

Appendix 11.1 Economic Evaluation

Appendix Table 11.1.1.1 Summary of Traffic Demand by Mode

Year	Items	Alternative	Railway Volume			Road Transport Volume			Aviation Transport Volume			Inlandwater Transport Volume		
			with	without	with-w/o	with	without	with-w/o	with	without	with-w/o	with	without	with-w/o
1994	Passenger (million pers.-km/year)	Hanoi-HCM Line	2,392			12,998			925			0		
		Hanoi-Lao Cai Line	332			930			0			0		
		Hanoi-Cai Lan Line	110			1,386			0			0		
Cargo (million ton-km/year)	Hanoi-HCM Line	1,189			5,266			0			459			
	Hanoi-Lao Cai Line	260			1,015			0			317			
	Hanoi-Cai Lan Line	50			1,286			0			823			
2000	Passenger (million pers.-km/year)	Hanoi-HCM Line	3,455	2,751	704	26,579	27,228	-649	1,541	1,593	-52	0	0	0
		Hanoi-Lao Cai Line	409	331	78	1,461	1,545	-84	0	0	0	0	0	0
		Hanoi-Cai Lan Line	196	127	69	2,318	2,354	-36	0	0	0	0	0	0
Cargo (million ton-km/year)	Hanoi-HCM Line	2,135	1,378	757	9,131	9,890	-759	0	0	0	491	487	4	
	Hanoi-Lao Cai Line	339	271	68	1,515	1,591	-76	0	0	0	381	372	9	
	Hanoi-Cai Lan Line	64	48	16	2,021	2,049	-28	0	0	0	936	924	12	
2005	Passenger (million pers.-km/year)	Hanoi-HCM Line	4,540	2,876	1,664	43,093	44,250	-1,157	2,156	2,557	-401	0	0	0
		Hanoi-Lao Cai Line	522	363	159	2,832	2,805	-27	0	0	0	0	0	0
		Hanoi-Cai Lan Line	321	146	175	3,624	3,724	-100	0	0	0	0	0	0
Cargo (million ton-km/year)	Hanoi-HCM Line	2,806	2,445	361	13,050	13,900	-850	0	0	0	516	512	4	
	Hanoi-Lao Cai Line	392	307	85	2,208	2,307	-99	0	0	0	425	413	12	
	Hanoi-Cai Lan Line	122	56	66	2,954	3,045	-91	0	0	0	1,030	1,006	24	
2010	Passenger (million pers.-km/year)	Hanoi-HCM Line	6,054	2,644	3,410	70,075	70,273	-198	3,679	6,082	-2,403	0	0	0
		Hanoi-Lao Cai Line	665	348	317	4,058	4,407	-349	0	0	0	0	0	0
		Hanoi-Cai Lan Line	444	160	284	5,825	5,820	-5	0	0	0	0	0	0
Cargo (million ton-km/year)	Hanoi-HCM Line	3,282	2,802	480	19,287	21,246	-1,959	0	0	0	490	485	5	
	Hanoi-Lao Cai Line	374	295	79	3,190	3,290	-100	0	0	0	433	416	17	
	Hanoi-Cai Lan Line	177	52	125	4,358	4,548	-190	0	0	0	1,100	1,038	62	

Appendix Table 11.1.2 Annual Working Hours

Year (days/year)	Work Days (days/week)	National Holiday	Working Hours (hr/day)	Working Hours (hr/year)
365	6	8	8	2,439

Note: formula = $\text{ROUND}((365 \cdot (6/7) - 8) \cdot 8, 0) = 2,439$

Time Value

Year	GDP per capita (US\$)	Working Hours (hrs/year)	Working Force Ratio (%)	Time Value (US\$/hr)
1994	258	2,439	0.5353	0.1976
2010	1,077	2,439	0.5353	0.8249

Appendix Table 11.1.3 Saving of Travel Time, Passengers

	Traffic Volume by Railway (mil. person-km/year)		Average Speed of Travel (km/h)		Saving of Travel Time (million hours)		Time Value (US\$/hr)	Saving of Time Value (million US\$/year)					
	Railway Volume (with)	Railway Traffic Converted from Road (without)	Bus Railway	Railway (with), without)	Traffic Converted from Road	Residual		Total	Traffic Converted from Road	Residual			
											Unit (US\$/hr)	Total	
Year 2000													
Hanoi-HCM Line	3,455	2,751	704	38.44	55.80	48.06	5.70	7.94	13.64	0.1853	1.06	1.47	2.53
Hanoi-Lao Cai Line	409	331	78	30.00	33.00	30.00	0.24	1.00	1.24	0.1853	0.04	0.19	0.23
Hanoi-Cai Lan Line	196	127	69	38.44	42.00	23.00	0.15	2.50	2.65	0.1853	0.03	0.46	0.49
Year 2010													
Hanoi-HCM Line	6,054	2,644	3,410	38.44	72.08	48.06	41.40	18.33	59.73	0.5890	24.39	10.80	35.18
Hanoi-Lao Cai Line	665	348	317	30.00	37.00	30.00	2.00	2.19	4.19	0.5890	1.18	1.29	2.47
Hanoi-Cai Lan Line	444	160	284	38.44	42.00	23.00	0.63	3.15	3.77	0.5890	0.37	1.85	2.22

Note:
 bus = 45 hours (Hanoi-HCMC) = 38.44 km/h
 train = 24 hours (Hanoi-HCMC) = 72.08 km/h
 train = 31 hours (Hanoi-HCMC) = 55.80 km/h
 train = 36 hours (Hanoi-HCMC) = 48.06 km/h

Appendix Table 11.1.4 Saving of Trafel Time, Cargo

	Cargo Volume by Railway (mil. ton-km/year)			Average Speed of Cargo Travel (km/h)		Saving of Travel Time (million hours)			Cargo Value (million US\$/year)	Time Value Unit (%/hr)	Saving of Time Value (million US\$/year)			
	Total Traffic Cargo (with)	Total Traffic Converted from Road (without)	Traffic Converted from Road	Road	Railway		Traffic Converted from Road	Residual			Total	Traffic Converted from Road	Residual	Total
					with	without								
Year 2000														
Hanoi-HCM Line	2,135	1,378	757	41.19	42.20	32.04	0.44	10.35	10.79	0.00288	0.04	1.00	1.04	
Hanoi-Lao Cai Line	339	271	68	41.19	42.20	32.04	0.04	2.04	2.08	0.00288	0.00	0.16	0.16	
Hanoi-Cai Lan Line	64	48	16	41.19	42.20	32.04	0.01	0.36	0.37	0.00288	0.00	0.03	0.03	
													21.6	
Year 2010														
Hanoi-HCM Line	3,282	2,802	480	41.19	42.20	32.04	0.28	21.06	21.33	0.00288	0.9	70.6	71.53	
Hanoi-Lao Cai Line	374	295	79	41.19	42.20	32.04	0.05	2.22	2.26	0.00288	0.1	6.0	6.08	
Hanoi-Cai Lan Line	177	52	125	41.19	42.20	32.04	0.07	0.39	0.46	0.00288	0.2	1.1	1.36	

Note:

truck = 42 hours (Hanoi-HCMC) = 41.19 km/h

train = 41 hours (Hanoi-HCMC) = 42.20 km/h

train = 54 hours (Hanoi-HCMC) = 32.04 km/h

time value = 25.2%/(365*24) = 0.00288%

cargo value = freight revenue x 20

Appendix Table 11.1.5 Saving of Road Transportation Cost

Items	mil. veh-km		w-w/o	mil. pcu-km	Saving in Passenger Vehicle
	with	without			
2000					
Passenger Vehicle Related:					
Hanoi - HCM Line	26,579	27,228	-649	0.0367	23.83
Hanoi - Lao Cai Line	1,461	1,545	-84	0.0367	3.08
Hanoi - Cai Lan Line	2,318	2,354	-36	0.0367	1.32
Cargo Vehicle Related:					
Hanoi - HCM Line	9,131	9,890	-759	0.0262	19.85
Hanoi - Lao Cai Line	1,515	1,591	-76	0.0262	1.99
Hanoi - Cai Lan Line	2,021	2,049	-28	0.0262	0.73
2005					
Passenger Vehicle Related:					
Hanoi - HCM Line	43,093	44,250	-1,157	0.0367	42.49
Hanoi - Lao Cai Line	2,632	2,805	-173	0.0367	6.35
Hanoi - Cai Lan Line	3,624	3,724	-100	0.0367	3.67
Cargo Vehicle Related:					
Hanoi - HCM Line	13,050	13,900	-850	0.0262	22.23
Hanoi - Lao Cai Line	2,208	2,307	-99	0.0262	2.59
Hanoi - Cai Lan Line	2,954	3,045	-91	0.0262	2.38
2010					
Passenger Vehicle Related:					
Hanoi - HCM Line	70,075	70,273	-198	0.0367	7.27
Hanoi - Lao Cai Line	4,058	4,407	-349	0.0367	12.82
Hanoi - Cai Lan Line	5,625	5,820	-195	0.0367	7.16
Cargo Vehicle Related:					
Hanoi - HCM Line	19,287	21,246	-1,959	0.0262	51.24
Hanoi - Lao Cai Line	3,190	3,290	-100	0.0262	2.62
Hanoi - Cai Lan Line	4,356	4,548	-192	0.0262	5.02

Appendix Table 11.1.6 Saving in Operation and Management Cost

	Hanoi-HCM Line	Hanoi-Lao Cai Line	Hanoi-Cai Lan Line
(million VN Dong)			
1994	183,000	35,200	14,157
2000	169,377	25,734	13,370
2005	141,866	20,077	14,493
2010	135,455	15,017	13,261
(Million US\$)			
1994	16.64	3.20	1.29
2000	15.40	2.34	1.22
2005	12.90	1.83	1.32
2010	12.31	1.37	1.21

Source: JICA Study Team

Appendix Table 1.1.1.7 Economic Benefit at Specific Year

Items	(unit: million US\$)						Growth Rate (2000-2010) (%)
	2000	2001	2005	2006	2010	2010	
1. Saving in Travel Time : Passenger							
Hanoi - HCM Line	2.53	3.29	9.43	12.28	35.18	30.112	
Hanoi - Lao Cai Line	0.23	0.29	0.75	0.96	2.47	26.794	
Hanoi - Cai Lan Line	0.49	0.57	1.04	1.21	2.22	16.310	
2. Saving in Travel Time : Cargo							
Hanoi - HCM Line	1.04	1.59	8.63	13.17	71.5	52.667	
Hanoi - Lao Cai Line	0.16	0.23	0.99	1.42	6.1	43.873	
Hanoi - Cai Lan Line	0.03	0.04	0.20	0.30	1.4	46.434	
3. Saving in Road Transport Vehicles : Passenger							
Hanoi - HCM Line	23.8	21.16	13.16	11.69	7.3	-11.194	
Hanoi - Lao Cai Line	3.1	3.55	6.28	7.25	12.8	15.328	
Hanoi - Cai Lan Line	1.3	1.56	3.07	3.64	7.2	18.422	
4. Saving in Road Transport Vehicles : Carogo							
Hanoi - HCM Line	19.9	21.82	31.89	35.06	51.2	9.947	
Hanoi - Lao Cai Line	2.0	2.05	2.28	2.35	2.6	2.789	
Hanoi - Cai Lan Line	0.7	0.89	1.91	2.32	5.0	21.266	
5. Saving in O&M							
Hanoi - HCM Line	15.4	15.06	13.77	13.46	12.3	-2.215	
Hanoi - Lao Cai Line	3.2	2.94	2.09	1.92	1.4	-8.134	
Hanoi - Cai Lan Line	1.3	1.28	1.25	1.24	1.2	-0.638	
Total							
Hanoi - HCM Line	62.7	62.9	76.9	85.7	177.5	10.978	
Hanoi - Lao Cai Line	8.7	9.1	12.4	13.9	25.4	11.343	
Hanoi - Cai Lan Line	3.9	4.3	7.5	8.7	17.0	15.960	

Appendix 11-2 Estimate of Accounts
 Financial Analysis for the Hanoi-Ho Chi Minh Line(Feasibility Studies up to 2000)

Estimate of Accounts	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Revenue	477,400	519,079	667,793	774,503	781,927	848,789	916,767	969,292	1,022,687	1,080,138	1,140,838	1,204,940	1,270,087	1,340,209	1,414,970	1,496,167	1,583,622
Passenger	216,000	230,025	340,175	371,244	384,702	421,901	446,174	471,216	497,647	522,253	552,063	586,183	620,924	657,749	696,722	738,059	781,784
Freight	261,400	289,054	318,618	351,259	387,225	426,888	470,593	497,986	525,040	557,885	588,775	618,757	679,163	745,640	818,248	898,128	985,816
Expense	556,000	624,172	698,622	792,900	800,782	871,432	933,215	979,226	1,024,427	1,073,339	1,124,471	1,180,392	1,240,924	1,303,699	1,369,812	1,439,179	1,511,622
Working Cost																	
Personnel	183,000	180,461	178,074	175,765	173,534	171,405	169,377	167,437	165,582	163,802	162,095	160,466	158,914	157,447	156,064	154,764	153,453
Non-Personnel	373,000	401,803	456,077	471,734	510,267	532,739	598,568	652,194	687,720	705,230	744,375	786,714	848,904	916,095	989,030	1,068,100	1,155,211
Sub Total	556,000	582,264	614,151	647,549	684,101	724,143	767,945	795,636	825,522	857,825	892,443	928,380	969,251	1,005,208	1,042,869	1,081,744	1,120,664
Depreciation																	
Carriage		11,686	23,373	35,059	46,746	58,432	70,118	81,808	93,494	105,184	116,876	128,571	140,271	151,976	163,686	175,401	187,121
Management		6,006	9,218	12,430	15,642	18,854	22,066	25,278	28,490	31,702	34,914	38,126	41,338	44,550	47,762	50,974	54,186
Sub Total		17,692	32,591	47,489	62,388	77,286	92,184	107,082	121,980	136,878	151,776	166,674	181,572	196,470	211,368	226,266	241,164
Infrastructure Rental		51,908	66,779	72,250	78,193	84,879	91,677	98,828	102,269	108,014	114,086	120,494	127,009	133,597	140,321	147,145	154,029
Profit	-78,600	-115,093	-30,829	-29,887	-27,856	-22,643	-16,948	-11,674	-2,740	6,799	16,387	24,548	36,133	49,610	65,138	82,988	101,976

Cash Flow Projection	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Cash In																	
Profit		36,493	47,771	48,713	50,744	55,938	61,652	66,926	75,840	85,399	94,987	103,148	114,733	128,210	143,738	161,388	180,378
Depreciation		0	17,692	32,591	47,489	62,410	74,098	87,472	97,636	107,890	117,942	127,318	144,694	158,070	171,446	184,822	198,198
Total		36,493	65,463	81,304	98,233	118,348	135,750	154,398	173,476	193,199	212,929	230,466	259,427	286,280	315,184	346,410	378,576
Cash Out (Investment)																	
Carriage		0	292,160	292,160	292,160	292,160	292,160	334,400	334,400	334,400	334,400	334,400	334,400	334,400	334,400	334,400	334,400
Management		0	30,030	16,060	16,060	16,170	16,280	30,030	0	0	0	0	30,030	0	0	0	0
Total		0	322,190	308,220	308,220	308,330	292,160	364,430	334,400	334,400	334,400	334,400	364,430	334,400	334,400	334,400	334,400
Surplus or Deficit		-36,493	-256,727	-226,916	-209,987	-189,983	-156,412	-210,032	-160,924	-141,201	-121,471	-99,854	-105,003	-48,120	-19,129	12,010	44,376
Cumulative Cash Flow		-36,493	-293,220	-520,136	-720,123	-920,085	-1,076,497	-1,286,529	-1,487,453	-1,688,634	-1,710,105	-1,810,039	-1,915,041	-1,963,161	-1,985,387	-1,970,347	-1,925,971

FTBR	5.44%	Residual Value (Management)	0
	8.71%	Residual Value (Carriage)	0
	11.63%	Residual Value (Management)	0
		Residual Value (Carriage)	0

Appendix 11-2 (Continued)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2034	2035	2036	2037	2038	2039	2040		
1,000,010	2,061,731	2,226,660	2,402,803	2,597,187	2,806,962	3,029,819	3,271,708	3,533,645	3,816,100	4,121,410	4,451,120	4,807,217	5,191,789	5,601,132	6,035,703	6,501,159	7,003,272	7,538,442	8,104,717	8,702,217									
844,329	911,875	984,825	1,063,611	1,148,700	1,240,196	1,339,844	1,447,031	1,562,794	1,687,817	1,822,843	1,968,670	2,126,164	2,296,252	2,479,957	2,678,354	2,892,622	3,124,032	3,373,955	3,643,871	3,934,371									
1,064,681	1,149,856	1,241,844	1,341,192	1,448,487	1,564,366	1,689,515	1,824,677	1,970,651	2,128,305	2,298,567	2,482,452	2,681,049	2,895,532	3,127,175	3,377,349	3,647,537	3,939,340	4,254,487	4,598,846	4,971,748									
1,270,112	1,852,053	2,001,986	2,130,478	2,298,143	2,415,636	2,571,661	2,762,972	2,974,379	3,118,745	3,297,090	3,500,137	3,739,224	4,014,403	4,319,899	4,614,026	4,929,189	5,266,899	5,628,771	6,016,540	6,428,871									
144,977	152,082	165,978	177,534	189,983	203,281	217,511	232,737	249,028	266,466	285,113	305,071	326,426	349,273	373,725	399,885	427,877	457,829	489,877	524,168	560,802									
1,206,076	1,322,601	1,415,183	1,514,246	1,620,240	1,733,660	1,855,016	1,984,848	2,123,808	2,272,476	2,431,548	2,601,256	2,783,879	2,978,751	3,187,264	3,410,372	3,649,098	3,904,535	4,177,852	4,470,202	4,782,802									
1,281,013	1,477,684	1,581,121	1,691,800	1,810,226	1,936,942	2,072,528	2,217,694	2,372,837	2,538,935	2,716,661	2,906,827	3,110,305	3,328,026	3,560,988	3,810,257	4,076,975	4,362,364	4,667,759	4,994,470	5,342,802									
192,192	192,192	192,192	192,192	192,192	192,192	192,192	192,192	192,192	192,192	192,192	192,192	192,192	192,192	192,192	192,192	192,192	192,192	192,192	192,192	192,192									
6,006	6,006	6,006	6,006	6,006	6,006	6,006	6,006	6,006	6,006	6,006	6,006	6,006	6,006	6,006	6,006	6,006	6,006	6,006	6,006	6,006									
198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198									
190,901	206,173	222,667	240,480	259,719	280,496	302,936	327,171	353,344	381,612	412,141	445,112	480,721	519,179	560,712	605,570	654,016	705,337	762,844	822,872	886,822									
138,890	179,676	224,483	274,325	329,045	389,256	455,698	528,735	609,663	697,373	794,410	900,985	1,017,988	1,146,386	1,287,233	1,441,677	1,610,970	1,796,473	1,999,671	2,222,171	2,464,671									
217,699	258,276	303,283	352,925	407,645	467,926	534,298	607,335	687,665	775,975	873,010	979,635	1,094,588	1,224,986	1,365,833	1,520,277	1,689,570	1,875,073	2,078,271	2,300,777	2,543,277									
198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198	198,198									
413,697	456,474	501,481	551,123	605,843	666,124	732,496	802,533	885,863	974,173	1,071,208	1,177,783	1,294,786	1,423,134	1,564,051	1,718,475	1,887,768	2,073,271	2,276,469	2,498,973	2,741,473									
30,030	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0									
30,030	0	0	0	0	30,030	30,030	0	0	0	30,030	30,030	0	0	0	0	0	0	0	0	0									
385,667	456,474	501,481	551,123	605,843	666,004	732,496	802,533	885,863	974,173	749,018	885,623	1,027,626	1,131,024	1,271,871	1,454,045	1,673,368	1,942,069	2,264,671	2,642,271	3,074,871									
-1,540,205	-1,083,830	-882,349	-511,226	-574,617	1,210,711	1,943,207	2,748,739	3,654,603	4,608,723	5,337,793	6,243,416	7,246,043	8,377,067	9,648,938	11,002,293	12,556,351	14,299,222	16,237,291	18,401,865	20,704,471									

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