# **CHAPTER 4**

# FUTURE SOCIO-ECONOMIC FRAMEWORK

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### 4.1 Future socio-Economic Framework

Future socio-economic framework was established for items which are necessary for traffic demand forecast as follows:

- Population by Region, Province and Municipality
- GDP and GRDP

## 4.1.1 **Population Projection**

## (1) Estimation of National Population from 2020 to 2040

The Philippine Statistics Authority (PSA) made a population projection until 2045 based on the 2010 census result. In 2015, another census was undertaken which showed that the total population of the country was 100.98 million. Comparing the PSA projection based on the 2010 census and 2015 census results, the population growth rate predicted by PSA projection is slightly higher than that of the actual population in 2015 as shown in **Table 4.1-1**.

Vear	Cens	us Result	PSA Projection					
Year	Population (persons)	2010-2015 Annual Average Growth Rate	Population (persons)	2010-2015 Annual Average Growth Rate				
2010	92,335,113	-	-	-				
2015	100,979,303	1.72%	101,562,300	1.73%				

Table 4.1-1Population Projection in 2015 by PSA

Source: Population Data in 2010 and 2015: Population Census 2010 and 2015; Population Projection: Philippine Statistics Authority, 2010 Census-based Population Projections in collaboration with the Inter-Agency Working Group on Population Projections.

Since there is no other official population projection and there is only a slight difference between the projection and the actual result of the population 2015, the Study Team projected the future population of the country until 2040 based on the population of 2015 and population growth rates estimated by PSA, as provided in **Table 4.1-2**. The future regional and provincial populations were estimated, utilizing the newly calculated population projection for the country.

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	Populat	ion (1000 )	persons)	Population Projection (1000 persons)								
	2000	2010	2015	2019	2020	2025	2030	2035	2040			
Philippines	76,504	92,335	100,979	107,556	109,267	117,190	124,454	130,932	136,524			
				2015	-2020	2020- 2025	2025- 2030	2030- 2035	2035- 2040			
Annual Average Growth Rate by PSA	_	-	-	1.5	9%	1.41%	1.21%	1.02%	0.84%			

Table 4.1-2Population Projection from 2019 to 2040

Source: Population Data 2000, 2010 and 2015: Population Census; Annual Average Growth Rate: Philippine Statistics Authority, 2010 Census-based Population Projections in collaboration with the Inter-Agency Working Group on Population Projections; and Population Projection from 2019 to 2040: JICA Study Team.

## (2) Projection of Future Population by Region, Province and Municipality from 2020 to 2040

The future population by region, province, and municipality was calculated in the similar manner, based on the past demographic trend and the estimated future population of the upper level. At first, population by region was projected from 2020 to 2040 based on the past trend and then adjusted, using the projected national population as a control total for each of the target years. Secondly, the estimated future population by region of the target years was used to project the future provincial population. Similar to the projection of the future population by region, the future provincial population was projected based on the past demographic trend of each of the projection of future municipal population, the municipal populations initially estimated from the past trend were adjusted to the future population of each of the provinces.

## (3) Consideration of Future Population of Urban Growth Centers

During the planning period of this project, the development of three urban centers, namely Metro Cebu, Metro Davao and New Clark City will be expected and promoted. Therefore, the growth of these centers should be taken into account in the projection of the future population.

On the initiative of JICA, a Roadmap for Mega Cebu 2050 and an Urban Transport Master Plan were formulated for Metro Cebu, while an Infrastructure Development Plan was prepared for Davao City, aiming at developing appropriate urban structures and necessary infrastructure which will contribute to the enhancement of economic and business activities and improvement of the urban environment. The New Clark City is envisioned as a new center in Central Luzon Region for decongestion of Metro Manila. Its development has been rushed by the Bases Conversion and Development Authority (BCDA), to host the 2019 Southeast Asian Games from the end of November 2019.

In the projection of the future population by 2040, the population growth of three urban centers proposed by the development plans were adopted. For Metro Cebu, the population projection in "The Project on Master Plan Study and Institutional Development on Urban Transport System in Metro Cebu" by JICA Study in 2019 was utilized (see **Table 4.1-3**). The population growth in Metro Cebu was adjusted within Visayas, including Region VI Western Visayas, Region VII Central Visayas, and Region VIII Eastern Visayas, assuming that Metro Cebu will attract intra-migration in the Visayas area.

For Davao City, the "Davao City Infrastructure Development Plan and Capacity Building Project" (IM4Davao) funded by JICA in 2018 adopted the population projection in the Davao Region Physical Framework Plan 2015–2045 for the formulation of the infrastructure development and land use plans (see **Table 4.1-4**). Hence, this study also projected future population, based on the population projection in the regional physical framework plan. The population growth in Davao Cebu was adjusted within Mindanao including five regions, assuming that Davao City will attract intra-migration in Mindanao.

Institutional Develop	ment on Ur	ban Trans	port Syster	n by JICA
City / Municipality	2020	2030	2040	2050
City of Carcar	156.9	186.4	215.3	243.8
Cebu City (Capital)	967.3	1,086.7	1,205.4	1,279.9
Compostela	63.1	77.6	91.9	106.1
Consolacion	155.2	196.6	238.2	279.8
Cordoba	62.9	78.6	92.2	108.1
Danao City	176.1	212.2	247.8	283.0
Lapu-Lapu City	482.4	663.9	749.0	845.0
Liloan	153.3	192.8	232.4	272.0
Mandaue City	391.7	461.8	531.6	601.1
Minglanilla	141.4	176.9	197.8	221.1
City of Naga	152.2	184.4	216.3	248.0
San Fernando	88.9	107.7	126.3	144.7
City of Talisay	236.4	279.7	322.7	365.5
Metro Cebu	3,227.8	3,905.3	4,466.9	4,998.1

Table 4.1-3Population Projection of Metro Cebu in the Master Plan Study and<br/>Institutional Development on Urban Transport System by JICA

Source: ALMEC Corporation, Oriental Consultants Global Co., Ltd., Nippon Koei Co., Ltd., and Chodai Co., Ltd. 2019. The Project on Master Plan Study and Institutional Development on Urban Transport System in Metro Cebu. Final Report. Japan International Cooperation Agency.

<b>Table 4.1-4</b>	Population Projection of Davao City in Davao Region
	Physical Framework Plan 2015–2045

	2015	2025	2035	2045						
Davao City	1,629,045	2,058,190	2,600,382	3,285,400						
Jurca: Regional Development Council Daygo Region Undeted Daygo Region										

Source: Regional Development Council Davao Region. Updated Davao Region Physical Framework Plan (DRPFP) 2015–2045.

The concept of New Clark City is envisioned to develop 9,450 hectares as a new urban center offering homes to 1.2 million population and 800,000 employment. The Clark Freeport and Special Economic Zone with a total area of 31,400 ha will be also developed, including Special Economic Zones (17,550 ha sub-zone and 2,100 ha industrial area) and Civil Aviation Complex (2,300 ha airport) in an adjacent area of New Clark City (BCDA, 2018).<sup>1</sup> Although the detail of the plan was not yet specified, its planned population of 1.2 million was taken into account in the population projection, considering its impact on the development of the surrounding regions. The population growth in New Clark City was adjusted by modifying the population of Central Luzon Region and National Capital Region (NCR), assuming that the development of New Clark City will attract population from NCR and Central Luzon.

<sup>&</sup>lt;sup>1</sup> BCDA. 2018. Shaping the future TODAY: New Clark City Project. Presentation for ASBAA & INAEC on 25 January, 2018.

Desting		Population		Рор	oulation Projec	tion	Average Annual Growth Rate					
Kegion	2000	2010	2015	2020	2030	2040	2000-2010	2010-2020	2020-2030	2030-2040		
Cordillera Administrative Region (CAR)	1,365,220	1,616,867	1,722,006	1,842,565	2,038,613	2,189,215	1.71%	1.32%	1.02%	0.72%		
National Capital Region (NCR)	9,932,560	11,855,975	12,877,253	13,786,827	15,214,296	16,279,264	1.79%	1.52%	0.99%	0.68%		
Region I - Ilocos Region	4,200,329	4,748,372	5,026,128	5,285,245	5,713,354	6,020,961	1.23%	1.08%	0.78%	0.53%		
Region II - Cagayan Valley	2,813,159	3,229,163	3,451,410	3,649,181	3,988,067	4,240,585	1.39%	1.23%	0.89%	0.62%		
Region III - Central Luzon	8,200,151	10,137,737	11,218,177	12,163,997	14,063,875	15,644,646	2.14%	1.84%	1.46%	1.07%		
Region IV-A - CALABARZON	9,320,629	12,609,803	14,414,774	16,014,430	18,985,599	21,468,719	3.07%	2.42%	1.72%	1.24%		
Region IV-B - MIMAROPA	2,298,796	2,744,671	2,963,360	3,177,164	3,544,354	3,831,043	1.79%	1.47%	1.10%	0.78%		
Region V - Bicol Region	4,686,669	5,420,411	5,796,989	6,146,613	6,741,732	7,189,582	1.47%	1.27%	0.93%	0.65%		
Region VI - Western Visayas	6,209,304	7,102,438	7,536,383	8,047,103	8,975,024	9,650,497	1.35%	1.26%	1.10%	0.73%		
Region VII - Central Visayas	5,704,655	6,800,180	7,396,898	8,050,667	9,261,636	10,206,516	1.77%	1.70%	1.41%	0.98%		
Region VIII - Eastern Visayas	3,610,191	4,101,322	4,440,150	4,723,794	5,293,789	5,714,478	1.28%	1.42%	1.15%	0.77%		
Autonomous Region in Muslim Mindanao (ARMM)	2,803,045	3,256,140	3,781,387	4,041,809	4,692,075	5,213,117	1.51%	2.19%	1.50%	1.06%		
Region IX - Zamboanga Peninsula	2,831,342	3,407,353	3,629,783	3,950,870	4,514,320	4,954,455	1.87%	1.49%	1.34%	0.93%		
Region X - Northern Mindanao	3,493,806	4,297,323	4,689,302	5,108,727	5,912,767	6,546,516	2.09%	1.74%	1.47%	1.02%		
Region XI - Davao Region	3,708,846	4,468,563	4,893,318	5,488,911	6,486,314	7,367,409	1.88%	2.08%	1.68%	1.28%		
Region XII - SOCCSKSARGEN	3,222,169	4,109,571	4,545,276	5,012,148	5,910,024	6,635,592	2.46%	2.01%	1.66%	1.16%		
Region XIII - Caraga	2,087,749	2,429,224	2,596,709	2,776,477	3,117,974	3,371,492	1.53%	1.35%	1.17%	0.78%		
Philippine Grand Total	76,488,620	92,335,113	100,979,303	109,266,528	124,453,813	136,524,087	1.90%	1.70%	1.31%	0.93%		

 Table 4.1-5
 Population Projection by Region from 2020 to 2040

Source: Population Data 2000, 2010 and 2015: Population Census; and Population Projection from 2019 to 2040: JICA Study Team.

		(	Census Results		Pop	ulation Project	ion	Annual Average Growth Rate				
Region	Province	2000	2010	2015	2020	2030	2040	2000- 2010	2010- 2020	2020- 2030	2030- 2040	
	Abra	209,491	234,733	241,160	253,071	269,041	279,576	1.14%	0.76%	0.61%	0.38%	
G 1111	Apayao	97,129	112,636	119,184	126,582	138,442	147,296	1.49%	1.17%	0.90%	0.62%	
Cordillera	Benguet	582,515	722,620	791,590	859,231	977,721	1,073,025	2.18%	1.75%	1.30%	0.93%	
Administrative	Ifugao	161,623	191,078	202,802	216,922	239,532	256,830	1.69%	1.28%	1.00%	0.70%	
Region (CAR)	Kalinga	174,023	201,613	212,680	225,842	246,601	262,032	1.48%	1.14%	0.88%	0.61%	
	Mountain Province	140,439	154,187	154,590	160,917	167,276	170,456	0.94%	0.43%	0.39%	0.19%	
National Capital Regio	on (NCR)	9,932,560	11,855,975	12,877,253	13,786,827	15,214,296	16,279,264	1.79%	1.52%	0.99%	0.68%	
	Ilocos Norte	514,241	568,017	593,081	618,236	656,974	682,451	1.00%	0.85%	0.61%	0.38%	
Region I - Ilocos	Ilocos Sur	594,206	658,587	689,668	719,836	767,236	799,021	1.03%	0.89%	0.64%	0.41%	
Region	La Union	657,945	741,906	786,653	826,316	892,797	940,478	1.21%	1.08%	0.78%	0.52%	
	Pangasinan	2,433,937	2,779,862	2,956,726	3,120,857	3,396,347	3,599,011	1.34%	1.16%	0.85%	0.58%	
	Batanes	16,467	16,604	17,246	17,836	18,718	19,234	0.08%	0.72%	0.48%	0.27%	
Decion II Cocover	Cagayan	993,580	1,124,773	1,199,320	1,261,183	1,367,993	1,445,712	1.25%	1.15%	0.82%	0.55%	
Vallay	Isabela	1,287,575	1,489,645	1,593,566	1,689,598	1,853,299	1,976,510	1.47%	1.27%	0.93%	0.65%	
vancy	Nueva Vizcaya	366,962	421,355	452,287	478,068	523,297	557,152	1.39%	1.27%	0.91%	0.63%	
	Quirino	148,575	176,786	188,991	202,496	224,760	241,977	1.75%	1.37%	1.05%	0.74%	
	Aurora	173,797	201,233	214,336	227,195	245,736	258,782	1.48%	1.22%	0.79%	0.52%	
	Bataan	557,659	687,482	760,650	822,449	924,722	1,003,726	2.11%	1.81%	1.18%	0.82%	
Pagion III Control	Bulacan	2,234,088	2,924,433	3,292,071	3,623,541	4,180,474	4,624,696	2.73%	2.17%	1.44%	1.01%	
Luzon	Nueva Ecija	1,659,883	1,955,373	2,151,461	2,290,546	2,525,683	2,700,792	1.65%	1.59%	0.98%	0.67%	
Luzon	Pampanga	1,878,139	2,340,355	2,609,744	2,827,864	3,197,047	3,484,542	2.22%	1.91%	1.23%	0.86%	
	Tarlac	1,068,783	1,273,240	1,366,027	1,487,949	2,009,626	2,519,078	1.77%	1.57%	3.05%	2.29%	
	Zambales	627,802	755,621	823,888	884,453	980,587	1,053,030	1.87%	1.59%	1.04%	0.72%	
	Batangas	1,905,348	2,377,395	2,694,335	2,922,159	3,368,001	3,731,862	2.24%	2.08%	1.43%	1.03%	
Pagion IV A	Cavite	2,063,161	3,090,691	3,678,301	4,180,335	5,138,752	5,956,337	4.12%	3.07%	2.09%	1.49%	
CALABARZON	Laguna	1,965,872	2,669,847	3,035,081	3,377,594	4,002,775	4,525,127	3.11%	2.38%	1.71%	1.23%	
CALADARLON	Quezon	1,679,030	1,987,030	2,122,830	2,270,461	2,514,229	2,701,845	1.70%	1.34%	1.03%	0.72%	
	Rizal	1,707,218	2,484,840	2,884,227	3,263,881	3,961,842	4,553,548	3.82%	2.76%	1.96%	1.40%	
	Marinduque	216,959	227,828	234,521	239,068	245,148	246,753	0.49%	0.48%	0.25%	0.07%	
Pagion IV P	Occidental Mindoro	380,250	452,971	487,414	522,308	581,477	627,501	1.77%	1.43%	1.08%	0.76%	
MIMAROPA	Oriental Mindoro	681,818	785,602	844,059	893,444	980,021	1,045,187	1.43%	1.29%	0.93%	0.65%	
	Palawan	755,412	994,340	1,104,585	1,220,624	1,423,623	1,591,145	2.79%	2.07%	1.55%	1.12%	
	Romblon	264,357	283,930	292,781	301,720	314,085	320,457	0.72%	0.61%	0.40%	0.20%	
Pagion V Bigol	Albay	1,090,907	1,233,432	1,314,826	1,382,210	1,498,525	1,583,006	1.24%	1.15%	0.81%	0.55%	
Region	Camarines Norte	470,654	542,915	583,313	617,710	677,911	723,286	1.44%	1.30%	0.93%	0.65%	
Region	Camarines Sur	1,551,549	1,822,371	1,952,544	2,082,113	2,300,697	2,468,150	1.62%	1.34%	1.00%	0.71%	

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			Census Results		Рор	ulation Project	ion	Annual Average Growth Rate			
Region	Province	2000	2010	2015	2020	2030	2040	2000- 2010	2010- 2020	2020- 2030	2030- 2040
	Catanduanes	215,356	246,300	260,964	275,663	299,742	317,408	1.35%	1.13%	0.84%	0.57%
	Masbate	707,668	834,650	892,393	953,208	1,054,338	1,131,977	1.66%	1.34%	1.01%	0.71%
	Sorsogon	650,535	740,743	792,949	835,709	910,519	965,755	1.31%	1.21%	0.86%	0.59%
	Aklan	451,314	535,725	574,823	622,055	708,205	774,199	1.73%	1.51%	1.31%	0.89%
	Antique	471,088	546,031	582,012	623,656	699,911	756,410	1.49%	1.34%	1.16%	0.78%
Region VI - Western	Capiz	654,156	719,685	761,384	800,619	875,342	925,734	0.96%	1.07%	0.90%	0.56%
Visayas	Guimaras	141,450	162,943	174,613	186,869	209,913	227,026	1.42%	1.38%	1.17%	0.79%
	Iloilo	1,925,573	2,230,195	2,384,415	2,557,388	2,877,145	3,115,560	1.48%	1.38%	1.19%	0.80%
	Negros Occidental	2,565,723	2,907,859	3,059,136	3,256,516	3,604,508	3,851,568	1.26%	1.14%	1.02%	0.67%
	Bohol	1,137,268	1,255,128	1,313,560	1,382,730	1,505,969	1,587,440	0.99%	0.97%	0.86%	0.53%
Region VII - Central	Cebu	3,356,137	4,167,320	4,632,359	5,121,442	6,040,517	6,783,357	2.19%	2.08%	1.66%	1.17%
Visayas	Negros Oriental	1,130,088	1,286,666	1,354,995	1,444,957	1,603,512	1,717,095	1.31%	1.17%	1.05%	0.69%
	Siquijor	81,162	91,066	95,984	101,538	111,638	118,624	1.16%	1.09%	0.95%	0.61%
	Biliran	140,274	161,760	171,612	183,840	205,814	221,988	1.44%	1.29%	1.14%	0.76%
	Eastern Samar	375,822	428,877	467,160	497,707	560,217	606,887	1.33%	1.50%	1.19%	0.80%
Region VIII -	Leyte	1,592,172	1,789,158	1,966,768	2,081,999	2,335,428	2,522,945	1.17%	1.53%	1.16%	0.78%
Eastern Visayas	Northern Samar	500,639	589,013	632,379	682,076	773,803	843,553	1.64%	1.48%	1.27%	0.87%
	Samar	641,124	733,377	780,481	833,338	930,643	1,001,753	1.35%	1.29%	1.11%	0.74%
	Southern Leyte	360,160	399,137	421,750	444,834	487,884	517,352	1.03%	1.09%	0.93%	0.59%
	Basilan	259,796	293,322	346,579	366,413	423,165	468,295	1.22%	2.25%	1.45%	1.02%
Autonomous Region	Lanao del Sur	800,162	933,260	1,045,429	1,121,378	1,287,709	1,418,777	1.55%	1.85%	1.39%	0.97%
in Muslim Mindanao	Maguindanao	801,102	944,718	1,173,933	1,256,270	1,498,582	1,699,056	1.66%	2.89%	1.78%	1.26%
(ARMM)	Sulu	619,668	718,290	824,731	881,428	1,018,413	1,127,413	1.49%	2.07%	1.46%	1.02%
	Tawi-Tawi	322,317	366,550	390,715	416,320	464,206	499,576	1.29%	1.28%	1.09%	0.74%
	Isabela City	73,032	97,857	112,788	126,259	153,439	176,296	2.97%	2.58%	1.97%	1.40%
Region IX -	Zamboanga del Norte	823,130	957,997	1,011,393	1,087,943	1,221,388	1,321,773	1.53%	1.28%	1.16%	0.79%
Zamboanga Peninsul	Zamboanga del Sur	1,437,941	1,766,814	1,872,473	2,054,095	2,362,503	2,606,160	2.08%	1.52%	1.41%	0.99%
	Zamboanga Sibugay	497,239	584,685	633,129	682,573	776,990	850,226	1.63%	1.56%	1.30%	0.90%
	Bukidnon	1,048,605	1,299,192	1,415,226	1,541,742	1,783,004	1,972,938	2.17%	1.73%	1.46%	1.02%
Decion V Northern	Camiguin	74,232	83,807	88,478	93,698	103,443	110,305	1.22%	1.12%	0.99%	0.64%
Mindeneo	Lanao del Norte	758,123	930,738	1,019,013	1,110,453	1,287,385	1,427,192	2.07%	1.78%	1.49%	1.04%
winiuanao	Misamis Occidental	486,723	567,642	602,126	645,569	724,773	783,537	1.55%	1.29%	1.16%	0.78%
	Misamis Oriental	1,126,123	1,415,944	1,564,459	1,717,265	2,014,162	2,252,544	2.32%	1.95%	1.61%	1.12%
	Compostela Valley	580,244	687,195	736,107	793,252	899,743	980,676	1.71%	1.45%	1.27%	0.87%
Dagion VI Deve	Davao del Norte	743,811	945,764	1,016,332	1,122,499	1,310,357	1,460,263	2.43%	1.73%	1.56%	1.09%
Region XI - Davao	Davao del Sur	1,684,088	2,024,206	2,265,579	2,638,190	3,223,174	3,785,133	1.86%	2.68%	2.02%	1.62%
Region	Davao Occidental	254,512	293,780	316,342	337,537	379,370	410,494	1.45%	1.40%	1.18%	0.79%
	Davao Oriental	446,191	517,618	558,958	597,433	673,670	730,843	1.50%	1.44%	1.21%	0.82%

			Census Results		Рор	ulation Project	tion	Annual Average Growth Rate				
Region	Province	2000	2010	2015	2020	2030	2040	2000- 2010	2010- 2020	2020- 2030	2030- 2040	
	Cotabato	958,643	1,226,508	1,379,747	1,520,711	1,804,244	2,034,965	2.49%	2.17%	1.72%	1.21%	
Decion VII	Cotabato City	163,849	271,786	299,438	355,048	449,210	529,701	5.19%	2.71%	2.38%	1.66%	
SOCCEVENDEEN	Sarangani	410,622	498,904	544,261	591,134	681,788	752,849	1.97%	1.71%	1.44%	1.00%	
SUCCEREARGEN	South Cotabato	1,102,550	1,365,286	1,509,735	1,648,725	1,923,752	2,143,075	2.16%	1.90%	1.55%	1.09%	
	Sultan Kudarat	586,505	747,087	812,095	896,530	1,051,030	1,175,002	2.45%	1.84%	1.60%	1.12%	
	Agusan del Norte	551,503	642,196	691,566	739,660	833,661	904,081	1.53%	1.42%	1.20%	0.81%	
Design VIII	Agusan del Sur	559,294	656,418	700,653	752,696	849,358	921,974	1.61%	1.38%	1.22%	0.82%	
Region AIII -	Dinagat Islands	106,951	126,803	127,152	137,715	152,443	162,914	1.72%	0.83%	1.02%	0.67%	
Caraga	Surigao del Norte	368,193	442,588	485,088	521,560	595,948	653,315	1.86%	1.66%	1.34%	0.92%	
	Surigao del Sur	501,808	561,219	592,250	624,846	686,564	729,208	1.13%	1.08%	0.95%	0.60%	
Philippine Total		76,488,620	92,335,113	100,979,303	109,266,528	124,453,813	136,524,087	1.90%	1.70%	1.31%	0.93%	

Source: Population Data 2000, 2010 and 2015: Population Census; and Population Projection from 2019 to 2040: JICA Study Team.







Durce: JICA Study Team Figure 4.1-4 Provincial Population Growth 2020-2030





Source: JICA Study Team Figure 4.1-5 Provincial Population Growth Rate 2030-2040

Source: JICA Study Team

Figure 4.1-6 Municipal Population Growth Rate 2010-2020







Figure 4.1-8 Municipal Population Growth Rate 2030-2040

The past economic performance represented by GDP was as follows:

## 4.1.2 Economic Framework

The economic framework of GDP and GRDP was formulated for the planning period of 2020 to 2040.

Table 4.1-7 Gi	owth Rate of GDP
Period	Annual Average Growth Rate
1998 – 2007 (9 years)	4.70%
2007 – 2012 (5 years)	4.66%
2012 – 2017 (5 years)	6.57%

 Table 4.1-7
 Growth Rate of GDP

Source: PSA.

As a long-term average, the country recorded an annual economic growth rate of 4.7%. A short-term average of 6.5% per year was achieved. **Table 4.1-8** shows GDP, GRDP, and the average annual growth rate, and **Table 4.1-9** provides per capita GDP and GRDP from 2013 to 2018 used by the Study.

The Government of the Philippines released a long-term vision, "Ambisyon Natin 2040" in 2016. The major goals of the vision are thus stated: "By 2040, the Philippines will be a predominantly middle-class society. Poverty and hunger will have been eradicated. There will be sufficient good quality local jobs available."<sup>2</sup> Achieving this vision means that the nation will become a high-income country by 2040. The World Bank estimated that per capita GNI needs to be expanded to US\$11,000 or the per capita GDP should reach US\$9,350 by growing yearly at 6.5% of the real GDP from 2017 to 2040.<sup>3</sup>

For the short term, NEDA's target is as follows:

"The Philippines will be an upper-middle country by 2022. In the medium term (2016-2022), GDP growth is expected to strengthen further to 7-8 percent in real term. This means that economy will expand by about 50% by 2022 from its base in 2016. Per capita income will increase from USD 3,550 in 2015 to at least USD 5,000 in 2022."

The International Monetary Fund (IMF) predicted that the Philippines will keep a high GDP growth rate of 6.4% in 2019 and 2020 as presented in **Table 4.1-10**.

<sup>&</sup>lt;sup>2</sup> National Economic and Development Authority. Highlights of National Survey on the Aspirations of the Filipino People.

<sup>&</sup>lt;sup>3</sup> The World Bank. 2018. Growth and Productivity in the Philippines: Winning the Future.

				PRIM	IARY			SECONDARY						TERTIARY					
	REGION	2013	2014	2015	2016	2017	2018	2013	2014	2015	2016	2017	2018	2013	2014	2015	2016	2017	2018
	Philippines	707.0	718.8	719.7	711.0	739.2	745.8	2,219.1	2,391.3	2,545.4	2,750.6	2,945.5	3,142.8	3,824.6	4,055.4	4,335.0	4,661.8	4,981.1	5,318.3
NCR	National Capital Region	4.8	5.0	5.2	5.3	5.3	5.3	472.3	487.9	521.4	548.3	559.4	561.9	1,978.1	2,104.2	2,244.0	2,422.7	2,595.1	2,744.7
CAR	Cordillera Administrative Region	13.2	13.2	12.7	12.1	12.7	12.0	63.7	65.3	67.6	67.4	80.1	87.5	47.7	50.1	53.6	57.4	60.8	65.4
1	Ilocos Region	50.8	53.2	52.5	51.6	52.8	51.6	54.4	58.0	62.8	73.4	78.1	87.4	106.1	113.8	121.8	132.3	141.2	150.8
II	Cagayan Valley	46.8	49.1	48.9	47.5	50.4	46.8	15.3	16.7	17.9	20.0	22.7	23.3	58.4	63.3	67.6	72.1	76.3	84.4
III	Central Luzon	108.2	114.7	115.3	116.1	120.6	125.0	249.3	289.0	309.3	358.2	407.9	438.8	254.9	265.3	281.7	298.9	315.5	340.2
IV-A	CALABARZON	71.2	70.3	72.1	74.6	74.1	74.7	717.6	764.0	807.5	836.7	901.7	973.2	381.8	396.1	422.6	453.4	480.5	514.6
IV-B	MIMAROPA	26.5	27.1	27.8	25.9	26.7	27.4	36.8	43.1	41.0	42.0	42.6	47.4	47.4	49.7	53.4	57.7	62.7	68.5
v	Bicol Region	33.4	33.8	33.0	33.0	33.8	34.9	26.8	28.2	35.2	37.9	39.2	44.7	76.7	80.8	87.2	93.3	99.3	108.0
VI	Western Visayas	62.8	61.4	61.0	59.9	65.2	64.3	50.3	57.1	70.4	77.9	84.6	91.9	153.9	162.4	174.1	185.8	201.6	216.7
VII	Central Visayas	28.4	27.9	28.5	28.5	30.4	30.8	160.9	179.2	179.1	204.3	210.4	230.3	238.0	253.3	275.3	291.9	310.9	332.7
VIII	Eastern Visayas	30.1	26.3	25.4	26.0	26.0	25.9	62.5	60.4	63.4	75.8	74.4	77.0	57.4	59.7	64.4	69.9	74.2	82.0
IX	Zamboanga Peninsula	29.6	30.4	31.0	29.5	29.4	30.1	47.9	52.9	59.6	64.3	63.8	66.2	59.7	63.0	67.0	71.0	75.6	83.0
Х	Northern Mindanao	60.8	62.8	65.2	66.8	69.9	70.2	85.3	92.6	97.1	106.7	112.9	122.9	104.4	113.0	121.5	131.5	139.7	152.2
XI	Davao Region	39.7	40.7	41.3	40.7	41.4	42.6	81.9	93.4	104.8	121.6	144.7	160.5	135.8	147.3	158.4	171.1	182.9	197.7
XII	SOCCSKSARGEN	52.7	55.1	53.9	48.8	53.1	54.4	63.1	67.6	69.3	78.3	84.9	91.7	69.5	74.1	80.0	86.1	92.8	100.6
XIII	Caraga	17.8	18.1	16.5	16.2	16.5	17.1	28.4	32.6	36.0	35.0	34.8	34.6	38.3	41.8	44.1	47.6	51.1	54.1
	Autonomous Region in Muslim																		
ARMM	Mindanao	30.1	29.9	29.4	28.6	30.8	32.5	2.5	3.4	2.8	2.9	3.2	3.4	16.6	17.5	18.3	19.3	20.6	22.6

 Table 4.1-8
 GDP and GRDP at Constant 2000 Prices (in Billion Pesos)

				TO	ΓAL			Average	Annual Gro	wth Rate 20	013-2018
	REGION	2013	2014	2015	2016	2017	2018	Primary	Secondary	Tertiary	Total
	Philippines	6,750.6	7,165.5	7,600.2	8,123.4	8,665.8	9,206.9	1.07%	7.21%	6.82%	5.31%
NCR	National Capital Region	2,455.2	2,597.1	2,770.6	2,976.2	3,159.8	3,312.0	2.35%	3.54%	6.77%	5.12%
CAR	Cordillera Administrative Region	124.6	128.7	133.8	136.9	153.6	164.9	-1.91%	6.56%	6.51%	4.78%
I	Ilocos Region	211.4	225.0	237.2	257.3	272.1	289.9	0.32%	9.93%	7.29%	5.41%
II	Cagayan Valley	120.5	129.1	134.4	139.5	149.5	154.4	0.02%	8.76%	7.63%	4.23%
III	Central Luzon	612.3	668.9	706.3	773.1	844.0	904.0	2.94%	11.97%	5.95%	6.71%
IV-A	CALABARZON	1,170.6	1,230.4	1,302.3	1,364.7	1,456.3	1,562.5	0.96%	6.28%	6.15%	4.93%
IV-B	MIMAROPA	110.7	119.9	122.3	125.6	132.1	143.4	0.69%	5.21%	7.67%	4.41%
V	Bicol Region	136.9	142.8	155.4	164.1	172.2	187.6	0.86%	10.83%	7.09%	5.40%
VI	Western Visayas	267.0	280.9	305.5	323.6	351.4	372.9	0.46%	12.81%	7.09%	5.73%
VII	Central Visayas	427.3	460.3	482.9	524.6	551.7	593.9	1.65%	7.44%	6.93%	5.64%
VIII	Eastern Visayas	150.1	146.5	153.2	171.6	174.7	184.9	-2.99%	4.26%	7.39%	3.54%
IX	Zamboanga Peninsula	137.2	146.3	157.6	164.9	168.8	179.4	0.34%	6.68%	6.83%	4.57%
Х	Northern Mindanao	250.5	268.4	283.8	305.0	322.6	345.3	2.92%	7.57%	7.83%	5.49%
XI	Davao Region	257.4	281.3	304.4	333.4	369.1	400.8	1.44%	14.40%	7.80%	7.66%
XII	SOCCSKSARGEN	185.3	196.8	203.2	213.2	230.8	246.7	0.62%	7.77%	7.68%	4.88%
XIII	Caraga	84.5	92.4	96.6	98.9	102.5	105.8	-0.82%	4.05%	7.15%	3.82%
	Autonomous Region in Muslim										
ARMM	Mindanao	49.3	50.8	50.6	50.8	54.6	58.5	1.55%	6.32%	6.26%	2.90%

Source: PSA.

	Table 4.1-9 GDI allu GKDI	i per Ca	apila al	Consta	III 2000	I IICES (	III I ESUS	<i>)</i>
		2013	2014	2015	2016	2017	2018	Annual Average Growth Rate 2013-2018
	Philippines	68.746	71,741	74.833	78.682	82.593	86.370	4.67%
NCR	National Capital Region	195,013	202,904	218,987	232,739	244,589	253,893	5.42%
CAR	Cordillera Administrative Region	72,773	73,971	75,048	75,401	83,153	87,722	3.81%
I	Ilocos Region	42,646	44,894	46,180	49,474	51,703	54,434	5.00%
II	Cagayan Valley	35,571	37,645	38,436	39,344	41,571	42,387	3.57%
III	Central Luzon	56,557	60,670	63,641	68,634	73,863	78,016	6.64%
IV-A	CALABARZON	84,657	86,644	92,184	94,811	99,346	104,708	4.34%
IV-B	MIMAROPA	38,141	40,706	39,575	39,837	41,069	43,715	2.77%
V	Bicol Region	24,014	24,719	25,770	26,686	27,487	29,369	4.11%
VI	Western Visayas	35,883	37,289	39,653	41,420	44,368	46,440	5.29%
VII	Central Visayas	59,200	62,743	64,846	69,322	71,743	76,024	5.13%
VIII	Eastern Visayas	35,002	33,771	33,771	37,144	37,121	38,598	1.97%
IX	Zamboanga Peninsula	38,001	39,887	41,873	43,043	43,326	45,265	3.56%
Х	Northern Mindanao	54,721	57,609	60,290	63,771	66,408	70,000	5.05%
XI	Davao Region	54,196	58,256	61,335	65,913	71,621	76,378	7.10%
XII	SOCCSKSARGEN	41,835	43,493	44,178	45,459	48,277	50,644	3.90%
XIII	Caraga	33,051	35,672	35,553	35,679	36,235	36,651	2.09%
ARMM	Autonomous Region in Muslim Mindanao	14,388	14,613	13,646	13,366	14,012	14,657	0.37%

<b>Table 4.1-9</b>	GDP and GRDP	per Capita at Constant	2000 Prices (in Pesos)
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Source: PSA.

In formulating the economic framework for this study, the annual GDP growth rate of 6.5% is adopted by 2040. The World Bank report examined a "Build, Build, Build" scenario as one of five alternative scenarios to achieve the per capita US\$9,350, by expanding the total investment up to 33.6 percent of GDP in 2040 that was pushed up by increased investment in infrastructure, while maintaining the annual GDP growth rate of 6.5%. The investment in high standard highways is indeed one of important investment programs to support the Build, Build, Build policy. The projection by IMF indicates the GDP growth rate higher than 6.5% by 2024. Thus, the economic framework by 2040 is estimated, adopting 6.5% of GDP growth rate for the materialization of the long-term vision. The GRDP was projected using the estimated GDP as a control total. Due to differences in sectoral growth rates, the estimated growth rates of GRDP for each region differ slightly.

The estimated GDP and GRDP from 2019 to 2040 is presented in Table 4.1-11.

### Table 4.1-10 Predicted Growth Rate of GDP from 2019 to 2024

			Pro	o <mark>jected</mark> G	rowth <b>R</b>	ate	
		2019	2020	2021	2022	2023	2024
	Philippines	6.48%	6.61%	6.74%	6.72%	6.77%	6.79%
~	-	1 1 4					

Source: International Monetary Fund

## Table 4.1-11Estimated GDP and GRDP (2019-2040) at Constant<br/>2000 Prices (in Billion Pesos)

					·		GDP	and GRDI	GRDP PREDICTION							
					PRIMAR	(					S	ECONDA	RY			
		2018	2019	2020	2025	2030	2035	2040	2018	2019	2020	2025	2030	2035	2040	
	Philippines	745.8	763.0	781.1	904.2	1,085.0	1,334.4	1,670.6	3,142.8	3,375.6	3,613.5	5,048.4	7,007.1	9,689.8	13,368.5	
NCR	National Capital Region	5.3	5.5	5.7	6.7	8.2	10.3	13.1	561.9	623.5	659.5	879.4	1,182.4	1,597.8	2,166.1	
CAR	Cordillera Administrative Region	12.0	12.1	12.1	12.2	12.7	13.4	14.3	87.5	88.4	93.8	127.0	172.6	235.2	320.8	
I	Ilocos Region	51.6	53.7	54.7	61.7	72.2	86.8	106.3	87.4	93.3	101.2	148.2	211.8	299.0	418.6	
11	Cagayan Valley	46.8	49.7	50.6	56.9	66.5	79.8	97.6	23.3	26.1	28.3	41.7	59.8	84.5	118.5	
III	Central Luzon	125.0	130.0	135.0	167.0	212.0	273.7	357.4	438.8	475.1	517.4	768.8	1,109.0	1,574.4	2,214.1	
IV-A	CALABARZON	74.7	77.4	79.4	92.9	112.4	139.3	175.7	973.2	1,021.3	1,085.0	1,472.9	2,005.2	2,734.7	3,733.8	
IV-B	MIMAROPA	27.4	27.3	27.7	30.3	34.5	40.3	48.1	47.4	48.1	50.3	63.7	82.4	108.2	143.3	
V	Bicol Region	34.9	35.2	35.9	41.1	48.9	59.5	73.9	44.7	48.4	52.7	78.0	112.2	159.0	223.4	
VI	Western Visayas	64.3	63.9	64.7	71.2	81.4	95.6	114.6	91.9	102.8	112.6	171.0	249.9	357.7	505.9	
VII	Central Visayas	30.8	31.1	31.9	37.4	45.3	56.3	71.0	230.3	245.5	262.8	367.2	509.7	704.9	972.5	
VIII	Eastern Visayas	25.9	27.2	27.8	32.3	38.9	48.0	60.2	77.0	83.7	88.8	119.8	162.6	221.1	301.3	
IX	Zamboanga Peninsula	30.1	30.5	30.9	34.1	39.1	46.1	55.4	66.2	73.6	78.5	108.2	148.9	204.6	281.0	
Х	Northern Mindanao	70.2	74.1	77.0	95.8	122.2	158.3	207.4	122.9	130.5	139.7	195.1	270.7	374.2	516.2	
XI	Davao Region	42.6	42.2	42.8	47.4	54.4	64.2	77.3	160.5	175.0	193.1	300.1	444.1	641.1	912.1	
XII	SOCCSKSARGEN	54.4	54.2	55.0	61.4	71.1	84.6	102.7	91.7	97.8	105.1	149.0	208.7	290.5	402.7	
XIII	Caraga	17.1	16.8	16.9	18.0	19.9	22.6	26.1	34.6	39.0	41.0	53.5	70.8	94.5	126.9	
ARMM	Autonomous Region in Muslim Mindanao	32.5	31.9	32.7	37.8	45.2	55.6	69.5	3.4	3.5	3.7	4.8	6.3	8.4	11.3	

			Average Annual Growth Rate												
					PRIMAR	Y					S	ECONDA	RY		
		2013- 2018	2015- 2020	2020- 2025	2025- 2030	2030- 2035	2035- 2040	AGR 2018- 2040	2013- 2018	2015- 2020	2020- 2025	2025- 2030	2030- 2035	2035- 2040	AGR 2018- 2040
	Philippines	1.32%	1.65%	2.97%	3.71%	4.22%	4.60%	3.73%	9.06%	7.26%	6.92%	6.78%	6.70%	6.65%	6.80%
NCR	National Capital Region	1.28%	2.05%	3.41%	4.10%	4.57%	4.91%	4.16%	7.44%	4.81%	5.92%	6.10%	6.21%	6.28%	6.33%
CAR	Cordillera Administrative Region	-1.59%	-0.93%	0.16%	0.77%	1.13%	1.30%	0.78%	7.59%	6.77%	6.25%	6.33%	6.38%	6.41%	6.08%
I	Ilocos Region	0.78%	0.82%	2.42%	3.20%	3.75%	4.15%	3.34%	12.14%	10.01%	7.92%	7.41%	7.13%	6.97%	7.38%
11	Cagayan Valley	0.30%	0.67%	2.38%	3.16%	3.71%	4.11%	3.39%	13.42%	9.64%	8.04%	7.48%	7.18%	7.00%	7.68%
III	Central Luzon	4.05%	3.20%	4.35%	4.89%	5.24%	5.48%	4.89%	12.23%	10.83%	8.24%	7.60%	7.26%	7.06%	7.63%
IV-A	CALABARZON	1.70%	1.95%	3.17%	3.89%	4.39%	4.74%	3.97%	7.55%	6.09%	6.30%	6.37%	6.40%	6.43%	6.30%
IV-B	MIMAROPA	0.17%	-0.11%	1.84%	2.62%	3.18%	3.60%	2.59%	4.98%	4.16%	4.85%	5.30%	5.59%	5.78%	5.15%
v	Bicol Region	1.75%	1.70%	2.75%	3.50%	4.03%	4.42%	3.47%	13.30%	8.38%	8.16%	7.55%	7.23%	7.03%	7.58%
VI	Western Visayas	-0.15%	1.20%	1.93%	2.72%	3.27%	3.69%	2.66%	14.86%	9.86%	8.72%	7.87%	7.44%	7.18%	8.06%
VII	Central Visayas	1.63%	2.32%	3.21%	3.92%	4.42%	4.77%	3.87%	9.48%	7.97%	6.92%	6.78%	6.70%	6.65%	6.77%
VIII	Eastern Visayas	-4.15%	1.85%	3.04%	3.78%	4.28%	4.65%	3.91%	7.41%	6.96%	6.19%	6.29%	6.34%	6.38%	6.40%
IX	Zamboanga Peninsula	0.55%	-0.09%	1.99%	2.78%	3.33%	3.75%	2.81%	7.76%	5.66%	6.63%	6.59%	6.56%	6.55%	6.79%
Х	Northern Mindanao	3.57%	3.40%	4.47%	4.98%	5.31%	5.54%	5.05%	8.98%	7.54%	6.91%	6.77%	6.69%	6.64%	6.74%
XI	Davao Region	-0.18%	0.75%	2.03%	2.82%	3.37%	3.79%	2.75%	17.63%	13.00%	9.22%	8.16%	7.62%	7.31%	8.22%
XII	SOCCSKSARGEN	1.53%	0.42%	2.20%	2.99%	3.54%	3.95%	2.93%	10.15%	8.69%	7.22%	6.98%	6.84%	6.75%	6.96%
XIII	Caraga	0.81%	0.52%	1.25%	2.02%	2.55%	2.94%	1.94%	5.72%	2.64%	5.46%	5.76%	5.95%	6.07%	6.08%
ARMM	Autonomous Region in Muslim Mindanao	2.15%	2.11%	2.93%	3.68%	4.19%	4.57%	3.51%	7.00%	5.64%	5.30%	5.65%	5.86%	6.01%	5.53%

Source: JICA Study Team

	2000 Prices (in Billion Pesos) (Continued)														
							0	OP and GF	RDP PREDI	CTION					
					TERTIA	RY						TOTAL			
		2018	2019	2020	2025	2030	2035	2040	2018	2019	2020	2025	2030	2035	2040
	Philippines	5,318.3	5,666.8	6,048.1	8,354.8	11,510.2	15,832.7	21,757.2	9206.9	9,805.3	10,442.7	14,307.4	19,602.4	26,856.9	36,796.3
NCR	National Capital Region	2,744.7	2,939.2	3,137.4	4,336.1	5,975.8	8,221.8	11,300.4	3312.0	3,568.3	3,802.6	5,222.2	7,166.4	9,829.9	13,479.6
CAR	Cordillera Administrative Region	65.4	69.4	74.0	101.8	139.9	192.0	263.5	164.9	169.9	179.9	241.0	325.2	440.6	598.5
I	Ilocos Region	150.8	161.7	173.0	241.5	334.9	463.0	638.5	289.9	308.7	328.9	451.3	619.0	848.7	1,163.5
	Cagayan Valley	84.4	89.1	95.3	133.0	184.5	255.0	351.7	154.4	164.9	174.2	231.6	310.7	419.3	567.8
III	Central Luzon	340.2	358.1	380.4	515.9	701.8	956.7	1,305.7	904.0	963.2	1,032.8	1,451.7	2,022.9	2,804.8	3,877.1
IV-A	CALABARZON	514.6	544.8	579.8	791.8	1,082.6	1,481.0	2,026.7	1562.5	1,643.5	1,744.2	2,357.6	3,200.2	4,355.0	5,936.2
IV-B	MIMAROPA	68.5	72.2	77.3	108.3	150.7	208.6	288.2	143.4	147.6	155.2	202.3	267.6	357.2	479.6
v	Bicol Region	108.0	114.5	122.4	170.2	235.6	325.1	447.8	187.6	198.1	211.0	289.3	396.6	543.6	745.1
VI	Western Visayas	216.7	228.5	243.9	336.6	463.5	637.3	875.5	372.9	395.2	421.2	578.8	794.7	1,090.6	1,496.0
VII	Central Visayas	332.7	355.4	379.4	524.9	723.8	996.2	1,369.7	593.9	632.0	674.2	929.5	1,278.8	1,757.4	2,413.3
VIII	Eastern Visayas	82.0	85.2	90.8	125.1	171.9	236.1	324.1	184.9	196.0	207.4	277.2	373.4	505.2	685.6
IX	Zamboanga Peninsula	83.0	86.7	92.3	126.4	173.2	237.2	325.0	179.4	190.8	201.7	268.8	361.2	487.9	661.4
х	Northern Mindanao	152.2	161.7	173.2	242.4	336.9	466.2	643.6	345.3	366.3	389.9	533.3	729.8	998.8	1,367.2
XI	Davao Region	197.7	211.2	226.3	317.6	442.1	612.6	846.4	400.8	428.4	462.2	665.0	940.6	1,317.9	1,835.9
XII	SOCCSKSARGEN	100.6	107.3	115.1	162.0	226.0	313.6	433.8	246.7	259.3	275.2	372.3	505.8	688.7	939.2
XIII	Caraga	54.1	58.4	62.4	87.2	120.9	167.1	230.5	105.8	114.2	120.4	158.7	211.6	284.2	383.5
ARMM	Autonomous Region in Muslim Mindanao	22.6	23.5	25.0	33.9	46.2	63.1	86.1	58.5	59.0	61.4	76.5	97.8	127.0	166.9

## Table 4.1-12Estimated GDP and GRDP (2019-2040) at Constant<br/>2000 Prices (in Billion Pesos) (Continued)

		Average Annual Growth Rate													
					TERTIA	RY						TOTAL			
		2013- 2018	2015- 2020	2020- 2025	2025- 2030	2030- 2035	2035- 2040	AGR 2018- 2040	2013- 2018	2015- 2020	2020- 2025	2025- 2030	2030- 2035	2035- 2040	AGR 2018- 2040
	Philippines	8.21%	6.89%	6.68%	6.62%	6.58%	6.56%	6.61%	6.40%	6.56%	6.50%	6.50%	6.50%	6.50%	6.50%
NCR	National Capital Region	8.16%	6.93%	6.69%	6.62%	6.59%	6.57%	6.64%	6.17%	6.54%	6.55%	6.53%	6.52%	6.52%	6.59%
CAR	Cordillera Administrative Region	8.19%	6.68%	6.58%	6.56%	6.54%	6.53%	6.54%	5.76%	6.10%	6.02%	6.17%	6.26%	6.32%	6.03%
I	Ilocos Region	8.80%	7.26%	6.89%	6.76%	6.69%	6.64%	6.78%	6.52%	6.76%	6.53%	6.52%	6.52%	6.51%	6.52%
11	Cagayan Valley	9.19%	7.10%	6.89%	6.76%	6.69%	6.64%	6.70%	5.09%	5.32%	5.86%	6.06%	6.17%	6.25%	6.10%
III	Central Luzon	7.49%	6.19%	6.28%	6.35%	6.39%	6.42%	6.30%	8.10%	7.89%	7.05%	6.86%	6.75%	6.69%	6.84%
IV-A	CALABARZON	7.74%	6.53%	6.43%	6.45%	6.47%	6.48%	6.43%	5.95%	6.02%	6.21%	6.30%	6.36%	6.39%	6.26%
IV-B	MIMAROPA	9.13%	7.67%	6.98%	6.82%	6.73%	6.67%	6.74%	5.32%	4.89%	5.44%	5.75%	5.94%	6.07%	5.64%
v	Bicol Region	8.89%	7.02%	6.82%	6.71%	6.65%	6.61%	6.68%	6.51%	6.30%	6.52%	6.51%	6.51%	6.51%	6.47%
VI	Western Visayas	7.99%	6.97%	6.66%	6.61%	6.58%	6.56%	6.55%	6.91%	6.63%	6.56%	6.54%	6.53%	6.53%	6.52%
VII	Central Visayas	8.32%	6.63%	6.71%	6.64%	6.60%	6.57%	6.64%	6.81%	6.90%	6.63%	6.59%	6.56%	6.55%	6.58%
VIII	Eastern Visayas	7.76%	7.11%	6.61%	6.57%	6.55%	6.54%	6.44%	4.27%	6.24%	5.98%	6.14%	6.23%	6.30%	6.14%
IX	Zamboanga Peninsula	7.91%	6.63%	6.49%	6.50%	6.50%	6.50%	6.40%	5.51%	5.06%	5.91%	6.09%	6.20%	6.27%	6.11%
х	Northern Mindanao	8.93%	7.36%	6.96%	6.80%	6.72%	6.66%	6.77%	6.62%	6.56%	6.46%	6.47%	6.48%	6.48%	6.46%
XI	Davao Region	9.13%	7.40%	7.01%	6.84%	6.74%	6.68%	6.83%	9.26%	8.71%	7.55%	7.18%	6.98%	6.85%	7.16%
XII	SOCCSKSARGEN	9.58%	7.55%	7.08%	6.88%	6.77%	6.70%	6.87%	5.89%	6.26%	6.23%	6.32%	6.37%	6.40%	6.27%
XIII	Caraga	8.98%	7.21%	6.90%	6.76%	6.69%	6.64%	6.81%	4.60%	4.51%	5.68%	5.93%	6.08%	6.18%	6.03%
ARMM	Autonomous Region in Muslim Mindanao	7.74%	6.40%	6.32%	6.38%	6.41%	6.43%	6.28%	3.49%	3.95%	4.51%	5.03%	5.37%	5.60%	4.88%

Source: JICA Study Team

## 4.2 Regional Development Scenario

### 4.2.1 Trends and Direction of Reginal Development

The general trends of the population growth and the economy were discussed in Chapter 2. This Section examines the economic development trend in more detail to evaluate development potentials and to formulate development scenarios. Then, the current settlement centers are analyzed by the characteristics of population, economic centers, administrative functions, and access to logistics centers. From the results of analysis, regional development scenarios are proposed, which are used as input for planning of HSH networks.

### (1) Characteristics of Regional Economy

In order to identify the development potential of each region, this Section analyzes 1) location quotient (LQ) and 2) special economic zones. Location quotient reveals the concentration of certain industries in regions as characteristics of the regional economy. Examination of SEZs supplements the location quotient analysis by offering detailed information on potential of the industry sector particularly.

## 1) Location Quotient Analysis

The location quotients of GRDP by industry and changes of the LQs from 2010 to 2017 are provided in **Table 4.2-1** and **Table 4.2-2**. According to the LQs of the primary, secondary and tertiary sectors estimated from GRDP data in **Table 4.2-1**, the primary sector is concentrated in ARMM, Cagayan Valley, SOCCSKSARGEN, Zamboanga Peninsula, MIMAROPA, Northern Mindanao, Bicol, and Ilocos Regions with more than a LQ of 2.2 in 2010. This result

shows significant concentration of primary sector activities in Mindanao, ARMM in particular, and in Cagayan Valley in Luzon, while there is less concentration in the regions in Visayas. The concentration of the primary sector was accelerated in these regions by 2017, except Zamboanga Peninsula. Cagayan Valley and ARMM have seen further concentration of the primary sector from 2010 to 2017.

The secondary sector is concentrated in CALABARZON, CAR, Eastern Visayas, Central Luzon, MIMAROPA, and Central Visayas in 2010. The top four regions in terms of the concentration of the secondary industry, CALABARZON, CAR, Eastern Visayas, and Central Luzon, remain unchanged in 2017. Davao, Central Visayas, Zamboanga Peninsula, and SCCSKSARGEN have seen the accumulation of secondary industry activities in 2017. Western Visayas and the regions in Mindanao, including Davao, Zamboanga Peninsula, and ARMM, have observed the development of the secondary industry.

The tertiary sector is predominantly concentrated in NCR from 2010 to 2017, due to the characteristics of the service sector-oriented industry in urban areas. There was an indication of enhancement of the tertiary sector in Eastern Visayas, MIMAROPA, ARMM, and CAR in 2017.

The analysis also indicated the balanced economic profiles of the two metropolitan areas, Central Visayas and Davao, among others.

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		2010			2015			2017		20	010-201	5	20	015-201	17	2	010-201	7
REGION / YEAR	PRIMARY	SECONDARY	ТЕКТІАКҮ	PRIMARY	SECONDARY	TERTIARY	PRIMARY	SECONDARY	ТЕКТІАКҮ									
PHILIPPINES	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NCR NATIONAL CAPITAL REGION	0.02	0.58	1.45	0.02	0.56	1.42	0.02	0.52	1.43	0.84	0.97	0.98	1.01	0.93	1.01	0.85	0.90	0.98
CAR ADMINISTRATIVE REGION	0.97	1.68	0.61	1.00	1.51	0.70	0.97	1.53	0.69	1.03	0.90	1.15	0.97	1.02	0.98	1.00	0.91	1.13
I ILOCOS	2.20	0.81	0.86	2.34	0.79	0.90	2.28	0.84	0.90	1.06	0.98	1.05	0.97	1.07	1.00	1.03	1.04	1.05
II CAGAYAN VALLEY	3.26	0.39	0.88	3.84	0.40	0.88	3.95	0.45	0.89	1.18	1.00	1.00	1.03	1.13	1.01	1.21	1.13	1.01
III CENTRAL LUZON	1.53	1.23	0.75	1.72	1.31	0.70	1.67	1.42	0.65	1.13	1.06	0.93	0.97	1.09	0.93	1.09	1.15	0.86
IVA CALABARZON	0.57	1.91	0.56	0.58	1.85	0.57	0.60	1.82	0.57	1.03	0.97	1.02	1.02	0.98	1.01	1.05	0.95	1.03
IVB MIMAROPA REGION	2.28	1.08	0.68	2.40	1.00	0.77	2.35	0.97	0.82	1.05	0.92	1.12	0.98	0.97	1.07	1.03	0.89	1.20
V BICOL	2.21	0.58	0.99	2.24	0.68	0.98	2.30	0.67	1.00	1.02	1.17	0.99	1.03	0.99	1.02	1.04	1.16	1.01
VI WESTERN VISAYAS	2.18	0.52	1.04	2.11	0.69	1.00	2.18	0.71	1.00	0.97	1.33	0.96	1.03	1.03	1.00	1.00	1.38	0.96
VII CENTRAL VISAYAS	0.71	1.08	1.01	0.62	1.11	1.00	0.65	1.12	0.98	0.88	1.03	0.99	1.04	1.01	0.98	0.92	1.04	0.97
VIII EASTERN VISAYAS	1.93	1.35	0.60	1.75	1.24	0.74	1.75	1.25	0.74	0.90	0.92	1.23	1.00	1.01	1.00	0.90	0.93	1.23
IX ZAMBOANGA PENINSULA	2.48	0.90	0.75	2.08	1.13	0.74	2.04	1.11	0.78	0.84	1.26	0.99	0.98	0.98	1.05	0.82	1.24	1.04
X NORTHERN MINDANAO	2.22	1.00	0.75	2.43	1.02	0.75	2.54	1.03	0.76	1.09	1.02	1.00	1.05	1.01	1.01	1.14	1.03	1.01
XI DAVAO REGION	1.70	0.90	0.91	1.43	1.03	0.91	1.31	1.15	0.86	0.84	1.14	1.00	0.92	1.12	0.95	0.77	1.27	0.95
XII SOCCSKSARGEN	2.73	0.94	0.67	2.80	1.02	0.69	2.70	1.08	0.70	1.03	1.08	1.03	0.96	1.06	1.01	0.99	1.15	1.04
XIII CARAGA	2.09	0.92	0.82	1.80	1.11	0.80	1.87	1.01	0.87	0.86	1.20	0.98	1.04	0.91	1.08	0.89	1.09	1.06
ARMM AUTONOMOUS REGION IN	Ι																	
MUSLIM MINDANAO	5.55	0.15	0.55	6.15	0.17	0.63	6.62	0.17	0.66	1.11	1.14	1.15	1.08	1.04	1.03	1.19	1.18	1.19

 Table 4.2-1
 Location Quotients of Three Economic Sectors by Region

Source: GRDP Data: PSA.

Table 4.2-2 provides the LQs of each sector in 2010 and 2017 and their changes for comparison of the characteristics of the regional economy. The economy of NCR is characterized by strong service sectors of which trade and repair of motor vehicles, financial service and real estates are the leading subsectors. CAR is strong in agriculture and forestry, mining, and manufacturing, while the service sector is currently expanding. Ilocos Region has a good concentration of the primary and secondary sectors, including agriculture and forestry, fishery, and energy subsectors, except manufacturing subsector. Those sectors have exhibited further development from 2010 to 2017. Cagayan Valley has a predominantly agricultural based economy, followed by transportation, mining, public administration, and other service subsectors. In Central Luzon, the primary and secondary sectors of agriculture and forestry, fishery, and manufacturing, are the leading sectors and the expansion of energy and manufacturing sectors have been observed. The CALABARZON economy is led by the manufacturing subsector of which concentration is the highest in the country, both in 2010 and 2017. MIMAROPA has a strong mining sector, followed by fishery and agriculture and forestry. Bicol is characterized by a balanced economy of agriculture and forestry, fishery, mining, and construction, which are currently expanding, and public administration and other service subsectors, though manufacturing subsector is weak.

The economic structure of Western Visayas is similar to Bicol, with relatively balanced development of subsectors in primary, secondary and tertiary sectors. The subsectors in the secondary sector, except manufacturing, has been growing in Western Visayas. The leading subsector in Central Visayas is construction, followed by other services. Eastern Visayas has strong subsectors in energy, agriculture and forestry, and fishery. Mining, construction, transport and financial subsectors have expanded from 2010 to 2017. Zamboanga Peninsula has a competitive fishery subsector, followed by agriculture and forestry; however, the fishery subsector has weakened by 2017, though still competitive in the country. In Northern Mindanao, agriculture and forestry, fishery and energy and water supply subsectors are relatively developed and have expanded by 2017, with mining and construction subsectors. Davao Region is strong in agriculture and forestry and construction, and from 2010 to 2017, the growth of the secondary subsectors of electricity, gas and water supply, construction and manufacturing has been recorded. SOCCSKSARGEN has an advantage in the primary sector of agriculture and forestry, and fishery subsectors. In Caraga Region, the mining subsector is the most competitive, followed by agriculture and forestry, transportation, fishery, public administration, and construction. The economy of ARMM is led by fishery and agriculture and forestry and there is also strong public administration sector. By 2017, the mining and construction subsectors have rapidly expanded, though still less competitive.

This analysis indicates that in general the economic sectors that already established certain levels of concentration have enhanced their position in the country in the past. Thus, it is expected that the composition of the economic sectors and advantages of the strong sector in each region would less likely change. On the other hand, the position of the secondary and tertiary sectors are advanced in some regions such as Davao Region, probably along with the development of the regional economy and expansion of urban activities. Therefore, it is essential to support the development of economic sectors, taking advantage of local characteristics and endowments in the currently growing areas and cities with high potentials of population growth and economic development.

2010																
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PHILIPPINES	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NCR NATIONAL CAPITAL REGION	0.0	0.0	0.0	0.5	0.8	0.9	0.8	1.8	1.5	1.5	1.4	1.3	0.0	0.6	1.5	1.0
ADMINISTRATIVE REGION	1.2	0.1	3.2	1.9	1.1	0.5	0.7	0.3	0.5	0.7	0.8	0.9	1.0	1.7	0.6	1.0
	2.3	1.9	1.3	0.2	1.4	3.4	1.4	0.5	0.9	0.7	1.0	1.1	2.2	0.8	0.9	1.0
II CENTRAL LUZON	1.5	1.6	0.3	1.4	1.0	0.7	1.4	0.5	0.9	0.8	0.6	0.7	1.5	1.2	0.8	1.0
NA CALABARZON MIMAROPA REGION	0.5	0.7	0.2	2.4	0.7 1.4	1.1	0.9	0.5	0.5	0.8 0.6	0.3	0.5	0.6 2.3	1.9	0.6 0.7	1.0 1.0
V BICOL	2.1	2.7	2.3	0.1	1.6	1.2	1.3	0.5	1.0	1.0	1.8	1.2	2.2	0.6	1.0	1.0
VI WESTERN VISAYAS VII CENTRAL VISAYAS	0.7	2.7	1.8	0.3	1.3	0.3	1.5	0.8	1.0	0.8	1.0	1.4	0.7	0.5	1.0	1.0
VIII EASTERN VISAYAS	1.8	2.4	0.1	1.1	1.1	3.4	1.0	0.3	0.5	0.5	1.1	0.8	1.9	1.3	0.6	1.0
X NORTHERN MINDANAO	2.5	1.3	0.3	0.9	1.0	1.9	0.9	0.9	0.5	0.5	0.8	0.8	2.5	1.0	0.8	1.0
XI DAVAO REGION XII SOCCSKSARGEN	2.0	0.5	2.4	0.7	1.6	0.3	1.0	1.2	0.7	0.7	0.6	0.9	1.7	0.9	0.9	1.0 1.0
XIII CARAGA	2.2	1.6	14.7	0.1	1.4	0.5	1.8	0.2	0.7	0.6	1.5	1.1	2.1	0.9	0.8	1.0
ARMM AUTONOMOUS REGION IN MUSLIM MINDANAO	5.3	6.5	0.2	0.0	0.1	0.8	0.4	0.1	0.3	0.7	2.5	0.6	5.6	0.1	0.5	1.0
0047																
2017	PRIMA	ARY		SE	CONDARY	,			TE	RTIARY						
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REGION / YEAR 2017	AGF HUN FOR	FISF	MIN	MAN	CO	ELE WAT	STO CON	DE NOT NOT PER HOL	FIN/ INTE	REA	S C O F O B O B O B O B O B O B O B O B O B	OTF	PRI	SEC	TER	тот
PHILIPPINES	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NCR NATIONAL CAPITAL REGION	0.0	0.0	0.0	0.5	04	0.9	0.8	17	15	15	14	12	0.0	0.5	14	10
CAR CORDILLERA		0.0	0.0	0.0	0.1	0.0	0.0							0.0		
ADMINISTRATIVE REGION	1.1	0.1 2.7	1.3 1.8	1.8	0.9	0.6	0.8	0.3	0.6	0.9	0.9	1.1 1.3	1.0 2.3	1.5 0.8	0.7	1.0 1.0
II CAGAYAN VALLEY	4.5	1.1	2.8	0.1	1.3	1.0	1.8	0.3	0.9	0.6	1.3	1.4	4.0	0.4	0.9	1.0
III CENTRAL LUZON IVA CALABARZON	0.6	1.6	0.2	2.3	0.8	1.0	0.9	0.4	0.8	0.6	0.5	0.5	0.6	1.4	0.7	1.0
MIMAROPA REGION	2.2	3.0	18.9	0.2	1.3	0.2	1.5	0.3	0.7	0.6	1.3	1.3	2.4	1.0	0.8	1.0
VI WESTERN VISAYAS	2.1	2.4	3.4	0.2	1.9	0.4	1.4	0.5	1.0	0.6	1.0	1.4	2.3	0.7	1.0	1.0
VII CENTRAL VISAYAS VIII FASTERN VISAYAS	0.7	0.5	0.8	1.0	1.8 1.7	0.5	1.1	0.9	1.0	1.0	0.7	1.2 1.0	0.6	1.1 1.3	1.0	1.0 1.0
IX ZAMBOANGA PENINSULA	1.7	3.6	0.4	1.1	1.8	0.3	0.9	0.6	0.7	0.5	1.3	1.1	2.0	1.1	0.8	1.0
X NORTHERN MINDANAO XI DAVAO REGION	2.7	1.9 0.4	0.5	0.9	1.4 2.1	1.7	1.0 1.0	0.9	0.5	0.4	0.8	0.8 0.9	2.5 1.3	1.0 1.2	0.8	1.0 1.0
XII SOCCSKSARGEN	2.7	2.9	0.3	1.1	1.3	1.1	1.0	0.6	0.7	0.5	0.9	0.8	2.7	1.1	0.7	1.0
XIII CARAGA ARMM AUTONOMOUS REGION IN	1.9	1.8	18.6	0.1	1.8	0.5	2.4	0.2	0.6	0.5	1.4	1.1	1.9	1.0	0.9	1.0
MUSLIM MINDANAO	6.1	9.4	0.8	0.1	0.3	0.7	0.6	0.1	0.5	0.7	3.4	0.7	6.6	0.2	0.7	1.0
2010-2017																
	PRIMA	ARY		SE	CONDARY	P.		ο Ο	TE	RTIARY	AL					
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	ND ND		<u> </u>	TURI	CTIO	PPL/	RTAT AND CATIC	D RE CLES CLES LD G	IATIC	ATE	ATIC	RVIC		Ϋ́		
	CULT ING /	g	G AN RYIN	IFACI	STRU	TRICI R SU	SPOF	E AN DTOF DRCY ONAL	ICIAL	EST/	NSE: NSE: NLSC	R SE	ARY	NDA	IARY	_
REGION / YEAR 2010-2017	HUNT	FISHI	MININ QUAF	MANU	CONS	ELEC	TRAN STOF COM	TRAD OF M MOTO PERS HOUS	INTER	REAL	PUBL	OTHE	PRIM	SECO	TERT	TOTA
PHI IPPINES	10	10	10	10	10	10	10	10	10	10	10	10	1.0	10	10	10
		1.0				1.0						1.0				
NCR NATIONAL CAPITAL REGION CAR CORDILLERA	0.8	1.0	0.0	1.1	0.5	1.0	0.9	1.0	0.9	1.0	1.0	1.0	0.8	0.9	1.0	1.0
ADMINISTRATIVE REGION	1.0	1.5	0.4	1.0	0.8	1.2	1.1	1.2	1.1	1.2	1.1	1.1	1.0	0.9	1.1	1.0
II CAGAYAN VALLEY	1.0	1.4	1.4	0.9	0.9	1.5	1.0	1.1	1.1	0.9	1.0	1.2	1.0	1.0	1.0	1.0
III CENTRAL LUZON	1.1	1.1	0.8	1.1	1.1	1.3	0.9	0.8	1.0	0.8	0.9	0.8	1.1	1.2	0.9	1.0
MIMAROPA REGION	1.2	0.8	0.9	1.3	0.9	1.0	1.3	1.1	1.3	1.0	1.2	1.3	1.0	0.9	1.0	1.0
V BICOL	1.0	1.3	0.8	1.3	1.2	1.3	1.1	1.1	1.0	0.8	1.0	1.1	1.0	1.2	1.0	1.0
VII CENTRAL VISAYAS	0.9	0.9	1.9	1.0	1.1	0.9	1.0	1.0	0.9	0.9	1.0	1.0	0.9	1.4	1.0	1.0
VIII EASTERN VISAYAS IX ZAMBOANGA PENINSULA	0.9	0.8	2.3	0.8	1.5	1.0	1.4	1.2	1.4	0.8	1.3	1.3 1.1	0.9	0.9	1.2	1.0 1 0
X NORTHERN MINDANAO	1.1	1.4	1.5	1.0	1.4	0.9	1.1	1.1	1.0	0.9	1.0	1.0	1.1	1.0	1.0	1.0
XI DAVAO REGION XII SOCCSKSARGEN	0.7	0.7	0.4	1.3 1.2	1.3 1.1	1.6 1.1	1.0 1.0	1.0	0.9	1.0 1.0	0.9	0.9	0.8	1.3 1.1	0.9	1.0 1.0
	0.9	1.1	1.3	0.9	1.3	1.1	1.3	1.0	1.0	0.9	1.0	1.0	0.9	1.1	1.1	1.0
MUSLIM MINDANAO	1.1	1.5	4.0	1.1	2.3	0.8	1.3	1.3	1.5	1.0	1.3	1.3	1.2	1.2	1.2	1.0

## Table 4.2-2 Location Quotients of by Sectors and by Region in 2010 and 2017

Source: GRDP Data: PSA.

Region/ High LQ*	1	2	3	4	5	6	7
NCR	Trade & repair of motor vehicles, etc. (1.7)	Financial intermediation (1.5)	Real estate (1.5)	Public admin. (1.4)	Other services (1.2)		
CAR	Manufacturing (1.8)	Mining & quarrying (1.3)	Agriculture (1.1) Public admin. (1.1)				
Region I ILOCOS	Electricity & utilities (3.2)	Fishing (2.7)	Agriculture (2.2)	Construction (1.9)	Mining & quarrying (1.8)	Transportation (1.4)	Other services (1.3)
Region II Cagayan Valley	Agriculture (4.5)	Mining & quarrying (2.8)	Transportation (1.8)	Other services (1.4)	Construction (1.3) Public admin. (1.3)	Fishing (1.1)	
Region III Central Luzon	Agriculture (1.7)	Fishing (1.6)	Manufacturing (1.6)	Transportation (1.2)	Construction (1.1)		
Region IVA CALABARZON	Manufacturing (2.3)						
Region IVB MIMAROPA	Mining & quarrying (18.9)	Fishing (3.0)	Agriculture (2.2)	Transportation (1.5)	Construction (1.3) Public admin. (1.3) Other services (1.3)		
Region V BICOL	Fishing (3.4)	Agriculture (2.1)	Construction (2.0)	Mining & quarrying (1.8) Public admin. (1.8)	Electricity & utilities (1.6)	Transportation (1.4) Other services (1.4)	
Region VI Western Visayas	Mining & quarrying (3.4)	Fishing (2.4)	Agriculture (2.1)	Construction (1.9)	Transportation (1.5)	Other services (1.4)	Public admin. (1.1)
Region VII Central Visayas	Construction (1.8)	Other services (1.2)	Transportation (1.1)				
Region V III Eastern Visayas	Electricity & utilities (3.6)	Fishing (2.0)	Agriculture (1.7) Construction (1.7)	Public admin. (1.5)	Transportation (1.4)		
Region IX Zamboanga Peninsula	Fishing (3.6)	Construction (1.8)	Agriculture (1.7)	Public admin. (1.3)	Manufacturing (1.1) Other services (1.1)		
Region X Northern Mindanao	Agriculture (2.7)	Fishing (1.9)	Electricity & utilities (1.7)	Construction (1.4)			
Region XI Davao Region	Construction (2.1)	Agriculture (1.5)	Trade and repair of motor vehicles, etc. (1.1)				
Region XII SOCCSKSARGEN	Fishing (2.9)	Agriculture (2.7)	Construction (1.3)	Manufacturing (1.1) Electricity & utilities (1.1)			
Region XIII CARAGA	Mining & quarrying (18.6)	Transportation (2.4)	Agriculture (1.9)	Fishing (1.8) Construction (1.8)	Public admin. (1.4)	Other services (1.1)	
ARMM	Fishing (9.4)	Agriculture (6.1)	Public admin. (3.4)				

 Table 4.2-3
 Concertation of Economic Sectors in Each Region

Note: Economic Sector: Agriculture: Agriculture, hunting and forestry, Electricity & utilities: Electricity, gas and water supply; Transportation: Transportation, storage and communication; Trade and repair of motor vehicles, etc.: Trade and repair of motor vehicles, motorcycles, personal and household goods; Public Admin. - Public administration & defense; compulsory social security \* The sectors with Location Quotient of more than 1.0 are presented in Table. The number in bracket indicates LQ for each sector.

Source: JICA Study Team calculated using GRDP Data from PSA.

## (2) Special Economic Zones

Special Economic Zones (SEZs) or Ecozones are defined by the Republic Act No. 7916 (the Special Economic Zone Act of 1995), as highly developed areas or the areas with the potential for development of "agro-industrial, Industrial tourist/recreational, commercial, banking, investment and financial centers." There can exist "Industrial Estates (IEs), Export Processing Zones (EPZs), Free Trade Zones, and Tourist/Recreational Centers" in ecozones.

The Philippines Economic Zone Authority (PEZA) issues a certificate to an SEZ, which is basically developed by the private sector which applies for the SEZ status to obtain fiscal and non-physical incentives. The eligible economic activities in the SEZs include: export manufacturing, IT service export, tourism, medical tourism, agro-industrial export manufacturing, agro-industrial export bio-fuel manufacturing and logistics and warehouse services.

As of November 2017, there are 379 operating and 141 proclaimed SEZs. As shown in **Table 4.2-4**, 67% of the operating and proclaimed SEZs are categorized as IT Park, followed by manufacturing SEZs (23%), both agro-industrial and tourism SEZs (approximately 5% each), and medical SEZs (2%). Among 379 operating SEZs, 44% of SEZs are located in NCR; 15% and 13% of the SEZs exist in CALRBARZON and Central Visayas Region respectively. The ratio of operating SEZs; CALABARZON and Central Visayas account for 13% and 12% respectively; 8% of the proclaimed ones are found in both of Central Luzon and Western Visayas. The increasing trend of SEZs is observed in the regions of Caraga, Central Luzon, Bicol, Western Visayas, and Northern Mindanao. In terms of province / city, new SEZs are planned to be established in Cagayan de Oro City in Northern Mindanao, Bulacan Province in Central Luzon, Negros Oriental Province in Central Visayas, and Iloilo and Bacolod City in Western Visayas.

Although it is the NCR that accommodates the largest number of the operating and proclaimed SEZs, the analysis of the proclaimed SEZs suggest a declining trend in establishment of SEZs in the NCR. Instead, among the regions, CALABARZON and Central Luzon and the currently emerging cities and areas such as Cagayan de Oro and Bulacan have started attracting the SEZs. It is suspected that the investors might be looking for an alternative location, to avoid the excessively congested NCR. If so, the formulation of an appropriate policy to encourage establishment of SEZs with incentives to investors is crucial to attract investors outside the NCR and other established regions for balanced regional development across the country. **Figure 4.2-1** and **Figure 4.2-2** provide the overview of distribution of SEZs by status and type in each of the regions.

Status/ Type	Agro- Industrial	IT Park	Manufacturi ng	Medical	Tourism	Total
Oneneting	22	249	88	2	18	379
Operating	5.8%	65.7%	23.2%	0.5%	4.7%	72.9%
<b>D</b> 1 · 1	6	98	31	0	6	141
Proclaimed	4.3%	69.5%	22.0%	0.0%	4.3%	27.1%
Tetel	28	347	119	2	24	520
Total	5.4%	66.7%	22.9%	0.4%	4.6%	100.0%

Table 4.2-4SEZs by Status and by Type as of November 2017

Source: PEZA



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Source: PEZA Figure 4.2-1 Distribution of SEZs by Status of Operating/ Proclaimed as of November 2017



Figure 4.2-2 Distribution of SEZs by Type as of November 2017



Source: Philippines Economic Zone Authority



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Source: Philippines Economic Zone Authority



## 4.2.2 Analysis of Metropolitan, Regional and Sub-regional Centers

## (1) Methodology of Analysis of Settlement Centers

The National Spatial Strategy (NSS) and the Physical Development Framework Plans formulated by the National Economic and Development Authority (NEDA) have proposed a settlement hierarchy. At the national level, the proposed settlement hierarchy has designated three levels of centers, namely: 1) metropolitan centers, 2) regional centers, and 3) sub-regional centers. At the local levels such as island or regional levels, provincial and local centers are specified. This analysis focuses on the analysis of settlements at the upper three levels.

The number of centers is four (4), thirty-seven (37) and one hundred and sixteen (116) for metropolitan, regional and sub-regional centers, respectively; the total is one hundred and fifty-seven (157). In this analysis, the characteristics of a city representing a metropolitan center, for example, Manila City for Metro Manila, is analyzed. Therefore, the total number of analyzed centers are one hundred and fifty-eight (157). According to the Draft National Physical Development Framework Plan 2016-2045, the overall characteristics of these centers are articulated in **Table 4.2-5**. The three-tiered system of center development has envisioned the future direction of nationwide center development by the central Government of Philippines. The details of these centers are described in **Table 4.2-7**.

Settlement Centers	Characteristics
Metropolitan Centers (4)	<ul> <li>Serve as the economic and administrative centers</li> <li>Primary international gateways</li> <li>Have distinct functions in         <ul> <li>innovation and advanced services</li> <li>culture and tourism</li> <li>education and research</li> <li>transportation and trade</li> <li>manufacturing and technology development</li> </ul> </li> </ul>
Regional Centers (37)	<ul> <li>Serve as regional markets and service centers to provinces         <ul> <li>✓ Regional Administrative Center</li> <li>✓ International Gateway</li> <li>✓ Tourism Hub</li> </ul> </li> <li>Direct linkages to Metro Manila and/or the metropolitan center in the Island Group (Luzon, Visayas, Mindanao)</li> </ul>
Sub-Regional Centers (116)	<ul> <li>Form the market catchments of regional centers.</li> <li>Connect to and serve as service centers of smaller provincial and local centers.         <ul> <li>Tourism Center/ Hub</li> <li>Agri-Industrial Center/ Hub</li> <li>Industrial Center / Hub</li> <li>Higher Education / Learning Center</li> </ul> </li> </ul>

Table 4.2-5	Settlement Cer	iter Hierarchy	and Characteristics
1 abic <b>-</b> .2-3	Settlement Cer	nul inclatury	and Characteristics

Source: NEDA. 2016. Draft National Physical Development Framework Plan 2016-2045

	Tuble III	o menopontan a	na negional centers	
	Luz	zon	Visayas	Mindanao
Metropolitan Centers	Metropolitan Manila		Metro Cebu	Metro Davao Metro Cagayan de Oro*
Regional Centers	<ul> <li>Laoag City</li> <li>Tuguegarao City</li> <li>Tabuk City</li> <li>Santiago City</li> <li>San Fernando City</li> <li>Metro Baguio</li> <li>Cabanatuan City</li> <li>Tarlac City</li> <li>Metro Subic</li> <li>Balanga City</li> <li>Metro Clark</li> </ul>	<ul> <li>Baliuag</li> <li>Malolos City</li> <li>Dasmarinas City</li> <li>Antipolo City</li> <li>Calamba City</li> <li>Batangas City</li> <li>Lucena City</li> <li>Calapan City</li> <li>Puerto Princesa City</li> <li>Legazpi City</li> <li>Metro Naga</li> </ul>	<ul> <li>Metro Iloilo-</li> <li>Metro Bacolod</li> <li>Tagbilaran City</li> <li>Tacloban City</li> <li>Ormoc City</li> </ul>	<ul> <li>Zamboanga City</li> <li>General Santos City</li> <li>Butuan City</li> <li>Cotabato City</li> <li>Dipolog City</li> <li>Jolo</li> <li>Surigao City</li> <li>Pagadian City</li> <li>Koronadal City</li> </ul>

 Table 4.2-6
 Metropolitan and Regional Centers

*Note: \* Cagayan de Oro is expected to be a metropolitan center by 2025. Source: NEDA. Philippine Development Plan 2017-2022.* 

<b>Table 4.2-7</b>	<b>Regional and Sub-Regional Centers</b>

	Region	<b>Regional Centers</b>	ers Sub Regional Centers		
Luzon	CAR	Baguio	Alfonso Lista Potia	Flora	Pudtol
		Tabuk	Banaue	Kiangan	Sadanga
			Bangued	La Paz	San Isidro
			Bauko	Lamut Langiden	Santa Marcela
			Besao	Luna	Tayum
			Bontoc	Penarrubia	Tubo
			Danglas	Pidigan	
	Region 1 Ilocos	Laoag	Dagupan	Cauayan	Santa Ana
		City of San	Alaminos	Ilagan	
		Fernando			
	Region II -	Santiago	Arayat		
	Cagayan Valley	Tuguegarao	Capas		
	Region III Central	Angeles	Concepcion	San Fernando	
	Luzon	Balanga	Hagonoy	San Ildefonso	
		Baliuag	Lubao	San Jose City	
		Cabanatuan	Mabalacat	San Jose del Monte	
		Malolos	Marilao	San Miguel	
		Olongapo-	Mariveles	Santa Maria	
		Subic	Mexico		
		Tarlac City	Meycauayan		
	Region IVA -	Antipolo	Bacoor	Imus Lipa	Sariaya
	CALABARZON	Batangas City	Baras	Nasugbu	Silang
		Calamba	Binan	Rodriguez	Tanauan
		Dasmarinas	Cabuyao	Montalban	Tanza
		Lucena	Cainta	San Mateo	Taytay
			General Mariano	San Pablo	
			Alvarez	San Pedro	
			General Trias	Santa Rosa	
	Region IVB -	Calapan	Boac	San Jose	
	MIMAROPA	Puerto Princesa	Romblon		
	Region V - Bicol	Legazpi	Daet	Masbate City	Sorsogon City
		Naga	Iriga	Matnog	Tabaco
			Ligao	Pili	Virac
Visayas	Region VI -	Bacolod	Dumangas	Kalibo	San Carlos
	Western Visayas	Iloilo City	Estancia	Malay	San Jose de
			Jordan	Miagao	Buenavista
			Kabankalan	Roxas City	
	Region VII -	Tagbilaran	Bogo	Toledo	
	Central Visayas		Dumaguete	Tubigon	
	Region VIII -	Ormoc	Calbayog		
	Eastern Visayas	Tacloban	Catbalogan		

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	Region	<b>Regional Centers</b>		Sub Regional Centers	
Mindanao	Region IX -	Dipolog	Aurora	Gingoog	
	Zamboanga	Pagadian	Ipil		
	Peninsula	Zamboanga City	Isabela City		
	Region X -		Iligan	Maramag	Valencia
	Northern		Laguindingan	Ozamiz	
	Mindanao		Malaybalay	Tubod	
	Region XI - Davao	Tagum	Digos	Mati	
			Malita	Panabo	
	Region XII -	Cotabato City	Glan	Polomolok	
	SOCCSKSARGEN	General Santos	Kidapawan	Tacurong	
		Dadiangas	Midsayap		
		Koronada			
	Caraga	Butuan	Bislig	Tandag	
	-	Surigao City	San Francisco	-	
	ARMM	Jolo	Bongao	Marawi	Parang

Source: NEDA. Philippine Development Plan 2017-2022.

For better planning and development of the HSH network, it is of great importance to comprehend the current specificities of these centers of different types. In this vein, this project identified typical types of the centers by analyzing their current conditions with the use of Principal Component Analysis (PCA) and Cluster Analysis as multivariate analysis. For a more comprehensive understanding of the centers, this analysis was conducted considering the following four (4) analytical dimensions, namely: 1) public administration, 2) demography, 3) industry, and 4) accessibility to logistics centers. Here, given that logistics centers are inclined to be developed with proximities to airports and/or seaports, the existence of large-scale airports and seaports is considered to represent accessibility to logistics centers in this analysis. The classification into typical types from the integrated perspective of these different dimensions ensures a numerical understanding of the multifaceted nature of the centers beyond the only categorization into metropolitan, regional and sub-regional centers. It is because the centers, even those of the same category, are assumed to have varied conditions in political or administrative, demographic, industrial and accessible terms. For this analysis, the number of employed variables is six (6) as shown in **Table 4.2-8**. The analysis flow is thus illustrated in Figure 4.2-5. This analysis attempted to reduce the number of employed variables to the extent possible in order to capture the characteristics of the centers in a simplified, but meaningful way, rather than to use a large number of variables.

Table 4.2-0 Employed Variables for Analysis of Centers				
Analytical Dimensions	Employed Variables	Notes		
Public administration	• Existence of provincial capitals	• Quantified with use of the number of 0 or 1 depending on their existence		
Demography	<ul> <li>Population size as of 2018</li> <li>Annual average population growth rates during 2010 to 2015</li> </ul>			
Industry	Number of Special Economic Zones     (SEZs)	• Used the total number of SEZs, albeit their designations of different type		
Accessibility to logistics centers	<ul> <li>Existence of large-scale airports</li> <li>Existence of large-scale seaports</li> </ul>	• Focused on international and class-1 domestic airports and base ports, given a large number of airports and seaports across the nation		

 Table 4.2-8
 Employed Variables for Analysis of Centers

Source: JICA Study Team



Source: JICA Study Team

Figure 4.2-5 Analysis Flow of Centers

### (2) Results of the Analysis

As a result, the analysis identified five typical types of centers, namely: one type for metropolitan centers (referred to as the MC), two types for regional centers (as the RC-I and RC-II), and two types for sub-regional centers (as the SRC-I and SRC-II). Note that the metropolitan, regional and sub-regional centers are abbreviated as MC, RC and SRC. The characteristics of these five typical types from the viewpoint of the four (4) analytical dimensions are summarized in **Table 4.2-9**. These characteristics were captured by interpreting the numerical evidences of these typical types with the use of standardized average values, as illustrated in the radar graphs of **Figure 4.2-6**. The spatial distribution of the typical five types of centers across the nation is depicted in **Figure 4.2-7**, and centers by typical type are shown in **Table 4.2-10**. The positions of the centers plotted on Principal Components 1 and 2 are shown in **Figure 4.2-7** for metropolitan and regional centers and **Figure 4.2-8** for sub-regional centers; in simple terms, centers located on the right-hand side of the figures have a strong extent of growth/development potential and those on the left-hand side have a weak extent. Note that their positions need to be comprehended in relative, not absolute, terms. **Figure 4.2-10** shows the shares of those five typical types by region; the radius of each circle is

proportional to the number of centers in each region. Considering these, the main findings by this analysis are described below.

م ک		Analytical Dimensions					
erarchy on of Cent ion)	Centers	ation incial	Demography		(sZ	Accessibility to Logistics Centers	
Settlement Hie (Policy Categorizatio Classificati		Public Administr (Existence of Prov Capital)	Population Size (2015)	Annual Population Growth Rate (2010-2015)	Industry (Number of SE	Airport	Sea Port
Metropolitan Center (MC)	Type 1: MC	High	High	Medium	High	High	High
Regional Center	Type 2: RC-I (Strong)	High	Medium	Medium	Medium	High	Medium
(RC)	Type 3: RC-II (Weak)	Medium	Medium	Low	Low	Low	Low
Sub-regional	Type 4: SRC-I (Strong)	Low	Medium	High	Medium	Medium/ Low	Medium/ Low
(SRC)	Type 5: SRC-II (Weak)	Low	Low	Low	Low	Low	Low

 Table 4.2-9
 Characteristics of Typical Five Types of Centers

Source: JICA Study Team

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Figure 4.2-6 Relative Comparisons of Typical Types of Centers (Standardized Values)

ó. Legend \*0<sup>8</sup> Center Classification . 1 - Metropolitan Center 0 2 - Regional Center I 2 3 - Regional Center II 4 - Sub-Regional Center I 5 - Sub-Regional Center II SANTA ANA Municipal Boundary ADAG CITY PUDTOI Provincial Boundary IN ISIDRO TABUK CITY LAGAN CAUAYAN CITY BONTOC BANAUE ANTIAGO CITA BAGUIO CITY SAN JOSE CITY LAC CITY NCEPCION SAN MIGUEL AN HOSE DEL MONTE CITY BARAS 养N CITY UCENA GIF ABACO CITY EGAZEI CITY SORSOGON CITY ROMBLON NOC SBATE OF ALBAYOG CITY AL AY CATBALOGAN CITY ALIBO 0 ESTANCI/ TACLOBAN CITY DRMOG CHY-DUMANGAS 0 0 CARLOS CITY 0 CEBU CITY AN CITY TUBIGON D PUERTO PRINCESA CITY TAGBILARAN CITY MAGUETE CITY 32 NDAG CITY GINGOOG CITY OLOG CITY LAGUNDINGAN SAN ERANCISCO LIGAN CITY BISLIG CITY MALAYBALAY CITY BOD MARAWI CITY VALENCIA CITY GADIAN CITY TAGUM CITY PARANG KIDAPAWANCHEY à MALI CITY BOANGA CITY DIGOS CITY ABELA CITY MALITA GEN SANTOS CITY BONGAO nt 10

Source: JICA Study Team Figure 4.2-7 Spatial Distribution of Typical Five Types of Centers

Level		Strong Growth/Development Potential		Weak Growth/Development Potential	
	Metropolitan	<mc> Monile City</mc>			-
Luzon	Regional Center	ARC-I (Strong)> Laoag City San Fernando City Tuguegarao City Cabanatuan City Angeles City Tarlac City Olongapo-Subic Malolos City	Batangas City Dasmarinas City Calamba City Lucena City Antipolo City Calapan City Legazpi City Naga City	< <b>RC-II (Weak)&gt;</b> Baguio City Tabuk City Santiago City Balanga City Baliuag	
	Sub-regional Center	<src-i (strong)=""> Mariveles Marilao Mabalacat San Fernando City San Jose Del Monte City Santa Maria Lipa City Tanauan City Bacoor Gen.Trias Imus Silang Tanza Binan City Cabuyao Santa Rosa City Rodriguez (Montalban) San Mateo Taytay Masbate City</src-i>		<pre><src-ii (weak)=""> Bangued Danglas La Paz Langiden Penarrubia Pidigan San Isidro Flora Luna Pudtol Santa Marcela Alfonso Lista (Potia) Banaue Kiangan Lamut Bauko Besao Bontoc Sadanga Tayum Tubo Alaminos City Dagupan City Santa Ana Cauayan City Ilagan Haronoy</src-ii></pre>	Meycauayan City San Ildefonso Arayat Lubao Mexico Capas Concepcion San Miguel San Jose City Nasugbu Gen. Mariano Alvarez San Pablo City San Pedro Sariaya Baras Cainta Boac San Jose Romblon Ligao City Daet Iriga City Pili Virac Matnog Sorsoron City
	Metropolitan	<mc></mc>		Thagonoy	-
ß	Regional Center	<pre><rc-i (strong)=""> Iloilo City Tagbilaran City Bacolod City</rc-i></pre>	Ormoc City Tacloban City Puerto Princesa City		-
Visaya	Sub-regional Center	<src-i (strong)=""> Roxas City Dumaguete City</src-i>		<pre><src-ii (weak)=""> Malay San Carlos City Kalibo San Jose Jordan Dumangas Estancia</src-ii></pre>	Miag-Ao Tubigon Bogo City Toledo City Kabankalan City Calbayog City Catbalogan City
	Metropolitan Center	< <b>MC&gt;</b> Davao City	Cagayan De Oro City		-
	Regional Center	< <b>RC-I</b> (Strong)> Dipolog City Pagadian City Zamboanga City Tagum City	Cotabato City Gen. Santos City Butuan City Surigao City	< <b>RC-II</b> (Weak)> Jolo Koronadal City	
Mindanao	Sub-regional Center	< <b>SRC-I</b> (Strong)> Iligan City Polomolok Mati City		<src-ii (weak)=""> Marawi City Malaybalay City Valencia City Ozamis City Gingoog City Panabo City Digos City Kidapawan City Midsayap Parang Bongao Ipil</src-ii>	Maramag Tubod Laguindingan Malita Glan Tacurong City San Francisco Bislig City Tandag City Isabela City Aurora

Table 4.2-10	<b>Centers Classified into Five Typical Types</b>
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Source: JICA Study Team



Source: JICA Study Team. Note: X and Y axes indicate Principal Component 1 and 2, respectively. In simple terms, centers located on the right-hand side of the figure have a strong extent of growth/development potential; centers located on the upper side of the figure have a strong extent of access to seaport/ airport and functions as the provincial capital.

Figure 4.2-8 Relative Extent of Growth/Development Potential of Metropolitan and Regional Centers



Source: JICA Study Team. Note: X and Y axes indicate Principal Component 1 and 2, respectively. In simple terms, centers located on the right-hand side of the figure have a strong extent of growth/development potential; centers located on the upper side of the figure have a strong extent of access to seaport/airport and functions as the provincial capital.

Figure 4.2-9 Relative Extent of Growth/Development Potential of Sub-regional Centers


Note: The radius of each circle is proportional to the number of centers in each region. *Source: JICA Study Team* 

Figure 4.2-10 Shares of Typical Five Types of Centers by Region

The main findings, which need to be considered for the planning and development of the HSH network, are discussed below:

Necessity of maximizing use of sophisticated settlement hierarchy: The analysis results unveiled that the National Spatial Strategy (NSS) has set the settlement hierarchy of the centers in a very sophisticated manner. It is therefore essential to plan the HSH network in line with this hierarchy. According to the analysis results, higher-order centers have tended to possess the greater extents of growth/development potential in all the analytical dimensions of public administration, demography, industry and accessibility to logistics centers. This tendency is obviously witnessed by comparisons among the MCs, RC-Is (Strong), RC-IIs (Weak) and SRC-IIs (Weak). Given that the MCs, namely Metro Manila, Metro Cebu, Metro Davao and Metro Cagayan de Oro, have the strongest extent of growth/development potential in all the analytical dimensions, the employed variables of these dimensions have proportionally and coincidently become greater from the SRC-IIs through the RC-Is and RC-IIs to the MCs. From another viewpoint, this tendency is underpinned by the fact that the employed variables of all the analytical dimensions are positively correlated. In short, the centers with political and geographical advantages have a tendency to experience demographic and economic growth. This tendency obviously represents the well-structured designations of three-tiered centers from sub-regional through regional to metropolitan centers by the National Spatial Strategy (NSS). Therefore, the current alignments of the HSH that plan to connect metropolitan centers with almost all the regional centers will contribute to the current spatial strategies of both 'concentration' and 'connectivity' without any distortions of development potential. Overall, the planned HSH network can achieve the promotion of metropolitan agglomerations and the strengthening of cohesions among metropolitan, regional and sub-regional centers.

Metropolitan centers and balanced regional development: At the same time, it is necessary to consider the fact that the MCs, especially Metro Manila, have continued to steadily experience population and economic growth. Looking at the shares of five typical types by region in Figure 4.2-10, the growth of regional and sub-regional centers can be observed in Region III and Region IV-A surrounding the NCR. However, the regions centered even on the other three metropolitan centers, namely, Region VII on Metro Cebu, Region XI on Metro Davao, and Region X on Metro Cagayan de Oro, have not yet experienced the sorts of growth especially at regional and sub-regional levels, though it is not surprising for Metro Cagayan de Oro, since it does not obtain the metropolitan status yet. Note that these three metropolitan centers, except for Metro Manila, have recently experienced rapid demographic and economic growth, with annual population growth rates during 2010 to 2015 of 1.3%, 2.4% and 2.3% for Manila, Cebu, Davao and Cagayan de Oro City, respectively. The HSH network can serve to promote the 'connected' growth within/among each of Region VII, Region XI and Region X, simultaneously accelerating the 'concentrated' growth of each of these three metropolitan centers. In addition, the HSH network is crucial to tap the development potentials and promote the functional development of the regions of those three metropolitan centers.

The prosperity of these regions centered on Metro Cebu, Metro Davao, and Metro Cagayan de Oro can contribute to accelerating the growth of the lagging regions surrounding each of the regions. Regions surrounding these three regions are relatively left behind, as evidenced in Regions VI and VIII surrounding Region VII, and Regions XII, XIII, IX and the ARMM surrounding Region XI and Region X. The shares of the RC-II (Weak) and SRC-II (Weak) are relatively high in these regions. At present, the regions adjacent to metropolitan centers that have benefitted from their large population and economic agglomeration are limited to Region III and Region IV-A, as observed in the current growth with higher shares of the RC-I (Strong) and SRC-I (Strong). In addition, the northern part of the Luzon island with a substantial amount of the centers, namely Regions I and II and the CAR, have been relatively left behind, as witnessed by higher shares of the RC-II (Weak) and SRC-II (Weak). Therefore, the HSH network needs to strengthen connections with these northern regions from the NCR.

Despite the prediction of decline in the future rates of their growth, excessive concentration on Metro Manila will worsen urban problems, such as traffic congestion and environmental degradation, leading to increased risk in the extent of functional paralysis of metropolitan centers in case of disasters. The continuous efficient functioning of the metropolitan centers and surrounding conurbations needs to be secured by promoting functional dispersion from Metro Manila. The HSH network will serve to achieve the sustainable and resilient growth of metropolitan centers by avoiding this excessive concentration, and to contribute to nation-wide balanced development by facilitating spatial dispersions of population and industry into provinces. In this sense, it will play a crucial role in achieving the desirable extent of 'concentration', strengthening 'connectivity' among different types of the centers, and securing 'vulnerability reduction'.

**Existence of regional centers with weak growth/development potential**: As mentioned above, the regional centers are classified into strong and weak centers in relative terms, namely the RC-I (Strong) and RC-II (Weak). It is necessary to pay attention to the regional centers with the weak extent of growth/development potential. The sorts of weak regional centers, namely those classified into the RC-II (Weak), are Tabuk, Santiago, Baguio, Baliuag, Balanga, Jolo and Koronadal City. The current plan of the HSH network already plans to connect all the strong regional centers classified into the RC-I (Strong) by the class-1 highways, and pursue to connect those weak regional centers classified into the RC-II (Weak) to a possible extent by the class-2 highways. By this, the HSH network can make better hierarchical connections at the levels of metropolitan and regional centers, which can facilitate the steady growth of the weak regional centers.

Existence of sub-regional centers with strong growth/development potential: The subregional centers are also divided into strong and weak centers in relative terms, namely SRC-I (Strong) and SRC-II (Weak). It is notable that the SRC-1 (Strong) has the highest pace of population growth on average; yet, almost all the rapidly growing sub-regional centers are located near the NCR owing to benefits from its largest population and economic agglomeration of Metro Manila (see Figure 4.2-7 and Table 4.2-10). It is unique that there exist the sorts of sub-regional centers with the strong extent of growth/development potential, with similar population sizes and faster paces of population growth even in comparison to strong regional centers of the RC-I (Strong). It is desirable that these strong sub-regional centers are taken into account in the planning and development of the HSH network. The rapidly growing sub-regional centers near the NCR will be integrated into Metro Manila as an expanded conurbation. The growing sub-regional centers are Dumaguete and Roxas in the Visayas; lligan, Polomolok and Mati in Mindanao and Masbate in south Luzon, except for those near the NCR. These cities can be considered strategic sub-regional centers that should be connected with metropolitan and regional centers in the Visayas and Mindanao islands. These connections are crucial to distribute the demographic and economic growth potentials of the metropolitan centers of Cebu, Davao and Cagayan de Oro. It is important to ensure that these mutual connections will create a consolidated, networked urban cluster centered on each of these metropolitan centers, which can contribute to the sustainable and inclusive development. Note that Mati City, which benefits from the proximity to Davao City, is comparatively weak among these strong sub-regional centers. By ensuring 'connectivity' between the metropolitan, regional and strong sub-regional centers rather than only connections between metropolitan and regional centers, it is possible to promote even development and reduce disparities within each region and even across the nation. Further, this 'connectivity' will serve to disperse development potentials even into the weak sub-regional centers classified as RC-II (Weak), leading to the strengthening of 'connectivity' even at the local level. Some of strong sub-regional centers will possibly grow to a sufficient extent to be upgraded to regional centers. Furthermore, there is currently no rapidly growing sub-regional centers in the northern part of Luzon Island. While the necessity to strengthen connections for the northern areas was discussed above, even the current conditions at the level of sub-regional centers suggest this necessity.

**Necessity of strategic allocation of SEZs**: Some sub-regional centers with a strong extent of growth/development potentials are considered to have experienced population growth along

with the increased number of SEZs. At the same time, it is assumed that jobs have increased in parallel with this population growth, whilst being impossible to investigate the recent trends of the spatial distribution of jobs due to the non-availability of employment and establishment data by municipality. Therefore, the recent economic development policy with the strategic utilization of SEZs can be considered as having successfully contributed to local and regional development. Besides, the strategic spatial allocation of SEZs can be the key to triggering population and economic growth even in provinces by attracting international and domestic investments there. In this vein, the HSH network should consider connections among largescale SEZs and their accessibility from/to metropolitan and regional centers. Note that the reason why the accessibilities to airports and seaports are to a lesser extent correlated with the number of SEZs and population growth would be that a number of SEZs have located inland in proximity to cities with large-size population. Needless to say, SEZs will serve for industrial development and job creation. Depending on geographical locations and available resources in surrounding areas, the types of SEZs should be appropriately determined. The specialization of SEZs also needs to be determined with consideration of development strategies of the nearest metropolitan or regional centers. By connecting different types of centers and SEZs through the HSH network, each urban cluster will grow not only by complementing other urban clusters, but also by creating new synergetic interactions to enhance growth potential as a whole. The HSH network can thus promote the formation of industrial clusters and networked economic systems to create more value added.

Here it should be noted that provincial capitals, each of which is likely to reside in the central area of each province for provision of equal accessibility to local residents there, do not necessarily contribute to facilitating growth or enhancing development potential in demographic and economic terms, especially at the level of sub-regional centers (see Figure 4.2-10). Note that the existence of provincial capitals positively serves as political and administrative advantages at the levels of metropolitan and regional centers (see Figure 4.2-9). Rather than the existence of provincial capitals, the proximities of sub-regional centers to the nearest metropolitan or regional centers are more influential factors in the pace of growth. From another viewpoint, tourism development requires better accessibility by all the means of land, air and sea transportation. Some sub-regional centers which satisfy these conditions, especially those near the sea, can be developed as tourist destinations. The National Spatial Strategy (NSS) already takes into account these aspects for the designation of tourism centers.

#### (3) Summary of Planning Recommendations based on Analysis Results

The following recommendations for the planning and development of the HSH network can be proposed on the basis of the analysis results above:

- The National Spatial Strategy (NSS) has set the sophisticated hierarchy of settlement centers. The currently proposed HSH network makes the most use of this hierarchy. However, at present, population and economic growth is limited mainly in the NCR and its surrounding regions, namely, Regions III and IV-A, without much functional dispersion across the nation. The HSH network across the nation is crucial to promote even nationwide development. The continuation of the current trend without the HSH network is considered to widen disparities among Metro Manila, the northern part of Luzon Island, the Visayas and Mindanao islands. At the same time, in each of the Luzon, Visayas and Mindanao islands, there exist increasing unevenness between urban clusters centered on metropolitan centers and lagging regions. The HSH network across the nation, which follows the settlement hierarchy established by the National Spatial Strategy (NSS), is crucial to promote even development at all the national, regional and local levels.
- Given that the HSH network plans to connect all the metropolitan centers and the largest parts of regional centers, it is recommended to ensure connections of the weak regional centers with the HSH Class-2 in order to make these centers serve truly as regional centers for the surrounding urban clusters. These regional centers are Baguio, Tabuk, Santiago

and Baguio in the northern part of Luzon Island; Baliuag, and Balanga in Central Luzon; and Koronadal and Jolo in Mindanao Island.

- Tabuk and Santiago, located in the northeastern Luzon, have less transport accessibility which has resulted in their weakness of population and economic growth. Therefore, the two-spine structure of the HSH network are strongly recommended to extend the HSH Class-1 into the northeastern part of Luzon island in the form of being parallel with the HSH Class-1 in its northwestern part. This parallel network of the HSH will contribute to promoting even development across Luzon.
- Baguio, Baliuag and Balanga City, which have the lesser extent of growth notwithstanding their closeness to the NCR, are desirable to be connected by the HSH Class-2 for the acceleration of growth.
- The sub-regional centers with the strong extent of growth/development potentials, namely, the RSC-Is (Strong), are recommended to be integrated into the HSH network. These sub-regional centers are Dumaguete and Roxas in Visayas; Iligan, Polomolok and Mati in Mindanao; and Masbate in south Luzon. Through this integration, sub-regional centers of high development potentials will be integrated into the urban systems of metropolitan and regional centers, simultaneously providing spillover effects of population and economic growth into sub-regional centers with the weak extent of growth/development potentials, namely the RSC-II (Weak).
- The HSH network needs to make connections among large-scale SEZs and their accessibility from/to metropolitan and regional centers, given their great contributory potentials to population and economic growth. This is especially applied to the urban clusters of three metropolitan centers.
- The existence of provincial capitals needs to be considered especially at the level of metropolitan and regional centers, rather than at the level of sub-regional centers. This existence provides political and administrative advantages beneficial for the acceleration of growth.

#### 4.2.3 Issues in Regional Development

In order to propose development scenarios, issues in regional development are discussed by island group of Luzon, Visayas and Mindanao, based on the analysis above.

#### <u>Luzon</u>

At first, excessive concentration of population and economic activities in Metro Manila should be mitigated for the future of Metro Manila itself and also for balanced development in the country. Metro Manila has suffered from congestion, environmental degradation, and various other urban issues caused by excessive concentration, which in fact could result in economic loss or cost of doing business there. The population growth in the center of Metro Manila has slowed down already and the population is currently expanding in its surrounding areas, such as Cavite and Rizal in CALABARZON, and Bulacan in Region III Central Luzon, which areas are so-called "Mega Manila." The two regions of CALABARZON and Central Luzon are expected to continue to grow in the future, because of progressing suburbanization facing Metro Manila and new development plans of SEZs and residential subdivisions. In particular, the development of Central Luzon is anticipated with the construction of the North-South Commuter Railway until Clark and the development of New Clark City in Tarlac, which will house 1.2 million population and offer 800,000 jobs. The emergence of a new urban center, Metro Clark, in the north, is intended to shift some functions of Metro Manila for decongestion and also expected to accelerate development of northern Luzon. On the other hand, the Naga-Legazpi corridor in Bicol has a potential to be the key growth center in southern Luzon. Thus, it is necessary to support development of key regional centers where population growth is expected by connecting those centers effectively and efficiently and investing in urban infrastructure to guide appropriate development of urban centers and decongestion of Metro Manila. For this sake, the HSH network can contribute to the development of settlement centers and decongestion of Metro Manila, by helping urban clusters form around regional centers and offering good access from SEZs and other production centers to port or airport outside Metro Manila.

In order to achieve balanced development, the northern regions in Luzon such as CAR, Region I Ilocos, and Region II Cagayan Valley, and the southern regions of Luzon including MIMAROPA and Bicol that have lagged behind, should be paid attention. The poverty incidence in 2015 is relatively high in the CAR, Cagayan Valley, Bicol and MIMAROPA. In these regions, the primary sector, namely agriculture and fishery, is the dominant sector in which the majority of the population are engaged. For the development of these regions, it is crucial to promote development of agro-processing industry and establish effective value-chain to connect production centers with major locations of consumption, such as metropolitan and regional centers. Moreover, each region has an advantage in a specific industry. For example, CAR has a strong manufacturing industry which is concentrated in Baguio City, and MIMAROPA is the center of mining and quarrying industry in the nation. The regional advantages in certain industries in terms of geography and natural resources should be cultivated by taking strategies of SEZ development and improvement of access to port and airport, as the contribution of these factors to economic development was witnessed in the previous analysis of urban centers. Specifically, in the northern regions, the fact that a number of key regional centers such as Baguio, Santiago, and Tabuk are not well connected might be one factor that hinder economic growth of the cities and compromising the competitiveness of the cities. Special attentions should be paid to these weak but important regional centers for the planning and development of HSH networks.

Some areas in Luzon Island are highly vulnerable to disaster including typhoons, floods, and volcanic eruption. The eastern seaboard of Luzon is continuously exposed to high risks of typhoon, which could affect economic and social activities significantly. Disaster risk reduction measures and securing redundancy in the case of emergency are crucial to reduce damage during disaster. Besides, a balance between preservation of agricultural land and urban development should be sought, especially in Region III, which is one of primal food producers in the country but under strong pressure for urbanization. This is important for agricultural land which is not only important for food production but also for functions of farmlands to mitigate disaster risk as buffer zones. Efficient land use needs to be promoted by adopting "concentration" and "connectivity" strategies.

#### <u>Visayas</u>

In the Visayas, Metro Cebu is the center of economy led by the manufacturing and tourism sectors, and its dominance is expected to be maintained in the future, despite the growth of regional centers, such as Bacolod and Iloilo. However, Metro Cebu has been facing various urban problems, such as traffic congestion, degradation of living environment, flooding, limited land available for development, etc. which require urgent and integrated efforts to seek solutions for sustainable development of the metropolitan area.

The Visayas is an archipelago consisting of various islands including Cebu, Negros, Panay, Leyte, Samar, and others. The most developed island, Cebu has a limited land appropriate for development and an issue of water scarcity. So that it is important to develop the regional centers of Bacolod, Iloilo, Ormoc, and Tacloban, and sub-regional centers with good development potentials, i.e., Dumaguete and Roxas, as a driving force of the regional economy and service centers for hinterlands. Considering the island characteristics, well-integrated transport networks of land and sea transport connecting these urban centers and between the centers in the regions and centers outside are essential for balanced development and mitigation of regional disparity in the Visayas.

The Visayas region has high potentials in tourism development, manufacturing, agriculture, and trade and service, including ICT industry. There are well-known world-class tourist destinations, such as Cebu, Boracay, and Bohol and also uncultivated resources and areas with potentials in tourism development for the domestic market. Improving connectivity for better

access to potential tourist areas with international gateways and major regional hubs is indispensable to accelerate tourism development and increase tourist arrivals in the region. Such strategy may contribute to not only the tourism sector, but also the other sectors such as manufacturing and agro-processing industry, because better connectivity means reduction of transaction costs in transportation and logistics and improved business environments, and can lead to the emergence of new investment opportunities. Industry development should be pursued in Samar, South Leyte and Negros Oriental where a high poverty incidence is found. Currently several SEZs exist and planned in those areas. It is necessary to encourage the development of SEZ as a leading force for development in strategic urban centers, in a coordinated manner with the construction of HSHs. Finally, the still fresh memory of the devastating damage caused by Yolanda in the Visayas calls for attention to the reduction of vulnerability to disasters by taking necessary measures for disaster risk reduction and management. For rescue operations during the emergency and smooth reconstruction in the recovery phase, accessibility to major urban centers needs to be secured by strengthening disaster resilience and developing redundancy of infrastructure.

#### <u>Mindanao</u>

Mindanao will host some major growth centers in the coming decades, considering its high population growth and uncultivated resources and potentials for development. Metro Davao is expected to continuously grow as the primary metropolitan area in Mindanao. In addition, Cagayan de Oro will gain a status of a metropolitan area by 2025, and other regional centers, Zamboanga and General Santos, will grow to one of metropolitan areas in the long-term. Promoting development of these major regional centers is a key to spread prosperity across Mindanao, since currently development is concentrated in Davao Region and Northern Mindanao where Metro Davao and Cagayan de Oro are located, respectively, and produce almost double the GRDP per capita of the other regions in Mindanao. It is essential to develop integrated urban centers for promotion of development in lagging regions. One strategy is SEZ development. Cagayan de Oro is currently attracting SEZs, such as IT Park, and other centers also try to develop SEZs. HSH networks should support the development of SEZs by improving access to the major logistics hubs, such as international and major domestic ports and airports.

Mindanao is endowed with development potentials in agriculture, agro-processing industry and tourism sectors. Because manufacturing and service sectors will thrive in the urban areas, transport networks should be developed in a way to provide good connections from farms to markets, and should also support the development of value-chain of agricultural products from production sites of raw commodities to processing points, and then to logistics hubs for domestic use and international export.

Its proximity to Malaysia, Indonesia and Brunei brings about a unique opportunity to Mindanao, and specifically to Zamboanga City, as a gateway to BIMP-EAGA. Taking advantage of the framework of BIMP-EAGA and economic integration of the ASEAN community, integrated strategies for connectivity and development should be explored, with certain attention to security issues. This strategy is important for poverty reduction in Mindanao, in particular in ARMM Region, which is the least developed region with the highest poverty incidence in the nation. The lowest level of infrastructure development leading to higher cost of doing business and to failure of attraction or development of quality human resources hinders the development of economic sectors which is indispensable for poverty reduction. Thus, this situation could not generate a positive cycle for economic growth. This regional disparity should be solved not only for economic development but also for sustainable peace in Bangsamoro and Mindanao.

It is necessary to mainstream DRRM in development of Mindanao. Though Mindanao used to be typhoon-free, recently typhoons are passing through northern Mindanao and brought about damage to some areas. Infrastructure should be disaster resilient and redundancy should be achieved by taking account of disaster risk. Climate change can affect productivity of the agricultural sector, which is the leading sector in Mindanao.

#### 4.2.4 Development Alternatives

#### (1) Spatial Development Strategies

The spatial development strategies for the formulation of HSH Master Plan are proposed, following the goal and objectives of the Draft National Physical Framework Plan 2016-2045 and the three strategies of the NSS, "concentration", "connectivity" and "reduction of vulnerability" described in Chapter 3 as follows:

- To achieve spatial patterns which contribute to balanced development across the nation by promoting development of urban centers as growth centers to lead the regional economy and by developing HSH networks integrating urban centers for efficient mobility and provision of access to services and jobs
- To promote the development of Regional Centers which have the potential to be Metropolitan Centers, with consideration of balanced development and mitigation of excessive concentration in the existing metropolitan centers and their connection with other centers by developing HSHs to form a well-integrated settlement pattern
- To support the development of Regional Centers in which the growth of population and production is constrained (RC-II: weak Regional Centers) and Sub-Regional Centers where rapid population growth is expected and high economic potentials are found (SRC-I: strong Sub-Regional Centers) by connecting them with HSHs
- To invest in urban transport infrastructure and upgrade the existing networks for improved mobility and for activating economic activities in the existing Metropolitan Centers to deal with traffic congestion and urban problems caused by excessive concentration
- To support the development of SEZs, tourism potential areas, and production centers, by making connections with major urban centers, such as Metropolitan and Regional Centers and logistics hubs of airport and seaports.
- > To increase disaster resilience and reduce disaster vulnerability of infrastructure and urban centers by adapting disaster risk mitigation measures and applying redundancy strategy in the development of infrastructure
- > To achieve efficient land use by developing well-structured settlement patterns with integrated efficient connectivity networks for preservation of land for production, environmental protection, and other purposes.

#### (2) Alternative Scenarios for Development

#### 1) Alternative Scenarios of Development by 2040

Three alternatives are discussed as development scenarios of spatial structure in 2040 in this section. For three island regions of Luzon, Visayas, and Mindanao, three alternative development scenarios, namely, Alternative A: Metropolitan-led Development, Alternative B: Decentralized Development Scenario, and Alternative C: Balanced Development Scenario, are proposed as follows:

#### Alternative A: Metropolitan-led Development Scenario

Alternative Scenario A aims to achieve regional development by supporting development of metropolitan center(s) in each island region, as the main driving force of the regional economy. The development of transport networks and other infrastructure will focus on the improvement of mobility, business environment, and living conditions within the metropolitan centers and its surrounding areas, namely, Metro Manila, Metro Cebu, and Metro Davao and Metro Cagayan de Oro. By building well-connected HSHs in the metropolitan areas and expanding the networks to the surrounding areas, metropolitan centers will be consolidated as a thriving hub of economy, culture, administration, and other services in the three land regions. Major important regional centers, such as Metro Clark in Luzon, Bacolod and Iloilo in Visayas, and

Zamboanga and General Santos in Mindanao will be developed, led by the strong growth of the metropolitan centers. Besides, development of regional centers will be encouraged in the areas far from the metropolitan centers. This scenario can be considered as the case following the current development trend without drastic change of the spatial structure. Although this alternative development scenario may promote financially viable investments focusing on the metropolitan centers, it contribution to regional development might be limited.

#### Alternative B: Decentralized Development Scenario

In Alternative Scenario B, a number of regional centers will be developed for the bottom up of the entire regions. This scenario intends to promote development of the area lagged behind, unlike Alternative A, which concentrates development effort in metropolitan centers. By developing regional centers geographically evenly, employment opportunities will expand and people will be able to access to administrative services and public facilities. To achieve regional development by distributing investments across the regions, the extended networks of HSH connecting regional centers will be developed in this scenario. Along with the development of HSH networks, regional centers with high development potential or at the strategic locations will be additionally developed. Because of distribution of investment across the regions and development promotion of regional centers, metropolitan centers would not grow as same as Alternative A and a large amount of public investments in development of HSH networks in relatively rural areas may be required, though potential benefits to rural populations could be significant.

#### Alternative C: Balanced Development Scenario

Alternative Scenario C is to promote development of both metropolitan centers and major regional centers for regional development. The assumption behind this scenario acknowledges the importance of the growth of metropolitan centers as the economic driver and nurturing of regional centers for decongestion of the metropolitans and development of decentralized spatial structure. Thus, HSH networks will be developed for the metropolitan centers and surrounding areas and connecting the metropolitan centers with selected regional centers. The development of additional regional centers will be also promoted. The development of HSH networks in this scenario could be done by the public and private investments.

#### 2) Alternative Scenarios for Development of Three Island Regions

The implications of the three alternative scenarios described above to the development of Luzon, Visayas, and Mindanao are discussed as follows.

#### Luzon:

In <u>Alternative Scenario A</u> for Luzon Island as shown in **Figure 4.2-11**, development will be expanded from Metro Manila to regional centers, connected by the HSH networks extending from the existing expressways. Metro Clark will be developed as the second center after Metro Manila. Several regional centers such as San Fernando-Bagio, Tuguegara, and Santiago in the north and Naga and Legazpi in the south which will be connected by HSHs will be developed. The spatial structure in this scenario would not change very much from the current spatial structure. The development will be concentrated in Metro Manila and along the NLEX to Metro Clark, in the western areas of Central Luzon Region.

<u>Alternative B</u> aims to develop various regional centers in the north and south parts of Luzon Island for balanced development and decongestion of Metro Manila (see **Figure 4.2-12**). In Great Capital Region, including Central Luzon Region, NCR, and CLABARZON, twin-spine spatial structure will be formed by development of new HSH Class 1 in the eastern side. The development of new Regional Centers such as San Jose Del Monte and Santa Cruz will be promoted with the expansion of the HSH networks. In this scenario, full networks of HSH including both HSH Class 1 and Class 2 will be developed at a maximum to support development of growth poles with development potential and be expected to contribute to the development of the northern Luzon, namely CAR, Ilocos, and Cagayan Valley Regions, particularly. <u>Alternative Scenario C</u> for Luzon Island is not very different from Alternative B as presented in **Figure 4.2-13**, since the HSH networks have been developed in the core regions of Luzon, i.e., Metro Manila and the surrounding areas. A major difference between Alternative B and C is that the HSH network does not reach Laoag in Ilocos Region in the western section and is not connected to the HSH in Cagayan Valley Region to complete the loop of the network. As a result, the development of the regional center and contribution to development in the north is slightly less than the Alternative C, though the spatial structure is almost completed. Note that this scenario is considered as a transition case to Alternative B, rather than the completed structure.

#### **Greater Capital Region:**

For Greater Capital Region (GCR) or the area of 100-km radius from Metro Manila, two scenarios of Alternative A and B are proposed as presented in **Figure 4.2-14** and **Figure 4.2-15**. <u>Alternative A</u> is the scenario following the current development trend and spatial structure centering Metro Manila and aiming to improve the current congested situations of the metropolitan center. New HSH networks will be developed around Metro Manila such as the sections around Laguna de Bay to mitigate traffic congestion in the metropolitan area. In addition, Metro Clark will be developed for the decongestion of Metro Manila by shifting some government functions and its connection with Subic will be strengthened. However, the basic spatial structure remains, which is skewed to the western area of Luzon, is unchanged and the development will expand along the NLEX to the north.

In contrast, <u>Alternative B</u> intends to transform the spatial structure of GCR to twin-spine structure. By developing the HSH networks in the eastern side of the island, twin-spine spatial structure will be formulated. The twin-spine spatial structure will induce development in the eastern side of Luzon, where development has lagged behind, and rebalance development which is biased to the western side. In this scenario, industrial corridors will be developed along the western spine to Metro Clark and Batangas, where various SEZs have been already located, following the development trend until now. On the other hand, the corridors along the eastern spine shall be developed, with focus on agribusiness, tourism, and eco-friendly industry for sustainable development.



Source: JICA Study Team



Source: JICA Study Team

#### <u>Visayas:</u>

In the case of <u>Alternative Scenario A</u> in **Figure 4.2-16**, the Visayas will maintain the existing spatial structure, following the current development path. Metro Cebu will be strengthened as the center in the Visayas. Regional centers, Bacolod and Iloilo, and Tacloban will grow to serve Western and Eastern Visayas Regions respectively; however, their service functions would not be fully cultivated since the development of HSH networks will be focused on the adjacent areas of the centers.

<u>Alternative Scenario B</u>, on the other hand, aims to develop regional centers as key economic and service centers in each island connected by the extended networks of HSHs (see **Figure 4.2-17**). The functions of sub-regional centers with high development potential will be strengthened. Bacolod and Iloilo will become an integrated metropolitan area. Roxas and Dumaguate, will become regional centers and access to Calabayog and Boracay area will be improved by the expansion of the HSH network. This scenario will support balanced development of the islands in the Visayas, considering its archipelagic characteristics. As a result, the economic situations and access to public services will be improved in the areas with relatively high poverty incidence such as Western and Eastern Visayas. However, relatively high cost to develop a number of the regional centers and infrastructure in all islands, including HSH networks, is anticipated.

<u>Alternative Scenario C</u> intends balanced development by supporting development of the metropolitan center and major regional centers (see **Figure 4.2-18**). The center function of Metro Cebu will be strengthened by improving networks within the metropolitan area and expansion of the north-south linkage. Two strong regional centers, Bacolod-Iloilo and Tacloban will emerge in Western and Eastern Visayas Regions with good connections to the surrounding areas. In this scenario, only selected regional centers in each of the islands will be developed, considering both contribution to development and required investment cost.

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Source: JICA Study Team

#### <u>Mindanao:</u>

Under <u>Alternative Scenario A</u> as presented in **Figure 4.2-19**, two metropolitan centers, Metro Davao and Metro Cagayan de Oro will be fully established in the northern and southern parts of Mindanao. Zamboanga and General Santos will function as important regional centers offering services and employment opportunities for the surrounding areas. The two corridors expanding from the metropolitan centers connected by the HSH networks will become key development corridors where a number of SEZs will be located for development of manufacturing and agro-processing industry. To create synergy between the two metropolitan centers, a new HSH network cutting across the inland area will be developed to connect the two development corridors for the promotion of development in the island.

In <u>Alternative Scenario B</u>, settlement centers, namely metropolitan centers, and regional centers will be fully developed across the island, connected by extensive networks of HSHs (see **Figure 4.2-20**). This scenario aims to achieve development of the entire island, by promoting both balanced development of regional centers, and trade and industrial development through strengthening interisland trade and logistics. In particular, the HSH links connecting Cotabato and the north and south directions will induce development in Bangsamoro Region, the least developed region in the country. Also the HSH Class 1 networks extended to Zamboanga, Surigao and Dipolog will strengthen the links with the BIMP-EAGA region and the Visayas by improving the transport and logistics functions of the cities.

<u>Alternative Scenario C</u> intends to promote development across the island by developing regional centers along the coastal areas where a majority of the population is inhabited as shown in **Figure 4.2-21**. The HSH networks connecting these centers will be developed to allow circulation of traffic around the island, resulting in balanced development of the island. Key regional centers such as General Santos, Cotababo, and Butuan will be connected by HSH Class 1 to the metropolitan centers.



Source: JICA Study Team

#### 3) Selected Scenarios for the Project

From the discussion above, Alternative Scenario Cs for Balanced Development are selected for the three island regions and Alternative Scenario B of Twin-Spine Development Scenario is chosen for GCR as preferred scenarios for the project targeting the year of 2040. The selected Alternative Scenarios are considered as most appropriate to implement the spatial development strategies described previously. The Alternative Scenario Cs are considered to not only contribute to regional development and transformation of the spatial structure to dispersed one, but also cost effective, in terms of the investment amount required to develop the HSH networks and various regional centers. The Alternative Scenarios B of the comprehensive model could be pursued in long-term after 2040. The comparison of the alternative scenarios is provided in **Table 4.2-11** and the selected scenarios are presented from **Figure 4.2-22** to **Figure 4.2-25**.

	Alternative A: Metropolitan-led Status-Quo Scenario	Alternative B: Decentralized Development Scenario	Alternative C: Balanced Development Scenario
Luzon	<ul> <li>Development of Luzon will be led by the growth of Metro Manila, supported by improving access to and mitigating the congestion in the metropolitan center.</li> <li>Metro Clark will be developed as the second center in Luzon, by transferring certain functions from Manila.</li> <li>HSHs will be developed in several sections in the north and the south to support development of the regional centers.</li> <li>Spatial structure skewed to the west will remain unchanged.</li> <li>This scenario follows the current development trend; however, contribution to regional development may be limited.</li> </ul>	<ul> <li>Focusing on development of regions, regional centers, which will be economic centers leading industry development and providing necessary services to surrounding areas, will be developed across the island.</li> <li>The development of HSH networks up to the northern and southern tips of the island will improve the mobility and then support development of the regional economy.</li> <li>Spatial structure will be transformed into a more balanced form.</li> <li>The contribution to regional development would be high; however, significant investment will be regional centers and infrastructure, i.e., HSH networks and longer timeframe should be considered for the implementation.</li> </ul>	<ul> <li>This balanced development scenario aims to improve the situation of the metropolitan center and promote development of selected regional centers.</li> <li>HSH networks will be extended to the major regional centers in the north and south</li> <li>Spatial structure will be transformed into a more balanced form.</li> <li>This scenario will support regional development, though its contribution would be to a lesser extent, compared with the Alternative B.</li> <li>This is a realistic scenario in terms of the cost and time horizon of the project by 2040.</li> </ul>
Visayas	<ul> <li>This scenario focuses on development of Metro Cebu and the regional centers as key economic centers of the Visayas and each of the islands.</li> <li>The HSH networks in the centers and surrounding areas will be improved.</li> <li>Though the congestion of the centers and regional economy would be improved, contribution to regional development would be limited.</li> </ul>	<ul> <li>To promote regional development, several regional centers will be developed in each of the island.</li> <li>Connecting the regional centers by the HSHs, mobility of people and goods will be enhanced and access to urban services and jobs in the centers will be improved.</li> <li>To develop multiple centers in each of islands, investment requirement would be high and the efficiency and scale of the economy might not be achieved.</li> </ul>	<ul> <li>This scenario intends to develop strong regional centers in the Visayas, while supporting further development of Metro Cebu.</li> <li>Iloilo and Bacolod will be integrated as a strong consolidated economic center in Western Visayas; while the functions of Tacloban will be strengthened as the center of Eastern Visayas.</li> <li>The HSH networks will be developed from the major regional centers to adjacent centers for regional development and better access to the urban services.</li> </ul>

 Table 4.2-11
 Comparison of Alternative Scenarios

	Alternative A: Metropolitan-led Status-Quo Scenario	Alternative B: Decentralized Development Scenario	Alternative C: Balanced Development Scenario
Mindanao	<ul> <li>The development of Mindanao will be led by two metropolitan centers and synergy between them.</li> <li>The development of Metro Davao and Metro Cagayan de Oro, two metropolitan centers, will be promoted by supporting development the industrial corridors along the HSHs. The development of HSHs connecting the two centers will produce strong synergy to lead development of the entire island.</li> <li>This may be a realistic and efficient regional development scenario. Nevertheless, development would not reach underdeveloped regions, especially Bangsamoro and regional disparity would remain as an important issue in future.</li> </ul>	<ul> <li>This scenario aims to achieve development of the entire island, tapping the full development potential.</li> <li>The regional centers connected by the HSH networks will be developed across the island as the center of the regional economy and urban services.</li> <li>The extensive networks of HSHs will support development of various industry in inland and coastal areas. In particular, Bangsamoro area will be benefitted from the HSH networks expansion to the region, and the HSH links to ports will promote regional and inter-island trade and logistics industry.</li> <li>The development of multiple regional centers and the extensive HSH networks could result in the significant investment costs and make the</li> </ul>	<ul> <li>Balanced development will be achieved by supporting development of the metropolitan and major regional centers across the island.</li> <li>The framework of the spatial structure will be formulated by the development of HSH networks connecting key centers. As a result, development of industry such as agro-processing will be promoted.</li> <li>This scenario would be realistic, in terms of the cost and benefit to regional development. Focusing on development of selected centers might be more effective and implementable than development of all the centers at once.</li> </ul>
GCR	<ul> <li>The main objective of this scenario is to mitigate congestion of the Metro Manila hindering efficient business and social activities by improving mobility of goods and people in the surrounding areas of Metro Manila and developing Metro Clark as the second center.</li> <li>The spatial structure would remain unchanged and development of settlements and industry will be expanded to the north-south directions along the existing highways, i.e., NLEX and SLEX.</li> <li>This scenario would not be the panacea, but rather a countermeasure to the current congestion of Metro Manila, since the mono-centric spatial and economic structure will be likely maintained.</li> </ul>	<ul> <li>Development of the twin-spine spatial structure with regional centers will sufficiently contribute to decongestion of the metropolitan center and balanced development in the GCR.</li> <li>The HSH networks newly developed as the eastern spine will promote development in this eastern side, while supporting the existing SEZs in CALABARZON with improvement of the mobility.</li> </ul>	

Source: JICA Study Team.

Note: The selected scenarios are highlighted.





Source: JICA Study Team

#### 4.2.5 Future Population and Spatial Structure

The basic spatial structure consisting of settlement centers and transport networks with projected population in 2040, which is aiming to achieve the development strategies, is proposed as shown in **Figure 4.2-26** to **Figure 4.2-29**.



Source: JICA Study Team. Note: The population of Metro Manila is indicated for Manila City. **Figure 4.2-26 Projected Population of Settlement Centers in Luzon** 



Source: JICA Study Team. Note: The population of Metro Manila is indicated for Manila City. **Figure 4.2-27 Projected Population of Settlement Centers in NCR and Surrounding Areas** 



Source: JICA Study Team. Note: The population of Metro Cebu is indicated for Cebu City.

Figure 4.2-28 Projected Population of Settlement Centers in Southern Luzon and Visayas



Figure 4.2-29 Projected Population of Settlement Centers in Mindanao

#### 4.2.6 Regional Development Scenarios

The detailed regional development scenarios are discussed for each region as follows:

#### Northern Luzon (CAR, Region I Ilocos, and Region II Cagayan Valley):

In order to promote development in northern Luzon, including CAR, Region I Ilocos, and Region II Cagayan Valley, it is necessary to support development of regional centers as leading economic centers, by connecting them by HSH networks and extending the twinspine spatial structure in northern Luzon.

Major growth centers are identified around regional and sub-regional centers, including Laoag for agribusiness and tourism, Tabuk-Tuguegarao and Santiago for agribusiness, San Fernando-Baguio corridor for industry, tourism, and agribusiness, and Vigan City area, Santa Ana, Bangued Area, and Alaminos for tourism development.

Currently the regional centers and growth centers in northern Luzon are not well connected; the constraint in accessibility has resulted in the "weak status" of development of the cities of Baguio, Tabuk, and Santiago. By extending the HSH networks, these cities will be developed as leading economic centers in the regions. In particular, Baguio City, one of the important centers in the north, in terms of not only industry, such as manufacturing and tourism, but also the education sector, will be enhanced. Tabuk and Santiago in CAR and Cagayan Valley will be developed as the center of agri-business in the region which are expected to contribute to poverty reduction.



Figure 4.2-30 Growth Centers and Development Potential in Northern Luzon

#### <u>NCR and Surrounding Areas (NCR, Region III Central Luzon and Region IV-A</u> <u>CALABARZON):</u>

Metro Manila or NCR will continue to function as the thriving center of economic, political, and administrative center of the nation, where vibrant and competitive economic activities including commercial and trade, financial, industry, and tourism will be further advanced and its center functions will be enhanced with the improvement of connectivity within the metropolitan and between the NCR and other centers.

In Region III Central Luzon, beside Metro Clark, growth centers will be developed along the NLEX. Particularly the regional centers such as Tarlac and Malolos, which will compose an important industrial corridor along this western spine. The development of Metro Clark, especially New Clark City with 1.2 million planned population, and the North-South Commuter Railway, will accelerate the expansion of these regional centers. Meanwhile, Metro Subic will be developed as an industrial and tourism center, with also the construction of the Subic-Clark Cargo Line.

On the other hand, the extension of new HSH networks along the eastern spine will promote the development of the eastern side of Central Luzon Region. Along the new highway, Cabanatuan, San Miguel, and San Jose del Monte, will be developed as the centers of industrial and commercial, agribusiness and tourism.

Region IV-A, CALABARZON, is and shall continue to be the primary industrial center of the nation. A number of SEZs are located in Cavite, Laguna and Batangas Provinces along the SLEX, STAR, and other arterial roads up to Batangas Port. The western and southern coastal areas of Batangas, such as Nasugbu, Mabini and Marcaban Island, Tagaytay in Cavite and other areas, will be developed as tourism centers. Though there is no center in the eastern side of Laguna Lake, new centers such as San Jose Del Monte and Santa Cruz are expected to be developed there, shifting spatial structure to single-spine to twin spine structure.



Source: JICA Study Team

### Figure 4.2-31 Growth Centers and Development Potential in NCR and Surrounding Areas Southern Luzon (Region IV-B MIMAROPA and Region V Bicol):

Region IV-B MIMAROPA consists of the five islands of Mindoro, Marinduque, Romblon and Palawan. The growth of the region will be led by the development of mining, fishing, and tourism in the centers of Calapan City, Mindoro, and Puerto Princesa and Brooke's Point in Palawan. The tourism potential in Puerto Galera, Masbate, and the northern area of Palawan will be also cultivated. The connectivity strategy for the promotion of development of these centers aims at building efficient networks of air and sea transport networks among them and between these centers and other centers, such as Metro Manila, for passenger and cargo. From the perspective of tourism development, establishing direct connections with Metro Manila and Metro Cebu by air are essential to attract visitors as well as investors interested in the region.

In Region V, Bicol, an economic corridor connecting the two regional centers of Naga City and Legazpi City will be developed, as a crucial growth corridor in the southern Luzon offering services to Bicol, MIMAROPA, and Western and Eastern Visayas. By effectively connecting the urban centers with diverse and unique economic potential in manufacturing, tourism, energy, and mining, synergy for integration and value chains of various products that will be generated will promote the development of the distinct economic corridor with competitive industries.

#### <u>Visayas (Region VI Western Visayas, Region VII Central Visayas and Region VIII</u> <u>Eastern Visayas):</u>

The regions in the Visayas are strong in the economic sectors of industry (manufacturing) and tourism. The regional development is, therefore, guided by how to develop these industries in specific locations where development potential is found and in the regional and some of sub-regional centers. Metro Cebu, the second largest metropolitan in the country, has been and is continued to be a driving force of the Visayan economy, as a hub of manufacturing, tourism and commercial and trade as well as international gateway, by attracting foreign and domestic investments. The other regional centers, Bacolod, Iloilo, Tacloban and Ormoc will grow with expansion of economic activities in a similar vein but at smaller scale. Internationally well-known tourist destinations of Boracay and Bohol will consolidate their status, by improving access and investing in development of tourism resources to enhance the competitiveness. With anticipated rise of demand for domestic tourism activities along the advancement of the national economy, Roxas, which is known as the seafood capital, the western coastal area of Capiz, Bantayan, Dumaguete and Siguijor, and southern Luzon will be developed, targeting domestic and then international tourists by diverting tourists from major international tourist spots, such as Cebu and Boracay. Meanwhile, agriculture will still be an important economic sector in the regions. In Samar and Negros islands, productivity of the primary sector will be improved; value chain will be established; and agribusiness and agro-processing industry will thrive with the establishment of SEZs in Calbayog, Catbalogan, and other centers. Negros Occidental will have been the largest producer of sugar in the country. By connecting the growth centers by the HSH networks and sea and transport, these centers will grow further; fruits of economic gain will be distributed to surrounding areas; and public facilities and services will be accessible to residents in small towns and villages in the hinterlands. As a result, poverty incidence will decline in the regions.



Source: JICA Study Team

Figure 4.2-32 Growth Centers and Development Potential in Southern Luzon



e: JICA Study Team

Figure 4.2-33 Growth Centers and Development Potential in Palawan



Source: JICA Study Team

#### Figure 4.2-34 Growth Centers and Development Potential in Visayas

## Mindanao (Region IX Zamboanga Peninsula, Region X Northern Mindanao, Region XI Davao, Region XII SOCCSKSARGEN, Region XIII Caraga, and ARMM):

In the coming decades, Mindanao will experience drastic socio-economic changes. With the rapid population growth, there will exist two metropolitan centers - Davao and Cagayan de Oro - and the regional centers of Zamboanga and General Santos, with the population of more than and nearly 1 million by 2040. Centering on these urban centers, the economic sectors of mainly industry or manufacturing and commerce and trade are intended to be developed as shown in **Figure 4.2-35**. Taking advantage as a gateway, Zamboanga will rapidly grow with industry development, focusing on international markets of BIMP-EAGA. Relatively equal distribution of the metropolitan and regional centers in the island will promote the development of each region and mitigate regional disparity, by offering employments and services to the areas behind.

Owing to the rich natural resources and environment, strong and competitive agricultural sector including fishery has grown in Mindanao. By developing HSH networks connecting production centers with markets, and investing in productivity improvement and value addition, the agricultural sector will thrive to produce export processed and non-processed but value-added goods for domestic and international markets, specifically in Northern Mindanao, such as Bukidnon, Lanao del Norte, and Misamis Oriental, and SOCCSKSARGEN Region including Cotabato, South Cotabato, and some other areas. Tourism sector will be promoted in Dipolog, Camigun Island, Surigao, Dinagat Islands, and other coastal and mountainous areas. Because insufficient infrastructure has hampered the development of Mindanao, investments in infrastructure, including HSH networks connecting major growth centers, is a key to economic development and poverty reduction in Mindanao.





## PART C

# PRESENT AND FUTURE TRAFFIC DEMAND

## **CHAPTER 5**

# PRESENT TRAFFIC CONDITION

## CHAPTER 5 PRESENT TRAFFIC CONDITION

#### 5.1 Traffic Survey Undertaken

Various traffic surveys were undertaken to better understand the travel characteristics within the study area. Appropriate survey methods were utilized to acquire necessary data that depict the actual traffic situation and will be used for transport modelling. Reliable traffic information plays a key role in the planning of road network and assessment of future road construction projects.

In addition to above, focus was also given to logistics movement to determine which routes are heavily used by trucks and which ports/airports are utilized by the manufacturing companies for movement of cargo.

All survey forms are available in **Appendix 5.1**. Detailed discussions of each type of survey are presented in the succeeding sections.

No.	Type of Survey	Unit	Luzon	Visayas	Mindanao	Total
1	Traffic count survey	Stations	35	16	14	65
2	Roadside OD survey	Stations	35	16	14	65
3	Travel speed survey	Stations	26	9	14	49
4	Truck OD survey at port and	Ports	6	5	9	20
	airport	Airports	6	7	7	20
5	Ferry passenger survey at port	Ferry ports	6	13	6	25
6	Port and airport administrator	Port administrators	6	5	9	20
	survey	Airport administrators	6	7	7	20
7	Logistics company interview survey	Companies	6	2	2	10
8	Manufacturing company interview survey	Companies	30	4	8	42
9	Interview survey to administrator at Special Economic Zone (SEZ)	Administrators of SEZs	10	2	2	14

 Table 5.1-1
 Traffic Survey Undertaken

Source: JICA Study Team

 Table 5.1-2
 Objectives of Traffic Survey and Method of Survey

No.	<b>Type of Survey</b>	Objectives	Method
1	Traffic count survey	To capture traffic volume by determining the number of vehicles passing through a road section over a period of time	Manual or by automatic counter (24-hour survey)
2	Roadside OD survey	To determine the origin, destination and trip purpose of passengers and establish the OD matrix	OD interview at roadside (16- hour survey)
3	Travel speed survey	To analyze the effect of traffic congestion on vehicle speed	Driving a passenger car along the selected route and using GPS to capture traffic data
4	Truck OD survey at port and airport	To obtain the volume and trip characteristics (origin, destination and the type of commodity administered) at the port/airport	Interview at port/airport gate
5	Ferry passenger OD survey at port	To obtain the volume and trip characteristics (origin, destination and trip purpose) of ferry passengers	Interview at port gate
6	Port and airport administrator interview survey	To understand how passengers and commodities flow through the selected port or airport	Interview with port/airport administrator

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No.	<b>Type of Survey</b>	Objectives	Method
7	Logistic	To get information on the type of commodities	Interview with logistics
	company	handled by the trucking company and	administrator of selected
	interview survey	understand how these products are transported	company
8	Manufacturing	To understand the flow of raw materials and	Interview with logistics
	company	manufactured goods within the target	administrator of selected
	interview survey	company	company
9	Interview survey		
	to administrator	To get basic information of SEZ and	
	at Special	understand problems and issues encountered	Interview with SEZ administrator
	Economic Zone	by the SEZ as well as solution to the problems	
	(SEZ)		

Source: JICA Study Team

#### 5.1.1 **Traffic Count Survey**

A traffic count survey, one of the most fundamental means of collecting data in transport planning, is used to determine the number of vehicles traversing a road section over a period of time. Traffic counts are useful in identifying which roads are used most, which ones need improvement, or which roads need an alternative route should the volume be excessive. Volume is usually stated in terms of passenger car units (PCUs) and is used to calculate the level of service (LOS) of the road and identify peak hours.

Tuble 211 5 Traine Count but vey Methouology		
Survey day	One regular weekday (from Monday to Friday)	
Survey time	24 hours (from 6:00 AM to 6:00 AM)	
Survey items	Traffic volume per type of vehicle	
Source: IICA Study Team		

 Table 5.1-3
 Traffic Count Survey Methodology

Source: JICA Study Team

A 24-hour traffic count was carried out at each of thirty-five (35) stations across Luzon and 30 stations in the Visayas and Mindanao. Surveyors were positioned at the side of the road and manually recorded the number of vehicles per vehicle type. The locations of traffic count stations are shown in Figure 5.1-1.

#### 5.1.2 **Roadside Origin-Destination (OD) Survey**

A roadside Origin-Destination (OD) Survey was conducted to establish the present OD matrices for trips of passengers and commodities. The objective is to acquire the trip characteristics among zones and to identify the type of commodities being moved from one zone to another. The survey was conducted by stopping vehicles at roadsides and asking the drivers questions relating to their trips. The location map of roadside OD survey stations is shown in Figure 5.1-1.

Survey day	One regular weekday (from Monday to Friday)	
Survey time	Luzon: 12 hours (from 6:00 AM to 6:00 PM) *	
	Visayas and Mindanao: 16 hours (from 6:00 AM to10:00 PM)	
Survey items	items Passenger vehicle: origin, destination (province, city/municipality, facility).	
	trip purpose, number of passengers	
	Freight vehicle: origin, destination (province, city/municipality, facility), trip	
	purpose, type of goods, loaded goods volume	

 Table 5.1-4
 Roadside OD Survey Methodology

\* as per police advisory

Source: JICA Study Team


Source: JICA Study Team Figure 5.1-1 Location Map of Traffic Count and Roadside OD Survey Stations

# 5.1.3 Travel Speed Survey

A travel speed survey was conducted in selected main corridors to analyze the effect of traffic congestion on vehicle speed. The method of the survey is to make a round trip on selected routes in the morning and evening peak hours and continuously record travel data using a GPS device. A passenger car is used and operated at the same general speed as that of the prevailing traffic condition. A surveyor boarding the car records the departure and arrival times, as well as the causes and duration of every delay. Travel speed routes for Luzon, Visayas and Mindanao are shown in **Table 5.1-6**.

Survey day	One regular weekday (from Monday to Friday)	
Survey time	Morning peak time, evening peak time	
Survey items	Time (departure and arrival), travel speed, information of positioning, cause of delay	

<b>Table 5.1-5</b>	<b>Travel Speed S</b>	Survey	Methodology
	1		

Source: JICA Study Team

No	Road	Route		
140.	Number	From	То	
LUZO	N			
1	NPR1	Guiguinto, Bulacan	San Rafael	25
2	NPR1	San Rafael Bulacan	Santa Rosa, Nueva Ecija	47
3	NPR1	Santo Domingo, Nueva Ecija	Carrangalan	39
4	NPR1	Carrangalan	Aritao, Nueva Vizcaya	55
5	NPR1	Cordon, Isabela	Alicia	40
6	NPR1	Naguilian, Isabela	Tumauini	42
7	NPR1	Cabagan, Isabela	Iguig, Cagayan	45
8	NPR1	Pasuquin, Ilocos Norte	Batac	38
9	NPR2	Santa, Ilocos Sur	Santiago	44
10	NPR2	Bauang, La Union	Bachotan	24
11	NPR2	Aringay, La Union	Rosario	32
12	NSR208	Rosario, La Union	Baguio City	48
13	NPR2	Pozorrubio, Pangasinan	Rosales	32
14	NPR2	Gerona, Tarlac	Mabalacat City, Pampanga	58
15	NPR2	San Fernando, Pampanga	Guiguinto	33
16	NPR64	Kawit, Cavite	Ternate	31
17	NSR47	Nasugbu, Batangas	Tuy	31
18	NPR65	Naic, Cavite	Carmona	41
19	NPR1	Batangas City	Calamba, Laguna	54
20	NPR66	Calamba, Laguna	Tiaong, Quezon	45
21	NPR1	Tayabas, Quezon	Pagbilao	30
22	NPR1	Gumaca, Quezon	Calauag	37
23	NPR68	Tagkawayan, Quezon	Ragay	40
24	NPR1	Sipocot, Camarines Sur	Pili	58
25	NPR1	Ligoro, Albay	Pilar, Sorsogon	41
26	NPR1	Castilla, Sorsogon	Juban	43
VISAYAS				
27	NPR5	Roxas City, Capiz	Tinaytayan	41
28	NPR6	Pototan, Iloilo	Iloilo City	30

# Table 5.1-6Travel Speed Routes

N	Road	Route		Length
No.	Number	From	То	(km)
29	NPR6	Enrique B. Magalona, Negros Occidental	San Enrique	59
30	NPR81	Binalbagan, Negros Occidental	Kabankalan City	41
31	NPR8	Toledo City, Cebu	City of Naga, Cebu	33
32	NPR1	City of Naga, Cebu	Carcar City Rotonda	18
33	NPR1	Calbayog City, Samar	Gandara	29
34	NPR1	San Jorge, Samar	Paranas	58
35	NPR5	Santa Rita, Samar	Tolosa	55
MIND	ANAO			
36	NPR9	Nasipit, Agusan del Norte	Butuan City	32
37	NPR9	Medina, Misamis Oriental	Magsaysay	45
38	NPR9	Balingasag, Misamis Oriental	Cagayan de Oro	38
39	NPR9	Laguindingan, Misamis Oriental	Cagayan de Oro	42
40	NPR1	Sumilao, Bukidnon Cagayan de Oro, Misamis Oriental		47
41	NPR1	Malaybalay, Bukidnon	Maramag	28
42	NPR1	Maramag, Bukidnon	Arakan, Cotabato	70
43	NPR1	Marilog District, Davao City	Talomo District, Davao City	42
44	NPR1	General Santos City	Malungon, Sarangani	40
45	NPR1	Sulop, Davao del Sur	Santa Cruz	44
46	NPR1	Bunawan, Davao City	Tagum City	32
47	NPR1	Tagum City, Davao del Norte	Montevista	44
48	NPR1	Trento, Agusan del Sur	Rosario	39
49	NPR1	Butuan City, Agusan del Sur	Prosperidad	58

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Source: JICA Study Team Figure 5.1-2 Location Map of Travel Speed Survey Stations

# 5.1.4 Truck OD Survey at Port and Airport

A truck Origin-Destination (OD) survey at ports and airports is primarily designed to identify the type of commodity transported at the selected port/airport. The survey is conducted at the main entry and exit points to be able to interview the majority of the truck drivers entering/leaving the port or airport. Locations of selected ports and airports are shown in **Table 5.1-8** and **Table 5.1-9**.

Tuble ent / True	Survey meenouology at 1 ort and migore meenouology	
Survey day	One regular weekday (from Monday to Friday)	
Survey time	24 hours; however, if the facility is not 24-hour operational, the survey during closing time is not undertaken	
Survey items	OD survey: origin, destination (province, city/municipality, facility), type of goods, loaded volume	
	Traffic count survey: number of trucks per type of truck to/from port or airport	

 Table 5.1-7
 Truck Survey Methodology at Port and Airport Methodology

Source: JICA Study Team

 Table 5.1-8
 Location of Ports Covered by the Survey

No.	Name	Location			
LUZ	LUZON				
1	San Fernando Port	La Union			
2	Manila North Harbor	Manila			
3	Manila South Harbor	Manila			
4	Manila International Container Terminal	Manila			
5	Subic Port	Subic			
6	Batangas Port	Batangas			
VISA	YAS				
7	Port of Tacloban	Leyte			
8	Iloilo Port	Iloilo			
9	Bacolod Port	Negros Occidental			
10	Cebu Port	Cebu			
11	Dumaguete Port	Negros Oriental			
MIN	DANAO				
12	Butuan Port	Agusan del Norte			
13	Surigao Port	Surigao del Norte			
14	Dapitan Port	Zamboanga del Norte			
15	Cagayan de Oro Container Terminal	Misamis Oriental			
16	Cagayan de Oro Port	Misamis Oriental			
17	Davao Port (Sasa)	Davao del Sur			
18	Polloc Port	Maguindanao			
19	Zamboanga Port	Zamboanga del Sur			
20	General Santos Port	South Cotabato			



Figure 5.1-3 Location Map of Ports in the Philippines

No.	Name	Location		
LUZ	LUZON			
1	Laoag International Airport	Ilocos Norte		
2	Tuguegarao Airport	Cagayan		
3	Clark International Airport	Pampanga		
4	Subic Bay International Airport	Zambales		
5	Naga Airport	Camarines Sur		
6	Legazpi Airport	Albay		
VISA	AYAS			
7	Kalibo International Airport	Aklan		
8	Tacloban City Airport (Daniel Z. Romualdez Airport)	Leyte		
9	Iloilo International Airport	Iloilo		
10	Bacolod-Silay Airport	Negros Occidental		
11	Mactan-Cebu International Airport	Cebu		
12	Bohol-Panglao International Airport	Bohol		
13	Dumaguete Airport Negros Oriental			
MIN	DANAO			
14	Butuan Bancasi Airport	Agusan del Norte		
15	Laguindingan International Airport	Misamis Oriental		
16	Dipolog Airport	Zamboanga del Norte		
17	Cotabato Awang Airport	Maguindanao		
18	Davao International Airport (Francisco Bangoy International Airport)	Davao del Sur		
19	Zamboanga International Airport	Zamboanga del Sur		
20	General Santos International Airport	South Cotabato		



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Source: JICA Study Team

Figure 5.1-4 Location Map of Airports in the Philippines

# 5.1.5 Ferry Passenger OD Survey

A ferry passenger OD survey was conducted at ports to determine the trip patterns of passengers who use the ferry. Interview was conducted at the boarding gates of the facility to catch the majority of ferry passengers. The list of selected ferry ports is shown in **Table 5.1-11**.

Survey day	One regular weekday (from Monday to Friday)	
Survey time	Operational hours of ferry	
Survey items	OD survey: origin, destination (province, city/municipality, facility), trip purpose, transport mode of access and egress, etc.	
	Traffic count survey: number of passengers, number of vehicles boarded on ferry	

Table 5.1-10	Ferry	Passenger	OD	Survey	Methodology
			~~	~~~~	1.1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0

Source: JICA Study Team

Table 5.1-11	Location of Selected Ferry Po	orts
	Location of Defected Lefty 10	1 13

No.	Name	Location			
LUZ	LUZON				
1	Batangas Passenger Terminal 1	Batangas			
2	Batangas Passenger Terminal 2	Batangas			
3	Batangas Passenger Terminal 3	Batangas			
4	Masbate Port (east)	Masbate			
5	Masbate Port (west)	Masbate			
6	Matnog Ferry Terminal	Sorsogon			
VISA	AYAS				
7	Caticlan Jetty Port	Aklan			
8	Iloilo Ferry Terminal 1	Iloilo			
9	Iloilo Ferry Terminal 2	Iloilo			
10	Iloilo Ferry Terminal 3	Iloilo			
11	Iloilo RORO Terminal	Iloilo			
12	Sibulan Ferry Terminal	Dumaguete			
13	Dumaguete Ferry Terminal	Dumaguete			
14	Toledo City Ferry Terminal	Toledo			
15	Cebu Ferry Terminal 1	Cebu			
16	Cebu Ferry Terminal 2	Cebu			
17	Cebu Ferry Terminal 3	Cebu			
18	Cebu Mactan Ferry Terminal	Cebu			
19	Polambato Port	Bogo			
MIN	MINDANAO				
20	Lipata Ferry Terminal	Surigao			
21	Surigao Ferry Port	Surigao			
22	Balingoan Port	Balingoan			
23	Port of Cagayan de Oro 1	Cagayan de Oro			
24	Port of Cagayan de Oro 2	Cagayan de Oro			
25	Dapital Ferry Terminal	Dapitan			



Source: JICA Study Team Figure 5.1-5 Location Map of Ferry Ports and Ferry Routes

### Port and Airport Administrator Interview Survey 5.1.6

A port and airport administrator interview survey was carried out to get a deeper understanding of how passengers and commodities flow and are handled through the port or airport. The surveyor asks the administrator for information such as number of passengers, cargo volume and trip characteristics of operating trucks to determine the type of commodities administered and the service area of the port/airport. To complement this, the survey also captured the transport access issues and problems faced by the port/airport and plans for the improvement of facilities.

The list of ports/airports covered by the survey is the same to that shown in Table 5.1-8 and Table 5.1-9.

Survey day	One regular weekday (from Monday to Friday)
Survey time	Port/airport office hours
Survey items	Number of plane/ship arrival, number of incoming and outgoing passengers, volume of cargo by container or bulk per commodity, list of logistics/trucking companies operating

 Table 5.1-12
 Port and Airport Administrator Interview Survey Methodology

Source: JICA Study Team

### 5.1.7 **Logistics Company Interview Survey**

A logistics company interview survey was undertaken to determine the type of commodities handled by the trucking company and get information how these commodities are transported. The surveyor asked the transport administrator for information on the logistics facilities, volume of commodities, and transport operations of the company. The survey also covered the problems encountered by the company in transporting cargos.

A total of ten (10) logistics companies were selected, with six operating in Luzon and the other four operating in the Visayas or Mindanao. The number of firms covered by the survey per area is shown in Table 5.1-14.

Ian	Tuble 5.1 15 Logistics Company meet the Would by Methodology					
Survey day	One regular weekday (from Monday to Friday)					
Survey time	Company office hours					
Survey items	Cargo volume per commodity, loading condition, vehicle inventory, warehouse inventory, service area, origin and destination of trucks, staying time of commodity					
Samaa UCA Stude Tam						

Table 5 1-13 Logistics Company Interview Survey Methodology

Source: JICA Study Team

 Table 5.1-14
 Number of Firms Covered by the Logistics Interview Survey per Area

Area	Number of Firms	Specific Location
Luzon	6	Metro Manila, Region III, Region IV-A
Visayas	2 Metro Cebu	
Mindanao 2		Metro Davao, Region XI and Region XII

Source: JICA Study Team

### **Manufacturing Company Interview Survey** 5.1.8

A manufacturing company interview survey was carried out at SEZ to analyze the inflow of raw materials and outflow of manufactured goods at the target company. The survey aims to determine the routes undertaken by the transport vehicles and the ports and/or airports utilized for the inflow and outflow of goods. The number of firms interviewed per SEZ is shown in Table 5.1-16.

Survey day	One regular weekday (from Monday to Friday)
Survey time	Company office hours
Survey items	Warehouse inventory, production rate per commodity, products exported or consumed, origin of raw material, destination of products, delivery cost of products

Table 5.1-16	Locations of Manufacturing	g Firms	Covered by	y the Survey	5
--------------	----------------------------	---------	------------	--------------	---

		Number of	
No.	Name	Location	Firms
			Interviewed
LUZ	ON		
1	Baguio City Economic Zone	Baguio City	4
2	Luisita Industrial Park	San Miguel, Tarlac	1
3	Clark Special Economic Zone	Angeles, Pampanga	2
4	Subic Shipyard Special Economic Zone	Subic, Zambales	4
5	Hermosa Ecozone Industrial Park	Hermosa, Bataan	2
6	Gateway Business Park	General Trias, Cavite	4
7	First Philippine Industrial Park	Sto. Tomas, Batangas	1
8	Laguna Technopark SEZ	Binan and Sta. Rosa City, Laguna	6
9	Light Industry & Science Park	Cabuyao, Laguna	1
10	Lima Technology Center	Lipa, Batangas	5
VISA	YAS		
11	West Cebu Industrial Park	Balamban, Cebu	2
12	Mactan Export Processing Zone	Lapu-lapu, Cebu	2
MIN	DANAO		
13	PHIVIDEC Industrial Estate-Economic Zone	Tagoloan, Misamis Oriental	3
14	AJMR Agro-Industrial Economic Zone	Davao City, Davao del Sur	1
15	DADC Economic Zone	Santa Cruz, Davao del Sur	1
16	ABERDI Plantation	Impasug-ong, Bukidnon	1
17	Lamsan Industrial Complex	Sultan Kudarat, Maguindanao	1
18	FECC Complex	Davao City, Davao del Sur	1

Source: JICA Study Team

# 5.1.9 SEZ Administrator Interview Survey

The SEZ administrator interview survey was undertaken to identify the types of industry located in each special economic zone. The survey gives a better understanding of how commodities are transported to/from ports and airports. Likewise, the incentives received by establishments within the SEZ and their transport problems encountered were sought. Locations of special economic zones covered by the survey are shown in **Table 5.1-18**.

Survey day	One regular weekday (from Monday to Friday)				
Survey time	Company office hours				
Survey items	Warehouse inventory, production rate per commodity, products exported or consumed, destination of products, delivery cost of products				

Table 5.1-17	<b>SEZ Administrator</b>	Interview Survey

No.	Name	Location			
LUZ	ON				
1	Baguio City Economic Zone	Baguio City			
2	Luisita Industrial Park	San Miguel, Tarlac			
3	Clark Special Economic Zone	Angeles, Pampanga			
4	Subic Shipyard Special Economic Zone	Subic, Zambales			
5	Hermosa Ecozone Industrial Park	Hermosa, Bataan			
6	Gateway Business Park	General Trias, Cavite			
7	First Philippine Industrial Park	Sto. Tomas, Batangas			
8	Laguna Technopark SEZ	Binan and Sta. Rosa City, Laguna			
9	Light Industry & Science Park	Cabuyao, Laguna			
10	Lima Technology Center	Lipa, Batangas			
VISA	AYAS				
11	West Cebu Industrial Park	Balamban, Cebu			
12	Mactan Export Processing Zone	Lapu-lapu, Cebu			
MIN	MINDANAO				
13	PHIVIDEC Industrial Estate-Economic Zone	Tagoloan, Misamis Oriental			
14	AJMR Agro-Industrial Economic Zone	Davao City, Davao del Sur			

 Table 5.1-18
 Locations of SEZ Covered by the Survey



Source: JICA Study Team



# 5.2 Traffic Condition / Traffic Survey Result

In this Section, only notable results are presented. Other analysis of survey results is available in **Appendix 5.2**.

# 5.2.1 Traffic Count Survey

# (1) Annual Average Daily Traffic: AADT

# 1) Survey Result

Traffic count results were converted to the annual average daily traffic (AADT) as shown in **Figure 5.2-1** which also shows the DPWH traffic count data in 2018 and the expressway traffic volume. The AADT excludes traffic volume counts of Motorbike and Tricycle.

# 2) Share of Large Truck

The share of large size trucks (rigid truck with 2 axles, rigid truck with 3 or more axles and articulated cargo truck such as container trailer) in the total traffic of the network is shown in **Figure 5.2-2**.

The traffic volume was based on AADT. As highlighted in the figure mentioned above, there are major roads across the country where share of large size truck traffic is higher than 30% of the total traffic volume indicating their important role in freight movement. Similarly, it should be noted that volume of large trucks is still highest in Metro Manila and surrounding areas however large truck share is dwarfed by very high volume of passenger cars.

# **3**) **Trend in Traffic Growth**

Traffic growth trend (using AADT) at the 53 major traffic points of national roads is shown in **Figure 5.2-3**. The AADT is increasing at an annual growth rate (AGR) of 4.8%.

Selected traffic count points along the major roads from North Luzon, Central Luzon, South Luzon, Visayas and Mindanao for the past seven (7) years are shown in **Figure 5.2-4**, **Figure 5.2-5**, **Figure 5.2-6**, **Figure 5.2-7** and **Figure 5.2-8**. One of the trends observed is the low AGR of traffic in Central Luzon but very high AGR in both North and South of Luzon. Perhaps one explanation is the close to saturation point of the road network in Central Luzon while motorization in the rural areas of the country continues to grow as manifested by the high AGR of traffic in North and South of Luzon.

In Visayas, the traffic growth is also observed to be high where some count stations even registered as high as 14.1%. The same is true in Mindanao where except the Davao-Butuan count station where AGR is recorded at 8.0%, all other traffic count stations registered more than 10% AGR. Again, this can be interpreted that motorization in the country is felt more strongly outside of Metro Manila.



Source: JICA Study Team, DPWH, MNTC, VTDI, MCX Tollway Inc., PTC, CIC, STAR Tollway Corporation, TMC, PIDC

# Figure 5.2-1 Annual Average Daily Traffic

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Note 1: *The* average AADT of 53 points observed result was calculated by ( $\Sigma$  Section length\*AADT/ $\Sigma$  Section Length). Section length is an assumption by the JICA study team. AGR: Annual Growth Rate Note 2: These excludes data in the urban areas.

Source: DPWH traffic count data















# • South Luzon

Figure 5.2-6 Trend of AADT at South Luzon



Source: DPWH traffic count data





Figure 5.2-8 Trend of AADT at Mindanao

### 5.2.2 **Roadside OD survey**

### (1) **Traffic Characteristics**

Based on the survey results, the characteristics of Trip Purpose, Vehicle Type, Commodity Weight and Type were prepared as shown in Figure 5.2-9 to Figure 5.2-12.

- Trip Purpose: Business trip has the largest share at 47%, followed by Private purpose at 31%. •
- Vehicle Type: Passenger cars have a share of 51% and Freight vehicles including light trucks, • Truck 2-axles, Truck 3-axles and Trailers comprise 33%.
- Commodity Weight: About 30% of Freight vehicles have a commodity load of 5 tons or more.
- Type: Among transport items carried by Freight vehicles, Agricultural Product has the largest ٠ share at 42%, followed by Construction Material and Machine with 31% share.



Source: JICA Study Team Figure 5.2-11 Commodity Weight Source: JICA Study Team Figure 5.2-12 Commodity Type

and Machine

# (2) Trip Length Distribution

A result analysis for trip length by type of vehicle based on the roadside OD survey in Luzon is shown in **Figure 5.2-13**.

With respect to car traffic which has the most traffic volume, trip lengths of less than 50km comprise about 53% of the total trips; Long trips of more than 100km constitute about 25 % of the surveyed trips. Trips of Jeepney traffic are almost less than 50 km at trip length. Bus traffic and truck traffic consist of long travel distances. Around 40% of the total traffic surveyed has long travel lengths of more than 100km. As for the total of all vehicles without Jeepney, around 30% comprises long trip lengths of more than 100 km.



Note: trip length calculated based on the roadside OD survey within Luzon *Source: JICA Study Team* 

Figure 5.2-13 Trip distribution by vehicle type

# (3) OD Characteristics

OD characteristics of selected survey stations are presented hereunder. A long trip distance of 100km or more shared from 25% to 30%. People's travel area and logistics area are area-wide; this trend will expand more in the future for business and logistics.

• Survey Station at North of Tarlac



Figure 5.2-14 Trip Distribution: Survey Station at the North of Tarlac

- **OD** Distribution Trip Origin Destination Trips Ratio 5,100 80% Inside of BICOL REGION BICOL REGION ⇔ NCR 610 10% BICOL REGION ⇔ CALABARZON 315 5% The others 363 6% 100% Total 6,388 Long trip :25% 35% 30% 25% - 100 trips 250 trips 20% - 500 trips 15% - 1000 trips 10% 1001 trips 5% 0% Source: JICA Study Team 0~30 30~50 50~100 100~200 200^ Distance(km) N=6.388
- Survey Station between at Camarines Sur: Between Naga and Legazpi

# Figure 5.2-15 Trip Distribution: Survey Station at Camarines Sur between Naga and Legazpi

• Survey Station at Cagayan de Oro: Between Cagayan de Oro and Iligan



Source: JICA Study Team



# 5.2.3 Travel Speed

# (1) Condition of Travel Speed

The travel speed survey results during the morning peak hour are shown in **Figure 5.2-17**, **Figure 5.2-18**, **Figure 5.2-19** and **Figure 5.2-20**. The travel speed in rural sections is mostly 40km/h or above, but the travel speed decreases significantly or less than 20km/h as one gets closer to the urban area.



Source: JICA Study Team Figure 5.2-17 Travel Speed during AM Peak Hour: North Luzon (Towards Manila)

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Source: JICA Study Team Figure 5.2-18 Travel Speed during AM Peak Hour: Bicol Region (Towards Manila)



Source: JICA Study Team

Figure 5.2-19 Travel Speed during AM Peak Hour: Visayas (Towards Urban Area)



Source: JICA Study Team Figure 5.2-20 Travel Speed during AM Peak Hour: Mindanao (Towards Urban Area)

# (2) Travel Speed at Specific Road Sections

Travel speeds at specific road sections are shown in **Figure 5.2-21**, **Figure 5.2-22** and **Figure 5.2-23**.

• San Rafael – Cabanatuan Section



Data: A.M. toward Manila Source: JICA Study Team Figure 5.2-21 Detailed Travel Speed Survey Results: San Rafael – Cabanatuan Section

• Naga City, Camarines Sur



Data: A. M. toward Manila Source: JICA Study Team Figure 5.2-22 Detailed Travel Speed Survey Results: Naga City

• Cagayan de Oro



Data: A.M. toward Cagayan de Oro Source: JICA Study Team Figure 5.2-23 Detailed Travel Speed Survey Results: Cagayan de Oro

# (3) Relation of Travel Speed and Population Size of Urban Area

The relation between travel speed and population size of the urban area analyzed from the travel speed survey results by the JICA Study Team is shown in **Figure 5.2-24**. The traffic function of the existing Primary National Roads, that should allow high-speed driving, has been significantly affected when passing through urban areas with over 100,000 population. It was observed that the travel speed at such urban sections becomes slower than 30 km/h.



Population Size of Urban Area on Survey Route

Data: Total of A.M. inbound and outbound, P.M. inbound and outbound Source: JICA Study Team

Figure 5.2-24 Relation of Travel Speed and Population Size of Urban Area

# (4) Causes of Stops

The analyses of "Causes of Stops" are shown in Figure 5.2-25.

Major causes of stops are "Slow moving vehicles ahead" and "Uncontrolled intersections", mainly within urbanized area.

# 1) All Sections



Data: Total of A.M. inbound and outbound, P.M. inbound and outbound Source: JICA Study Team





Data: Total of A.M. inbound and outbound, P.M. inbound and outbound

Source: JICA Study Team Figure 5.2-26 Causes of Stops (Sections Near Metro Manila) Data: Total of A.M. inbound and outbound, P.M. inbound and outbound Source: JICA Study Team Figure 5.2-27 Causes of Stops (Other Sections)

# 5.2.4 Ferry Passenger OD Survey at Ferry Port

A ferry passenger survey was undertaken at the ferry ports (Figure 5.1-5), and the results are shown below.

- Based on the ferry passenger survey results, the traffic demand volumes between main islands are shown in **Figure 5.2-28** and **Figure 5.2-29**.
- The traffic demand is high between Luzon and Mindoro, between Cebu and Bohol, and between Panay and Negros.
- The highest traffic demand for both ferry passengers and vehicles is in the section connecting Luzon and Mindoro Island.
- The section connecting Cebu Island and Bohol Island has many ferry passengers, but there are not many vehicle trips (number of vehicles carried by ferry or locally known as Ro-Ro).
- The section connecting Bicol region and Samar Island has fewer ferry passengers, but there are many vehicle trips (number of vehicles carried by ferry or locally known as Ro-Ro).







Source: JICA Study Team Figure 5.2-29 Number of Vehicles Carried by Ferry Boats between Islands

# 5.2.5 Truck OD Survey at Port and Airport

# (1) Present Condition at Port and Airport in the Philippine

1) Port

**Table 5.2-1** shows the number of Ports in the Philippines. The Philippine Ports Authority (PPA) is responsible for managing and operating most public ports nationwide. Ports in the Cebu area are managed and operated by Cebu Port Authority (CPA) independent of PPA. Subic and San Fernando Port are managed and operated by the Freeport Special Economic Zone Authority.

	PPA						
	РМО	BP	OTP	OGP	PP		
	PMO NCR North	Manila North Harbor	0	0	8		
	PMO NCP South	Manila South Harbor	0	0	2		
z	FINO NCK South	MICT	0	0	2		
[O]	PMO Northern Luzon	-	6	17	20		
D,	PMO Bataan/Aurora	Lamao	3	1	13		
Ι	PMO Batangas	Batangas	3	6	32		
	PMO Bicol	Legaspi	6	24	10		
	PMO Palawan	Puerto Princesa	6	3	11		
	PMO Mindoro	Calapan	6	6	1		
	PMO Marinduque/Quezon	Lucena	2	1	5		
	PMO Masbate	Masbate	2	13	3		
S	PMO Negros Oriental/Siquijor	I/SiquijorDumaguete35I/SiquijorFort San Pedro, Iloilo River Wharf611ICPC, LOBOCIIIISamarTacloban521Intal/Bacolod/Banago/BredcoBanago55	14				
ΥA		Fort San Pedro,					
Y	PMO Panay/Guimaras	Iloilo River Wharf	6	11	14		
/IS		ICPC, LOBOC					
-	PMO Eastern Leyte/Samar	Tacloban	5	21	14		
	PMO Negros Occidental/Bacolod/Banago/Bredco	Banago	5	5	14		
	PMO Western Leyte/Biliran	Ormoc	8	7	12		
	PMO Bohol	Tagbilaran	6	3	2		
	PMO Misamis Oriental/Cagayan de Oro	Cagayan de Oro	3	6	18		
	PMO Lanao del Norte/Iligan	Iligan	1	0	9		
	PMO Agusan	Nasipit	2	2	6		
0	PMO Surigao	Surigao	5	12	9		
Ž	PMO Misamis Occidental/Ozamiz	Daima	2	1	1		
DA		NCR North       Manila North Harbor         NCR South       Marila South Harbor         Northern Luzon       -         3ataan/Aurora       Lamao         3ataan/Aurora       Lamao         3ataan/Aurora       Lamao         3atangas       Batangas         3icol       Legaspi         *alawan       Puerto Princesa         Mindoro       Calapan         Marinduque/Quezon       Lucena         Masbate       Masbate         Negros Oriental/Siquijor       Dumaguete         Fort San Pedro,       Ioilo River Wharf         ICPC, LOBOC       Eastern Leyte/Samar       Tacloban         Negros Occidental/Bacolod/Banago/Bredco       Banago       Western Leyte/Biliran         Ormoc       Bohol       Tagbilaran         Misamis Oriental/Cagayan de Oro       Cagayan de Oro       Lagaoo         Lanao del Norte/Iligan       Iligan       Agusan         Misamis Occidental/Ozamiz       Daima       Ozamiz         Davao       Sasa Wharf       SocSARGEN         Sub-Total       29       ER AUTHORITY         Name of Authority       BP       29         Cabato       Cotabato       San Fernando         B	2	1	1		
Z	PMO Davao	Sasa Wharf	3	4	25		
Σ	PMO SOCSARGEN	Makar Wharf	1	0	15		
	PMO Zamboanga del Norte	Dapitan	2	2	2		
	PMO Zamboanga	Zamboanga	5	5	11		
	PMO Cotabato	Cotabato	1	0	0		
	Sub-Total	29	97	155	271		
	OTHER AUTHORITY						
	Name of Authority	BP	Sub-P	ort Ot	her-Port		
	Cebu Port Authority (CPA)	Cebu International		5	7		
	Couron Automy (CIA)	Cebu Domestic		5	'		
	Poro Point Management Corporation (PPMC)	San Fernando	-		-		
	Subic Bay Metropolitan Authority (SBMA)	Subic	-		-		
	Sub-Total	4 5 7		7			
	GRAND TOTAL	568					

Table 5.2-1Number of Port in the Philippine

Note1: PMO is Port Management Office, BP is Base Port, OTP is Other Terminal Port, OGP is Other Government Port, PP is Private Port

Source: PPA, CPA, JICA Study Team

The cargo traffic (in tons) and container traffic (in Twenty-Foot Equivalent Units or TEUs) handled by the major ports for the past 5 years are shown in **Table 5.2-2** and **Figure 5.2-32**.

The average growth rate (AGR), from 2014 to 2018, of the cargo traffic handled is 6%, while the AGR of the containers handled is 8%. The AGR of the major ports tends to steadily increase every year.

Dout Nome		Cargo ('000ton)				Container ('000TEU)				
Port Name	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
Manila North Harbor	15,233	19,775	24,326	26,562	27,505	1,044	1,131	1,239	1,364	1,505
Manila South Harbor	5,096	5,440	6,560	6,949	8,099	889	878	1,046	1,108	1,204
MICT	21,431	21,573	23,256	23,849	25,915	1,877	1,961	2,174	2,276	2,374
Subic	6,061	7,569	7,071	6,633	6,852	78	124	125	141	212
Iloilo	2,988	3,348	3,575	3,758	3,985	124	137	152	162	166
Cebu	14,373	14,093	14,933	16,331	17,980	701	813	870	888	920
CDO	4,641	5,252	5,935	6,554	7,245	206	237	263	266	279
Davao	3,888	4,187	4,210	4,430	4,329	272	296	304	315	289
Grand Total	247,172	263,692	287,516	301,133	312,991	6,320	6,825	7,544	8,076	8,744

 Table 5.2-2
 Cargo and Container Traffic Handled at Major Ports (2014-2018)

Source: PPA, CPA, JICA Study Team

The proportions of the total cargo and container traffic handled by the major ports are shown in **Figure 5.2-30** and **Figure 5.2-31**. The top 10 ports accounted for 33% of the total cargo traffic and 79% of the total container traffic.



Source: PPA, CPA, JICA Study Team

Figure 5.2-30 Proportions of Total Cargo Traffic Handled by the TOP 10 Ports Source: PPA, CPA, JICA Study Team

Figure 5.2-31 Proportions of Total Container Traffic Handled by the TOP 10 Ports


Source: PPA, CPA, JICA Study Team **Figure 5.2-32** Growth of Cargo and Container Traffic at the Major Ports

## 2) Airports

**Table 5.2-3** shows the number of the Airports in the Philippines. The Civil Aviation Authority of the Philippines (CAAP) is the agency responsible for implementing policies on civil aviation in the country. CAAP also manages and operates public airports nationwide, except for those in Manila, which are under the Manila Airport Authority (MIAA), those in Cebu, which are under the Mactan-Cebu International Airport Authority (MCIAA), those in the Davao Region, which are under the Davao International Airport Authority (DIAA), and Clark International Airport, which is under the Clark International Airport Corporation (CIAC). CAAP, MIAA, MCIAA, DIAA, and CIAC are all attached to or under the supervision of DOTr.

	Class	No.	Name of International (Int'l.) Airport
-	International	5	<ul> <li>Clark Int'l. Airport</li> <li>Puerto Princesa Int'l. Airport</li> <li>Laoag Int'l. Airport</li> <li>Subic Bay Int'l. Airport</li> <li>Ninoy Aquino (Manila) Int'l. Airport</li> </ul>
Luzon	Principal-C1	5	-
	Principal-C2	8	-
	Community	21	-
	International	5	<ul> <li>Mactan-Cebu Int'l. Airport</li> <li>Bacolod-Silay Int'l. Airport</li> <li>Bohol-Panglao Int'l. Airport</li> <li>Iloilo Int'l. Airport</li> <li>Kalibo Int'l. Airport</li> </ul>
visayas	Principal-C1	4	-
	Principal-C2	5	-
	Community	9	-
	International	4	<ul> <li>General Santos Int'l. Airport</li> <li>Francisco Bangoy Int'l. Airport (Davao)</li> <li>Laguindingan Int'l. Airport</li> </ul>
Ninidanao	Principal-C1	5	-
	Principal-C2	6	-
	Community	11	-
TOTAL		88	

Source: CAAP, NAIA\_20190510\_TotalStats\_2012-2019, CLARK operational-statistics, Mactan-Cebu passengers, JICA Study Team

The passenger traffic at the major airports for the past five (5) years is shown in **Table 5.2-4** and **Figure 5.2-33**. The passenger traffic at NAIA is around 78% of the total.

<b>Table 5.2-4</b>	Number of	f the Passenger	Traffic at the	Majorly Ai	irport (2014-201	.8)
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-									(U	nit: 000 Pa	(ssenger)
Ainmont Nome		2014		2015		2016		2017		2018	
Airpor	t Ivame	Dom	For	Dom	For	Dom	For	Dom	For	Dom	For
NAIA		18,020	16,075	19,415	17,168	20,578	18,938	21,065	20,958	22,081	22,974
Total		34,094		36,583		39,517		42,022		45,054	
Cebu		5,160	1,680	5,769	2,012	6,394	2,436	6,905	3,146	7,611	3,766
	Total	6,8	40	7,7	81	8,8	31	10,0	051	11,3	78
Davao		3,408	44	3,186	51	3,462	91	4,141	94	4,288	147
	Total	3,4	52	3,2	37	3,5	53	4,2	35	4,4.	36
CLARK		91	787	42	827	52	899	431	1,083	1,350	1,314
Total		878		869		951		1,515		2,664	
Iloilo		1,727	56	1,854	62	1,875	69	1,955	68	2,215	81
	Total	1,7	83	1,9	16	1,9	44	2,0	23	2,2	96
Puerto P	rincesa	1,372	7	1,565	27	1,613	31	1,767	23	2,047	104
	Total	1,3	79	1,5	92	1,6	44	1,7	90	2,1.	51
CDO		1,553	0	1,756	0	1,776	0	1,815	0	2,080	0
	Total	1,5	53	1,7	56	1,7	76	1,8	15	2,0	80
Bacolod		1,318	0	1,466	0	1,499	0	1,579	0	1,770	0
	Total	1,3	18	1,4	66	1,4	99	1,5	79	1,7	70
Grand T	<b>Fotal</b>	41,584	19,482	44,787	21,163	47,897	23,797	51,201	26,812	55,633	29,314
	Total	61,0	065	65,9	950	71,6	594	78,0	014	84,9	47

Note: Dom - Domestic Departure/Arrival, For - Foreign Departure/Arrival

Source: CAAP, NAIA\_20190510\_TotalStats\_2012-2019, CLARK operational-statistics, Mactan-Cebu passengers, JICA Study Team



Source: CAAP, NAIA\_20190510\_TotalStats\_2012-2019, CLARK operational-statistics, Mactan-Cebu passengers, JICA Study Team

Figure 5.2-33 Passenger Traffic at the Major Airports

#### (2) Survey Results

## 1) Overall

- A truck OD survey was undertaken at the ports and airports. Location of the ports and airports covered by the OD survey is indicated in **Figure 5.1-3** and **Figure 5.1-4** respectively.
- Based on the survey output, desire line maps were prepared (Figure 5.2-34 to Figure 5.2-37 for some selected ports and Figure 5.2-38 for NAIA airport).
- The volumes of trucks to/from the ports/airports around Manila are significant compared to those of the other ports/airports. The former ports/airports have wide service areas compared to the others.
- Similarly, the main truck flow was observed to end within the island where the ports/airports are located. This means that the length of truck trips is not that long and the share of trucks moving into another island via RORO is not that significant.
- Moreover, trucks to/from the ports/airports in Luzon Island tend to concentrate their origins/destinations at the areas along the expressway.

## 2) Seaports

- The volume of trucks to/from MICT (Manila International Container Terminal) Port is about 6,000 units/day, which is the largest among the surveyed ports.
- MICT (Manila International Container Terminal) Port has the widest service area in the northsouth direction among all survey ports.
- The volume of trucks to/from Batangas Port is about 2,300 units/day, which is the second largest among the surveyed ports, following Manila Ports.
- The volume of trucks to/from Bacolod Port is about 1,200 units/day, which is the largest among the survey ports in the Visayas. The service area of Bacolod port is within on the Negros island.
- The Volume of trucks to/from Cagayan de Oro Port is about 1,600 units/day, which is the largest among the surveyed ports in Mindanao. The service area of Cagayan de Oro port is within Mindanao island.



# 3) Airports

- The volume of trucks to/from NAIA airport is about 3,100 units/day, which is the largest among the surveyed airports.
- NAIA airport has the widest service area in the north-south direction among all surveyed airports.



Source: JICA Study Team

Figure 5.2-38 NAIA Airport

#### 5.3 Freight Movement and Logistics Corridors Survey

#### 5.3.1 Survey Methodology

In all the surveys under this Section, face-to-face interview using prepared questionnaire of 5 to 6 pages was employed. The alternative method was by sending email when meeting officers of an entity turned out to be difficult due to their busy schedules.

#### (1) Ports

In determining ports to include in the target samples, the following were considered (**Figure 5.3-1**):

- Importance of the port in terms of cargo volume and hierarchy (Base port or Container terminal)
- Importance of the port in terms of location taking into account the goal of balanced development of the country (i.e. dispersed location of ports with expressway support by linking them to economic productions and markets)

#### (2) Airports

The same considerations were taken into account in determining airports to include in the target samples, as follows (**Figure 5.3-1**):

- Importance of the airport in terms of cargo volume and hierarchy (i.e. International Airport or Principal Class 1 or Principal Class 2)
- Importance of the airport in terms of location taking into account the goal of balanced development of the country (i.e. target airports are distributed throughout the country, and expressways might have a role in linking them to economic production areas and markets)

#### (3) Trucking Companies

The target survey trucking companies were the major trucking companies in Luzon, Visayas and Mindanao. To achieve this, trucking and forwarding associations (e.g. Confederation of Trucking Association of the Philippines) were approached for their support by introducing the survey teams to different local trucking and forwarding associations in Manila, Cebu and Davao. Basically, the following procedures were undertaken in selecting truck companies to include in the target companies:

- Candidate trucking companies that have licenses to operate in the whole of Luzon (for target samples in Luzon)
- Candidate trucking companies that have licenses to operate in the whole of Cebu island (for target samples in the Visayas)
- Candidate trucking companies that have licenses to operate in the whole of Mindanao (for target samples in Mindanao)
- Trucking companies that handle both container and bulk cargoes

## (4) Special Economic Zones (SEZ)

Interviews with the administrators of special economic zones (SEZ) were undertaken as well to get basic information on the major economic zones in the whole country. Similarly, through this interview, problems and issues encountered by the SEZ, as well as what the administrators thought are helpful measures to address them, were learned. In selecting the economic zones to be included in the survey, the following were considered (**Figure 5.3-1**):

- Size of ecozones (i.e., number of locators, investment amount, land area)

- Corporate nationality (where possible, target ecozones are co-owned by Filipino and foreigners to ensure locators/companies are engaged in both export and import products)
- Target SEZ are distributed throughout the country and expressways might have a role in linking them to economic production areas, markets, and international gateways like ports and airports



Figure 5.3-1 Location of Surveyed Ports, Airports and Economic Zones

# (5) Manufacturing Companies

The target manufacturing companies are mostly located inside the SEZ and engaged in both importation and exportation of their products. NFA in Cabanatuan (the largest in Luzon in terms of volume of rice supply) and NFA in Davao (largest in Mindanao in terms of volume of rice supply) were added in the list.

In Mindanao, due to their thriving agri-industries related to banana, mango, palm oil, coconut, corn among others, large companies engaged in these businesses were included as well. These agri-industries were selected taking into account their large contribution to the economy of Mindanao.

	Target Industries		Criteria for Selection of Candidate Manufacturing Companies
1. 2. 3.	Agri-related products (Palay, corn, fruit, vegetables, tobacco, sugar cane, copra) Manufactured Foods (Canned fruit, groceries, beer) Manufactured Goods (Drugs, footwear, furniture, textiles, appliances, rubber product, beauty products)	1. 2.	Target company is also operating in other ASEAN countries to allow us to compare their operation and logistics costs (Philippines vs ASEAN) Raw materials sourced locally (or at
4.	Manufactured machine, equipment, appliances (Electrical Parts / Equipment and Products, Electronic / IT Related Part / Equipment / Products, Precision Machine, Vehicle Parts & Transport Equipment / Parts, Automobiles, Machinery and its parts)	3.	least partially sourced locally) to know transport problems at the source of raw materials Industrial output (finished products) preferably for domestic and
5.	<b>Construction Materials</b> (Cement, concrete, steel, wood product, asphalt, clay and sand)	4.	international markets Target company shall be medium to
6.	<b>Producer Goods</b> (Fertilizer, paper, machinery, chemicals, others)		large size

# 5.3.2 Logistics Costs in the Philippines

## (1) Position of the Philippines in Road Freight Transport Price

It is often said that logistics in the Philippines is high. However, there is only limited literature which has explored the degree of seriousness of this issue and has placed it in perspective by comparing it with logistics costs in other countries. To understand if the logistics cost of the Philippines is higher than those of its neighboring countries and, if higher, by how much, a survey with the major manufacturing firms in the economic zones was undertaken.

**Figure 5.3-2** illustrates the road transport price (cost in ton-km) which indicates the position of the Philippines among the countries in the world. The cost of transporting goods in the Philippines by road is US Cent 9.7/ton-km (average of 30 routes in Luzon considered in the study), which is higher than even those in some developing countries in Africa which is known to have high transport cost particularly its land locked countries of Burkina Faso (US Cent 9/ton-km), Rwanda (US Cent 9/ton-km) and Uganda (US Cent 8.5/ton-km). Note though that most of the data in Africa were almost 10 years old and most likely have increased as well. To arrive at the above data, 30 routes in Metro Manila by two major manufacturing companies (other companies did not give complete data hence the no) were studied and the said figure is the average. Of the 30 routes covered by the study, the route with lowest price is US Cent 7.23/ ton-km and the route with highest price is US Cent 40.06/ ton-km.

When the cost comparison is narrowed down to only among ASEAN countries as indicated in **Figure 5.3-3**, only Cambodia has higher road transport cost than Philippines indicating that logistics system of other countries in the region is perhaps operating better. Indonesia, Thailand, Vietnam, and Myanmar have lower road transport cost which is between US Cent 5.9 to US Cent 7 per ton-km. According to the 2012 ADB report titled "Trade and Trade Facilitation in

the Greater Mekong Subregion", road transport costs in most middle-income countries predominantly around US Cent 4 to US Cent 6 per ton-km. Trucking industry operating within this range can be considered operating efficiently. It can be said then that the US Cent 9.7/ton-km road transport price in the Philippines is rather high.

The worsening traffic congestion in Metro Manila and other major cities where trucks have to pass to reach their destination is deemed to contribute significantly to this escalating cost. Normally, road transport cost is composed of fuel costs, wages, tires, maintenance cost, among others.

Similarly, in this survey, the road transport price (cost in ton-km) in 2015 was also calculated by asking the participating manufacturing companies the cost they paid for one truck trip from origin to destination. By comparing the two costs (average cost of the 30 routes: 2015 cost is US Cent 9.2/ton-km and 2019 cost US Cent 9.7/ton-km), it was observed that transport cost increased by 5.2% in the last five (5) years or about 1.03% per annum.



Note 1: Philippine data is taken from the Survey by JICA Study Team (2019). Data of Philippines is taken from two major manufacturing companies which provided complete and comprehensive data of their 30 routes in Luzon during the survey. Note 2: Other data are taken from the following:

- Burkina Faso (2010 WB Study "Corridor Logistics Initiative")
- Australia, Bangladesh, Mexico, Colombia (2009 WB Study "Freight Transport Development Toolkit: Road Freight")
- Georgia (2009 ADB Study "George Transport Sector Assessment, Strategy and Road Map")
- India (2018 ADB Study "India: Supporting Logistics Sector Development")
- USA, China, Indonesia, Myanmar (2018 ADB Study "Myanmar Transport Policy Notes")
- Bolivia (2009 WB Study "Strengthening Bolivian Competitiveness: Export Diversification and Inclusive Growth")
- Iran (2007 WB Study "The Cost of Being Landlocked: Logistics Costs and Supply Chain Reliability")
- South Africa (2008 WB Study "The Impact of Regional Liberalization and Harmonization in Road Transport Services: A Focus on Zambia and Lessons for Landlocked Countries")
- Thailand, Vietnam, Cambodia, Burundi, Congo, Niger (2012 ADB Study "Trade and Trade Facilitation in the Greater Mekong Subregion")
- Laos (2018 WB Study "Transport Costs and Prices in LAO PDR: Unlocking the Potential of an Idle Fleet")
- Kenya, Zambia, Uganda, Rwanda, Cameroon, Chad (2009 WB Study "Transport Prices and Costs in Africa")
- Brazil, France (2009 WB Study "Transport Prices and Costs in Africa: A Review of the Main Corridor")
- Costa Rica, Nicaragua, El Salvador, Honduras, Guatemala, Panama (2014 WB Study "What Drives the High Price of Road Freight Transport in Central America?")

#### Figure 5.3-2 International Comparison of Road Freight Prices



Note: Source of data same as in Figure 5.3-2

Figure 5.3-3 Road Freight Prices in ASEAN countries

# (2) Share of Logistics Cost in the Value of Product in the Philippines and other ASEAN Countries

The above figure only estimated the road transport cost in the Philippines and did not capture the other cost components of logistics. The recently completed joint study of the Department of Trade and Industry (DTI) and World Bank (WB) however shed a light on the share of the different components of logistics. The said study attempted to understand the share of logistics cost in the product value (e.g. if a product has a value/selling price of USD 1,000, how much of it is consumed by logistics cost) in the Philippines and compared the result with the logistics cost of other ASEAN countries. The study revealed that Philippines has the highest share of logistics cost in the value of product among the four (4) ASEAN countries as illustrated in **Figure 5.3-4**. The country has as well the highest cost in all the logistics cost's subcomponents: transport, warehousing, inventory, and logistics administration. The development of a good network of high standard highways will surely contribute in reducing the high transport cost in the Philippines, which is almost double the transport cost in Thailand.

To put it in perspective, developed countries which have advanced infrastructure appears to have their logistics cost at about 10% of the product value as reported by the 2008 World Bank study titled "Improving Logistics Costs for Transportation and Trade Facilitation". Hence, Thailand's logistics is operating efficiently (or at least very close to it) as indicated by the 11.10% cost of the product value. Other countries however particularly the Philippines have a lot to fine tunes in their logistics system to lower their logistics cost.





In the same joined study by DTI and WB, it identified that, from the users' perspective, the most important issues are as follows: reliability (44%), cost (30%), and time (26%). Again, the development of a good network of high standard highways will contribute to increasing the logistics reliability of the Philippines by providing highly functional roads that would link the different logistics facilities (ports, airports, factories, etc.).

Interestingly, the said study implies that, due to the low reliability of the logistics system (e.g., unpredictable arrivals due to customs-related problems, traffic congestions etc.), manufacturers are forced to maintain a large volume of supply which require securing huge warehouses and calls for good inventory and administration. Obviously, the above process entails additional cost which could partly explain the reasons behind the high logistics costs in the Philippines.

Taking into account the above, it can be said that, if the development of high standard highway network will contribute to securing timely delivery of goods, it will result as well in reducing the costs of the other sub-components of logistics, such as warehousing, inventory and logistics administration. This view is anchored on the fact that having a more reliable logistics system will free the users (manufacturing companies) from overstocking large volume of supply; hence, their needs to maintain huge inventory and rent for huge warehouses will decrease as well. Similarly, a reliable logistics system is needed to enable manufacturing companies to plan efficiently which would bring down their logistics cost.

#### (3) Comparison of Logistics Cost in Luzon, Visayas and Mindanao

When the data on logistics cost of the Philippines is disaggregated among the major islands of the country, it reveals the huge disparity among them. Mindanao has the highest logistics cost, followed by the Visayas. Luzon is the best performing island among the three. The said study has the following to say for the reason behind the huge differences in cost:

"Overall, Mindanao appears to face the highest logistics cost/sales, reaching almost a third of its sales; while Luzon face the lowest. It is also worthwhile to note that Luzon's logistics cost/sales is lower than that of the national average. Luzon is the main industrialized island group in the country and thus, benefits from lower logistics cost, consistently in all components. Cost components in Mindanao, meanwhile, emerge as the highest among the three island groups."

For the high transport cost in Visayas, the study indicates that this is most likely attributed to the geographical nature of the region, with a multitude of inter-island shipping used in the logistics of freight.



Figure 5.3-5 Comparison of Logistics Costs among Major Islands of the Philippines

#### 5.3.3 Relationship between Logistics Cost and Quality of related Infrastructure

In the preceding Sub-sections, it was confirmed that logistics cost in the Philippines is higher than those in most of its ASEAN neighbors. The next question is why this is so? A quick look at the figure below reveals that there seems to be a closer link between road freight cost and the quality of related infrastructure to logistics. In the said figure, Thailand, Vietnam and Indonesia have better infrastructure ranking over the Philippines and naturally they have lower road transport cost as well. These three countries can be considered as best performing ASEAN countries among the compared six countries (note: Singapore and Malaysia lacked complete data hence the exclusion). Philippines is just outside the circle of this best performing ASEAN countries. For the Philippines to join the circle, its LPI should climb from rank 67 to within the range of 40 to 60 coupled with the improvement of its road transport cost from US cent 9.7/ton-km to within the range of 8 to 6 (**Figure 5.3-6**). The other ASEAN countries performed poorer than Philippines are Cambodia and Myanmar.



Source: Plotted by the JICA Study Team based on the data from 2018 World Bank (for LPI), same data sources at Figure 5.3-1 (for road transport price), and JICA Study Team survey for Philippine data

#### Figure 5.3-6 Relationship between Road Transport Price and LPI (Infrastructure ranking)

The quality of road in these countries appears to have impact in pushing higher the road transport price. For example, Thailand is judged as having the best quality of road among the compared ASEAN countries and as observed in **Figure 5.3-1**, the country has the lowest road transport price as well. Cambodia and Philippines, on the other hand, two countries which have high transport cost are also assessed to have poor quality of road (the higher the rank, the poorer the quality of road). The only exception is Vietnam where although it has lower road transport price that the two countries mentioned above (Cambodia and Philippines), its quality of road is assessed to be in poorer condition that the two countries above.



Source: Plotted by the JICA Study Team based on the data from 2016-2017 Global Competitiveness Report, World Economic Forum; same data sources at Figure 5.3-1 (for road transport price), and JICA Study Team survey for Philippine data

#### Figure 5.3-7 Relationship between Road Transport Price and Quality of Road

Another relationship explored is between the length of expressway a country has and road transport price. This is complicated to assess since it is difficult to quantify the direct and indirect impacts of expressway network on road transport price unless a particular methodology designed for this purpose and a survey is undertaken among the compared countries. The purpose however here is to use the existing data and see if there are some patterns that can be observed.

As seen in **Figure 5.3-8**, it appears that Indonesia (820 km) and Vietnam (815 km)– two countries with longest expressway – have relatively lower road transport price as well (US Cent 6.0/ton-km and US Cent 7/ton-km respectively). Myanmar which have 590 km of expressway have a road transport price comparable to Vietnam. The Philippines which have about 400km of expressway are supposed to have around US Cent 8.0/ton-km to get closer to the straight line. Perhaps the current price of US Cent 9.7/ton-km is a bit high. Cambodia which haven't started developing its expressway network have the highest road transport price (US Cent 10.2/ton-km). Thailand appears to be outlier wherein despite its limited length of expressway at 225km, its road transport price is lower at US Cent 6.0/ton-km. This is perhaps due to its significantly well developed national highway network with flyovers and more than 4 lanes in vital sections.



Source: ASEAN- Japan Transport Partnership (https://www.ajtpweb.org/ajtp/statistics/index.html); accessed on Nov. 12, 2019 Figure 5.3-8 Relationship between Road Transport Cost and Length of Expressway

# 5.3.4 Impact of Expressways on Logistics

## (1) Logistics Corridor in Luzon Island

Logistics corridors (or routes preferred by truck drivers) were established through interviews with trucking companies and manufacturing companies (Figure 5.3-9). Trucks serving the economic zones in northern Luzon are basically using the NLEx, TPLEx and SCTEx. The latest addition in the truck routes in the north is the Harbor Link of NLEX (although the entire section is not yet completed) which partially relieve trucks from traffic congestion at R-10 and C-4. South of Manila, trucks continue to prefer the SLEx, Star Tollway, CAVITEx, and NAIAx over local roads. Similarly, due to its strategic location as link between the economic zones in Cavite and the SLEx, the Governor's Drive is also handling large volume of trucks. In the same figure, the following can be further observed:

- Ecozones which are hosting light industries like Baguio City Economic Zone, Clark Freeport Zone, Gateway Business Park among others normally use the airports to export majority of their products. Their products normally include electronical parts, computers chips, IT related products, plastic related parts among others. Perhaps this is due to light character of products.
- These ecozones above (except Gateway Business Park) are closer to Clark airport than to NAIA airport. How about majority of their products are still brought to Manila for shipment via NAIA airport. One of the reasons is the availability of more flight destinations in NAIA airport compared to Clark airport.
- Ecozones which are hosting heavy industries like Luisita Industrial Park, Lima Technology Center, First Philippine Industrial Park among others use ports to export majority their products. Their product normally includes car parts, precision machines, chemicals, processed food, iron and steel among others. Perhaps this is due to heavy character of their products.
- Although these ecozone hosting heavy industries are much closer to ports outside Metro Manila like Subic Port and Batangas Port, interview reveals that most of their products are still ship out via Manila International Container Port (MCIP). For example, Luisa Industrial Park is closer to Subic Port than MICP but majority of their products (estimated by the administrator to be around 70% to 80% of their products) still ship out via MICP (Figure 5.3-9).

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Note: NAIA=Ninoy Aquino International Airport; MICP=Manila International Container Port

Figure 5.3-9 Logistics Corridors and Ecozones' Gateway Ports and Airports

## (2) Impact of Expressway on Truck's Travel Time and Cost in Luzon

Due to the high concentration of economic zones in Luzon, the travel time of trucks between the major logistics facilities (i.e., ports, airports, ecozones) has been studied by comparing travel data in 2015 and 2019. The said data are supplied by interviewed trucking companies and manufacturing companies, requesting them to recall the 2015 travel time and the current travel time from one logistics facility to another. The following are the major observations:

- Impact of TPLEX to Ecozones in the North Trucks serving economic zones in far north, like Baguio City Economic Zone (BCEZ), experienced improved travel time from the ecozones to gateway ports and airports (e.g., Clark International Airport, NAIA, Manila Port). This improvement in travel time is largely due to the opening of Tarlac Pangasinan La Union Expressway (TPLEX). For example, unlike before, now trucks may complete the journey from BCEZ to Clark International Airport in four (4) hours which is one (1) hour faster than before the opening of TPLEX, to NAIA in six (6) hours (instead of 7 hours before the opening of TPLEX), and to Manila Port in seven (7) hours instead of eight hours.
- Impact of NAIAX to Ecozones in Cavite Economic zones located in Cavite and surrounding areas, which use NAIA (distance of about 40km) to ship out their products, experienced a 30 minutes time saving compared with their travel time in 2015. It should be noted that the ramp which connect NAIAX and CAVITEX was opened in 2016 which allows the transfer of trucks from one expressway to another without using local roads.
- Ecozones in Laguna area In general, trucks servicing ecozones from Laguna to Manila port experienced more than an hour increase in their travel time in the span of five years (2015 to 2019). This can be attributed to worsening traffic congestion particularly at local roads which connect the economic zone and expressway, heavy congestion at the on rams/off ramps of the South Luzon Expressway (SLEX) and local roads in Metro Manila and increasing congestion at the SLEX during rush hours.

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Figure 5.3-10 2015 and 2019 Freight Transport Cost and Travel Time

# 5.3.5 Logistics Flow of Manufacturing Companies (including Palay) in Luzon, Visayas, and Mindanao

Three manufacturing companies (one for Luzon, one for Visayas and one for Mindanao) were profiled in this Section and their detailed logistics (cargo) flow is illustrated in the succeeding figures. The idea is each company represents each island in terms of gate port/airport, usual truck routes, and problems encountered, among others. Similarly, since palay (grains) generate major truck trips for distribution, palay production and distribution were studied as indicated in the last figure.

Company A in Luzon – It is a major car manufacturing company which established its manufacturing plant in early 90s. The company assembles vehicles in their factory in Laguna. Sources of different parts needed to assemble a vehicle come from domestic and foreign origins. Raw materials sourced abroad are car components from Japan and ASEAN countries via Manila International Container Port (MICP). There are also locally sourced components which come from Tarlac and Cavite. Finished products (assembled vehicles) are made available to both domestic market and foreign market. For foreign markets, these include: Thailand, Taiwan, Indonesia, Vietnam, Malaysia, Pakistan, India, Turkey, UK and Mexico (Figure 5.3-11).

Where an expressway is available, truck transporting products of the company are utilizing the expressway. Some of the problems they raised which affect operation of their company include: truck ban, road repair, and heavy traffic congestion in almost every part of Metro Manila.

• Company B in Visayas (Lapu-Lapu City) – It is a major sewing company established in 2015 inside the Mactan Export Processing Zone II (MEPZ II) producing more than 8,000 ready-to-wear clothes per month. Its main business is the production of ladies' garments, such as blouses, skirts, one-piece dresses, coats and jackets. Raw materials normally come from Japan and enter via the international port and airport of Cebu. Its products are exported to Japan through the Mactan-Cebu International Airport (MCIA) and Cebu International Port (Figure 5.3-12).

The company management shared factors which influenced them to establish their company in the ecozone which are: (i) the availability of highly skilled labor, (ii) closeness to port and airport and (iii) tax incentives offered by the by the Philippine Economic Zone Authority (PEZA). The tax incentive benefits, however, might be affected by the government's plan to enact Tax Reform for Acceleration and Inclusion (TRAIN-2). For this reason, they expressed their reservation with the said tax reform program.

As far transportation-related problems are concerned which affect their operation, the most serious is traffic congestion particularly access roads of the bridges connecting Cebu City to Mactan City. For example, in 2015, they recalled that transportation time from their factory to the Cebu International Port was just 1 hour. However, this year, this 8km to 10km distance (depending on which route to take) requires about 1 hour and 30 minutes to complete a single trip or a 50% increase in travel time due to serious traffic congestion, especially on the approach road of the bridge on both sides (Mactan side and Cebu side). Taking into account opinions of other manufacturing companies, there is a need to construct an expressway (or alternative route) connecting Lapu-lapu City to Mandaue City to Cebu City.

Company C in Mindanao (Davao City) – It is a major company established in 2006 and engaged in exportation of fresh fruits. Its main business is exportation of fresh bananas, pineapples, and papayas. It has plantations in Surigao, Bukidnon, Davao del Norte, North Cotabato and Compostela Valley. It exported its products to such countries as Japan, Korea, China, Middle East, Singapore and New Zealand (Figure 5.3-13) via two ports in Davao City and one in Panabo City.

Due to lack of existing expressways in Mindanao, trucks transporting their products from the plantation to their processing plants near the port are regularly using the existing National Roads which are always congested when passing through cities and municipalities due to mixing of traffic and road friction.

One of their biggest plantations is located in Bukidnon. Bringing their products from their planation in Bukidnon to Davao is difficult due to the following reasons: local roads connecting to the national highway are in poor condition, the national road is congested, poor peace and order situation, vertical and horizontal alignment of the road is less suitable for trucks, and truck ban inside Davao City. For these reasons, they envisioned that an expressway will address most of their needs.

• NFA Gateway Ports and Palay's Regional Distribution – It is important to identify gateway ports of NFA since it involves a high number of trucks to transport large volumes of imported palay (grain) from the port to different cities and municipalities (Figure 5.3-14). For example, last February 20 this year, close to 8,000 bags of palay for NFA Region III were unloaded at Subic Port. According to NFA officials, bringing this large volume of palay to different locations involved 150 trucks doing multiple trips (Figure 5.3-15).

As seen in **Figure 5.3-14**, the largest volume of imported palay enters the country through the MICP (28%). In the Visayas, the largest volume of palay is observed to go through Cebu Port and distributed to the different cities and municipalities in Cebu Island. In Mindanao, Davao Port and Cagayan de Oro Port are receiving the largest volume of important palay. Distribution of the palay reaches as far as cities and municipalities in the Provinces of Sultan Kudarat, South Cotabato, Davao del Norte and Compostela Valley.

Looking at the three figures mentioned above, it is clear that expressways will contribute in distributing efficiently palay throughout the country by linking gateway ports to major destination cities. Similarly, as seen in the three figures, there are regions in the country which produce surplus palay (green color in the map), such as Region III in Luzon, and Region 11, Region 12, and BARMM in Mindanao. In the case of Luzon, surplus palay will be brought to NCR and neighboring cities which could not produce enough palay to sustain their residents. Again, expressways will allow the distribution in speedy manner.



Figure 5.3-11 Logistics Flow of a Major Car Company in Luzon



Figure 5.3-12 Logistics Flow of a Major Fresh Fruits Exporter in Mindanao



Figure 5.3-13 Logistics Flow of a Major Fresh Fruits Exporter in Mindanao



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Note: Self-sufficient is based on the average rice consumption per capita in the Philippines which is about 120kg/capita reported by various studies including the 2017 "The Rice Economy and the Role of Policy in Southeast Asia" by Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) Figure 5.3-14 NFA Gateway Ports and Regional Movement (2019)



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Figure 5.3-15 Rice Logistics of NFA Region III (2018) and Region XI (2016)

#### 5.3.6 Summary of Issues identified by Manufacturing Companies and Trucking Companies

The issues identified by the manufacturing and trucking companies may be classified into two: (i) infrastructure-related issues and (ii) operation-related issues. Issues identified by interviewed firms in Luzon are discussed below and illustrated in **Figure 5.3-16**. Issues identified by interviewed firms in the Visayas are presented in **Table 5.3-2** and those in Mindanao are indicated in **Table 5.3-3**.

#### (1) Infrastructure-related Issues

- Incomplete formation of the expressway (due to missing links in the network of expressways, trucks are forced to take local roads which make the trucks experience severe traffic congestion and delayed the arrival of cargoes)
- Limited parking space for trucks (the lack of sufficient parking space resulted in the chaotic scenes outside most ports of the countries)
- On-ramp and off-ramp section of expressways are not connected to high capacity roads. This can be best illustrated at the CAVITEx where trucks from Manila Port going to ecozones exiting at Alabang-Zabote exit (middle of the expressway) instead of at the end exit in Kawit which is closer to their destination. Interviews with trucking companies revealed that they exit early (at Zapote because this is connected to Emilio Aguinaldo Highway which has a high capacity. Exit at Kawit is connected to a narrow road, which is very congested.
- Low vertical clearances (this refers to pedestrian bridge and other elevated structures over the road carriageways). They mentioned that the 4.2-meter vertical clearance is too low for the trucks. In addition, the low-lying wires also pose a risk for trucks when they pass through certain corridors. Accordingly, the ideal vertical clearance is at least 5 meters. (Note: Per D.O. 79, S. 2016 and D.O. No. 53 S. 2016, Welcome arch/Overhead boundary marker post = 5.33 m, Overhead utilities and power lines' vertical clearance = 5.50 m)
- Poor condition of road surface, with some of them surfaced with earth/gravel (manufacturing companies particularly in Mindanao are sometimes getting their raw materials from interior places, hence, trucks have to use local roads which are mostly in poor condition)

#### (2) Operation-related Issues

- Truck ban (truck ban is a popular measure enacted by most large cities in the country such as Metro Manila, Metro Cebu, and Davao), which according to truck companies is negatively affecting their productivity since they have to wait until the truck ban hours are lifted.
- Negative effect of RA 8794 or the Anti Overloading Act (According to them, rules stated in this Act is unrealistic since the stated Gross Vehicle Weight limit is very limited. Because of this Act, they always have to split the cargo, thus, the transportation cost doubled due to additional labor cost and additional trip. It must be pointed out, however, that this Act limits, not the gross vehicle weight, but the axle load to 13.5 tons. Another issue is the lack of control from the trucking company on the weight of containers to be picked up at the port. In some cases, the container is already overweight at the port of origin (e.g., from port in China) and the trucking company is forced to transport it from port to ecozone/factory since it has no authority to open the container. This process of transporting overweight containers resulted in penalty on the side of trucking companies from the government authorities).
- Traffic congestion especially inside the city severe traffic congestion is particularly serious in Metro Manila, Metro Cebu and Metro Davao and secondary cities/municipalities.



Figure 5.3-16 Problems and Proposed Solutions by the Trucking and Manufacturing Companies in Luzon

Problem encountered	Recommendation
Truck ban	Lifting of truck ban
Trucks, or vehicles weighing more than 4,500 kilograms,	
will not be allowed on the roads of Cebu City, Mandaue	
City, and Lapu-lapu City from 6 AM to 8 AM and 5 PM	
to <b>8 PM</b> . Violators will be made to pay a fine of P1,000.	
Traffic congestion in urban areas	Construction of new expressway/alternate routes
Along city roads particularly in <b>Cebu City</b> , <b>Lapu-lapu</b>	
City, Mandaue City (2 bridges leading to Lapu-lapu City)	
Low value for maximum Gross Vehicle Weight (as per	Adjust maximum GVW
anti-overloading act)	с 
	Constant d'alors - l'data d'an
Maximum allowable weight, as per RA 8794 is 41.5	Constant dialogue with trucking
<i>metric tons</i> for code 12-2 and <b>42 metric tons</b> for code	association/stakenoiders
12-3 trucks	
Electric/telephone wirings too low in some local roads	Higher vertical clearance
12 motors is too low	(Nota: Par D O 70 S 2016 and D O No 53 S
<b>4.2 meters</b> is 100 low	2016 Overhead utilities and power lines' vertical
	clearance = 5.50m)
Poor road condition/portion of roads with potholes near	Road repair and maintenance
Cebu Port	-
Narrow width of roads (Minglanilla, Talisay, Naga	Widening of roads
Highway)	
This has been observed at certain road sections in the	
City of <b>Tausay</b> , lown of <b>Minguantia</b> and <b>Naga Highway</b> .	Dattan dasian of roads/langan turning radius
Small turning radius for 40-ft trucks	Better design of roads/larger turning radius
This is usually observed at certain road sections along	
Naga-Toledo Road	
Bridges could not carry the weight of trucks	Replacement of bridges

# Table 5.3-2Problems and Proposed Solutions by Trucking and<br/>Manufacturing Companies in Cebu

Problem encountered	Recommendation
Local roads are not paved/very rough (esp. during rainy season)	Road construction/rehabilitation
Local roads to plantations such as those in Bukidnon	
Peace and order (security issues along major highways)	
Congestion along Bukidnon Highway	Construction of new expressway/alternate routes
Traffic congestion in urban areas	
Truck ban	Lifting of truck ban/lessen hours for truck ban
Trucks are not allowed to pass through in <b>Davao City</b> from <b>5 AM to 9 AM</b> and <b>4 PM to 8 PM</b> .	
Trucks are not allowed to pass through in various areas in <b>Cagayan de Oro</b> (Poblacion and Cogon; Carmen; Puerto Market) from <b>7 AM</b> to <b>9 AM</b> and <b>5 PM</b> to <b>7 PM</b>	
Narrow interior roads	Widening of roads
Public is unaware of new roads constructed by the DPWH	Signages for new routes
Bridges could not carry the weight of trucks	Replacement of bridges
This has been observed in bridges along <b>Bukidnon</b> – <b>Davao Road</b> , where maximum load limit is <b>5 tons</b> .	
Steepness of road	Better design of roads
This is usually observed at certain road sections along <b>Bukidnon-Davao Road</b>	
Road safety issues	Coordination with LGU
	Placement of proper pedestrian crossing
Lack of weighing facilities for trucks	Procurement of complete weighing facilities

# Table 5.3-3Problems Encountered and Solutions Proposed by<br/>Trucking and Manufacturing Companies in Davao