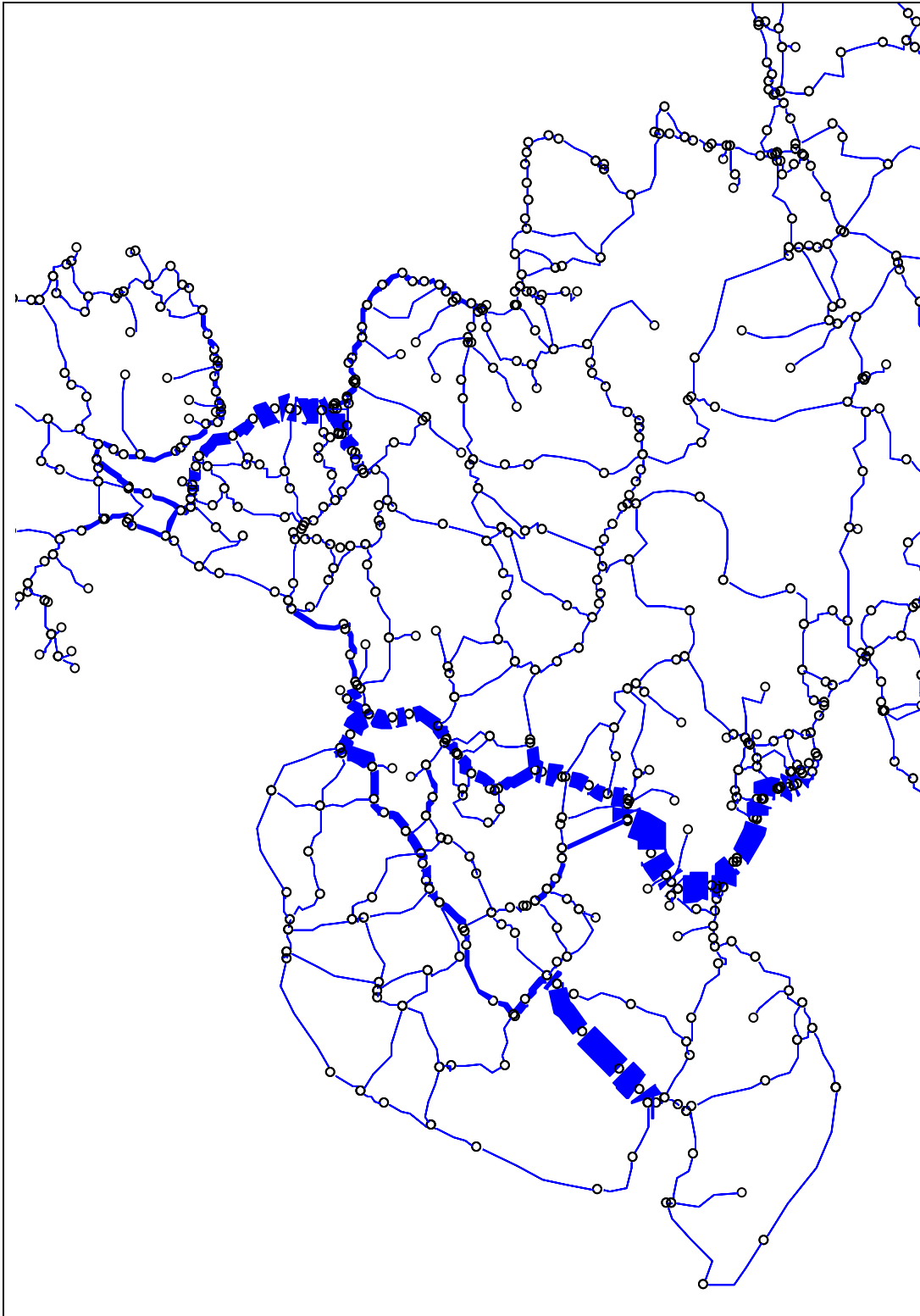
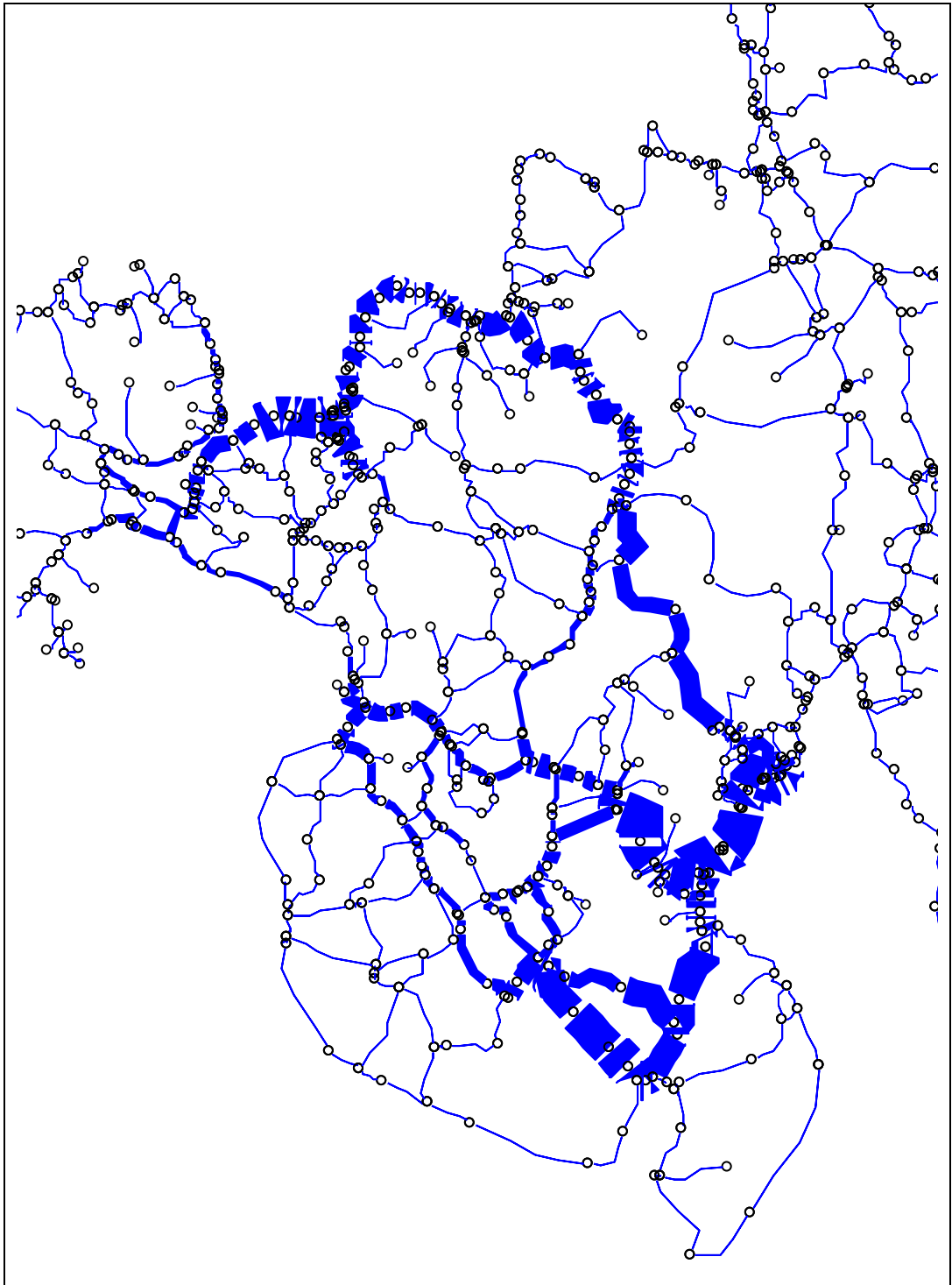


FIGURE 4.2.2-8 OD TRIPS CAPTURED BY ALL ROAD-SIDE OD SURVEYS



**FIGURE 4.2.2-9 PRESENT OD ESTIMATED BY ENTROPY
MAXIMIZATION METHOD**

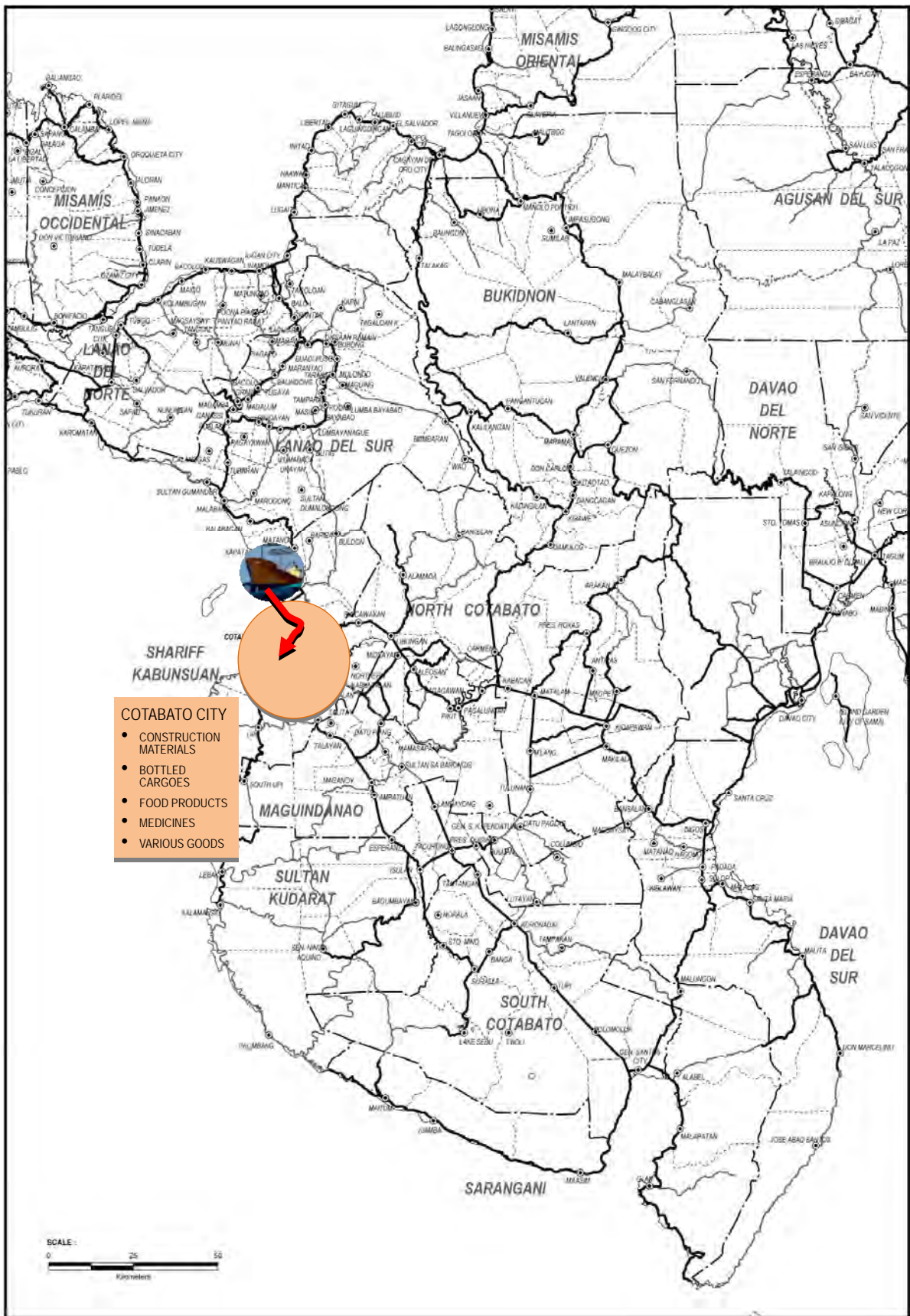


FIGURE 4.2.3-1 POLLOC PORT – DESTINATION OF INCOMING CARGO

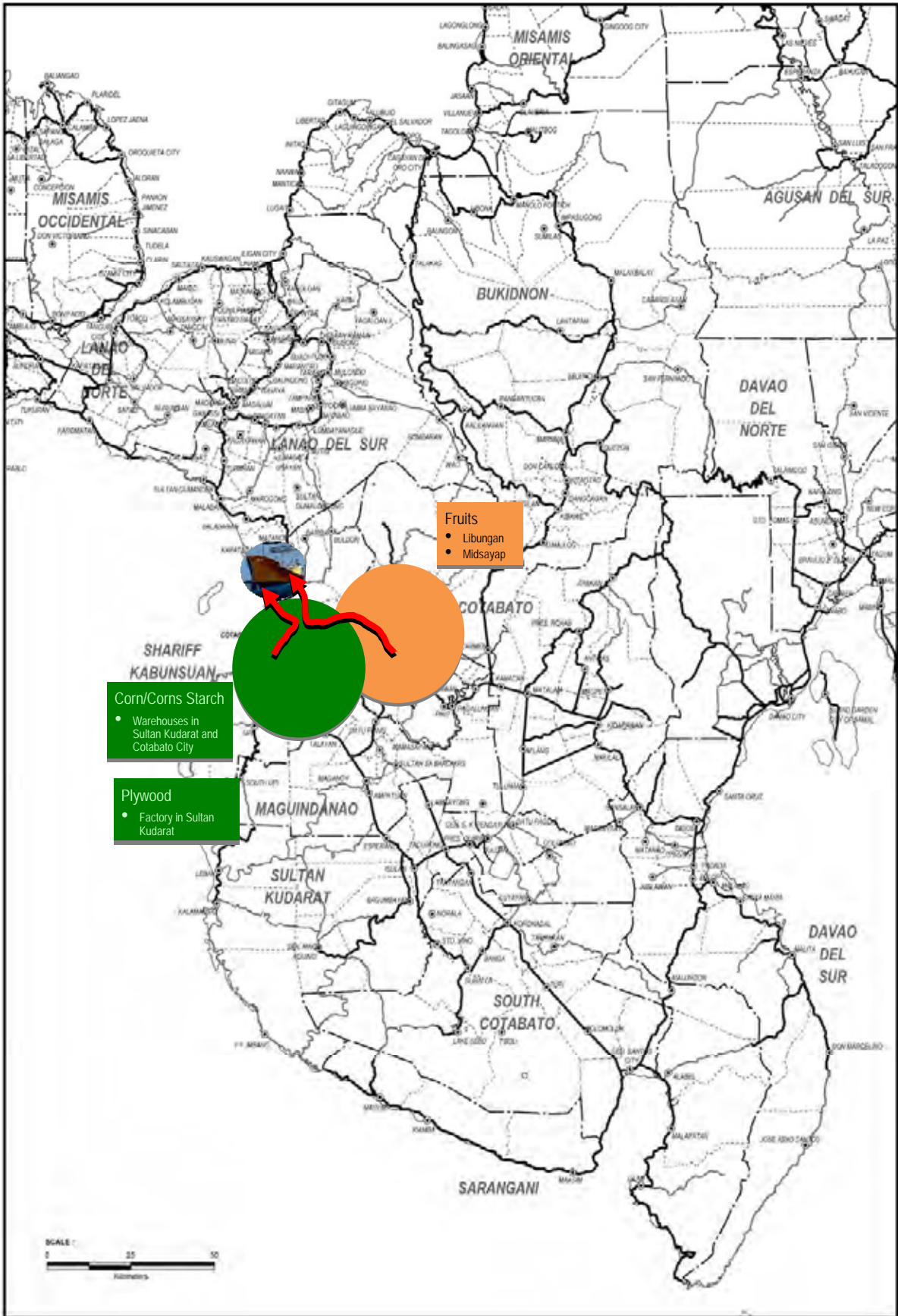


FIGURE 4.2.3-2 POLLOC PORT – ORIGIN OF OUTGOING CARGO (2/2)

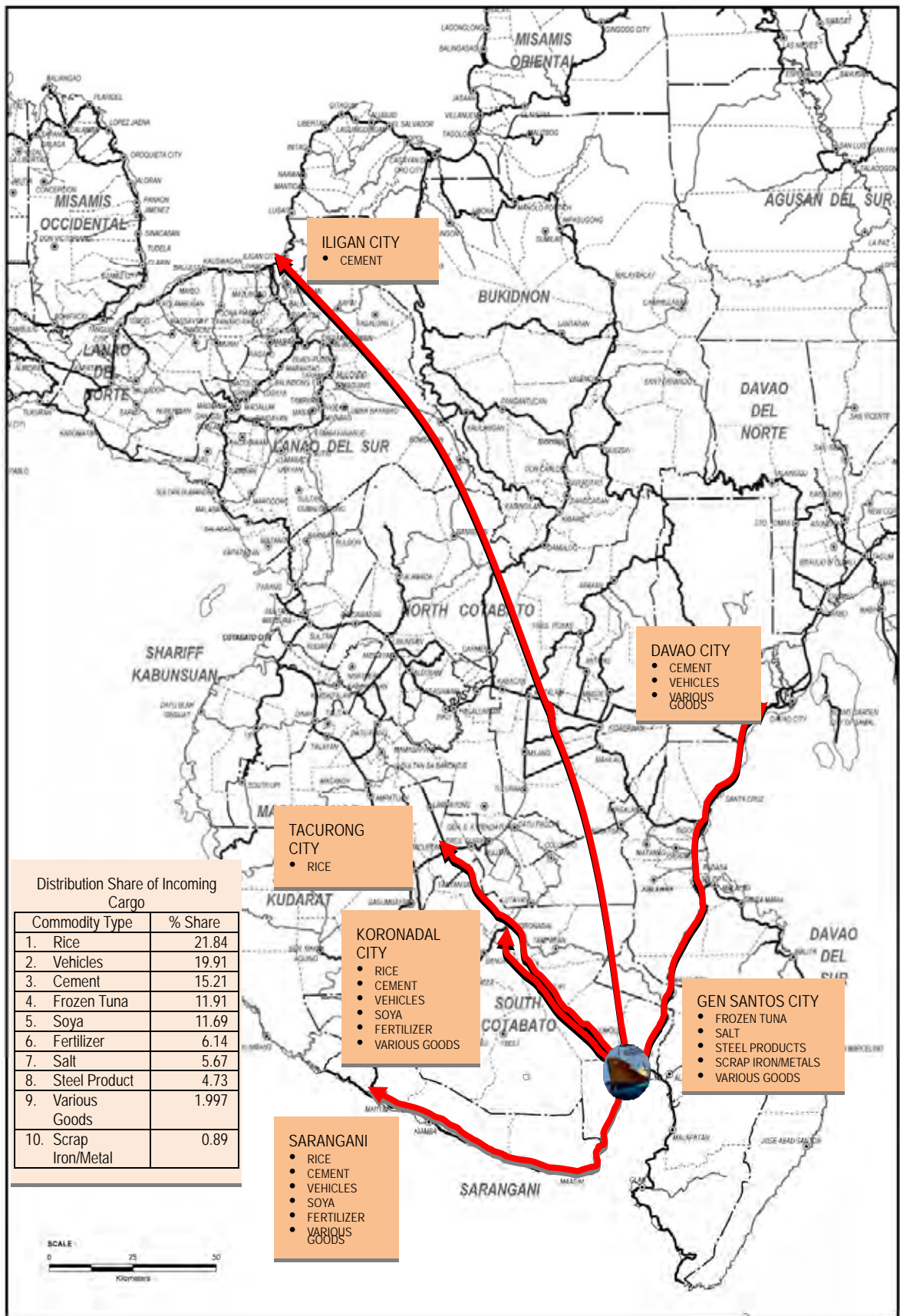


FIGURE 4.2.3-3 GEN. SANTOS PORT – DESTINATION OF INCOMING CARGO

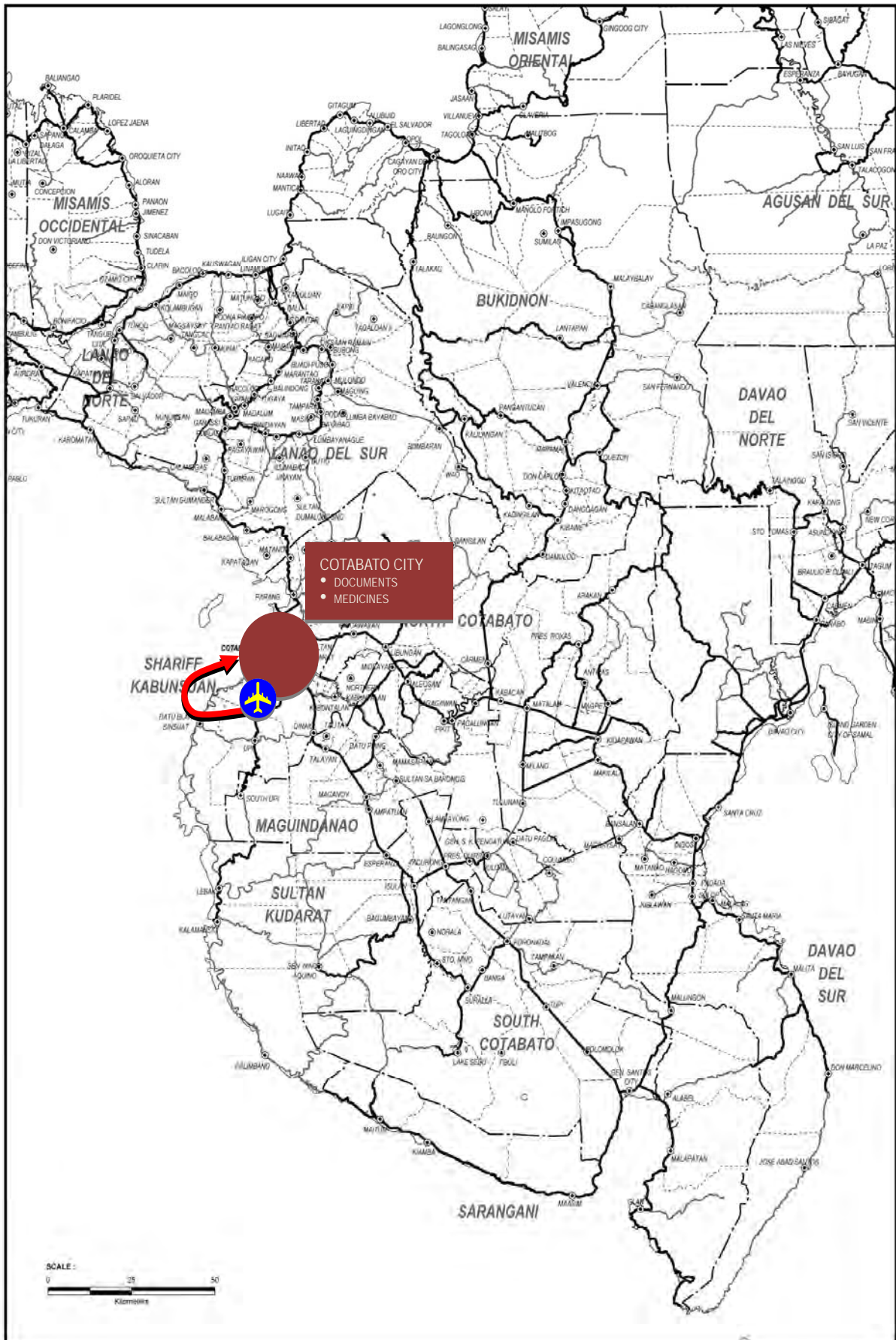


FIGURE 4.2.3-4 AWANG (COTABATO) AIRPORT – DESTINATION OF INCOMING CARGO

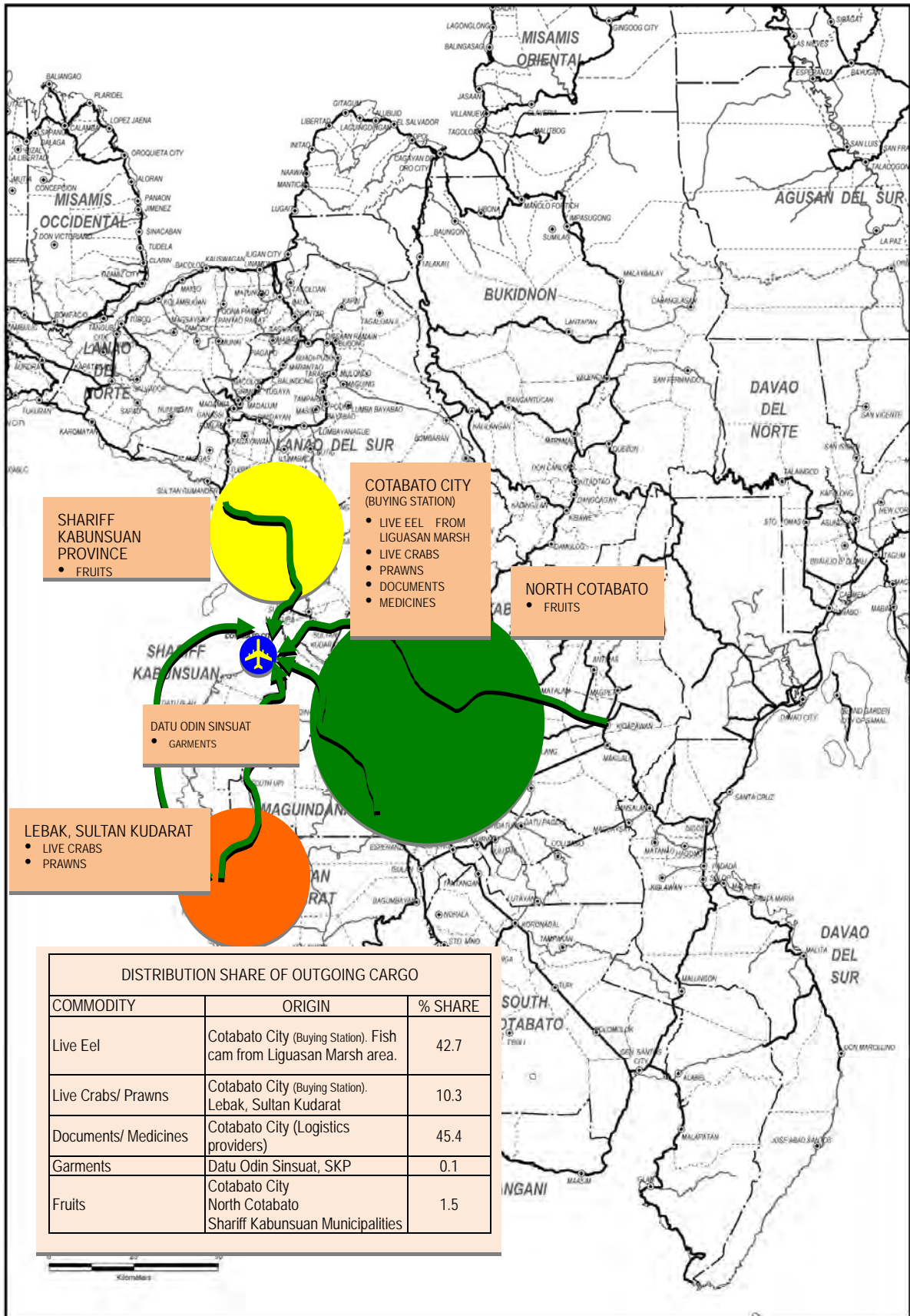


FIGURE 4.2.3-5 AWANG (COTABATO) AIRPORT – ORIGIN OF OUTGOING CARGO