

# A Way for Activating Overnight Trains in Japan based on “Stakeholder Approach”

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## **[abstract]**

After privatization and separation of JNR, differences of management vitality among JR companies widened, problems of the regional networks became more serious, and overnight trains declined.

And since privatization and separation of JNR, all JR group are individual private companies and have no capital ties between each other, then about direct communication trains across above two JR companies, JR companies need to coordinate their train operation time schedules. This coordination produces additional cost.

This paper calculates revenue and expense of overnight trains and provide a way for activating overnight trains based on “Stakeholder Approach”.

## **[key words]**

stakeholder approach, Japan Freight Railway Company, train car holding company

## **1. Introduction**

In April 2012, we commemorated a quarter-century after privatization and separation of JNR.

After privatization and separation of JNR, differences of management vitality among JR companies widened, problems of the regional networks became more serious, and overnight trains declined. Overnight trains enable us to begin our activities from morning and give some benefit of activating regions along railway lines of running overnight trains.

After entering of “Heisei” era, for example, constructions of new Shinkansen bullet-train lines started and are now constructing, and low cost carriers have increased. Expressway buses have attracted many passengers. And economy hotel chains have located hotels across the whole country and users of these hotels can make a booking and a cancellation via internet, easily. These other transportations and hotels have deprived overnight trains of their customers.

And since privatization and separation of JNR and all JR group are individual private companies and have no capital ties between each other<sup>1</sup>, then about direct communication trains across above two JR

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companies, JR companies need to coordinate their train operation time schedules. This coordination produces additional cost.

This paper calculates revenue and expense of overnight trains and provides a way for activating overnight trains based on “Stakeholder Approach.”

We will discuss as follows: in section 2, we affirm current situations and problems of overnight trains in Japan, and calculate revenue and expense of overnight trains. In section 3, we discuss a way for activating overnight trains based on “Stakeholder Approach.” Finally, in section 4, we indicate conclusions of this thesis.

## 2. Current Situations and Problems of Overnight Trains in Japan

In 15 March 2014, JR East (East Japan Railway Company) abolished the “Akebono” Sleeper Limited Express. After inauguration of JR group, JR companies have abolished Sleeper Limited Express trains, then since 15 March 2014, only 5 lineups of Sleeper Limited Express trains continue to operate (See Table.1) (except for “Nanatsu-boshi in Kyushu” as trains exclusive for group passengers).

**Table 1** Overnight Trains operate as of 15 March 2014

Train Operating company	Name of Train	Train Route	Train Lines
JR East, JR Hokkaido (Hokkaido Railway Company)*	Hokutosei	Ueno and Sapporo	Tohoku main line, IGR line, Aoimori line, Tsugaru-Kaikyo line, Hakodate main line, Muroran main line, Chitose line
JR East, JR Hokkaido*	Cassiopeia	Ueno and Sapporo	Tohoku main line, IGR line, Aoimori line, Tsugaru-Kaikyo line, Hakodate main line, Muroran main line, Chitose line
JR East, JR Central (Central Japan Railway Company), JR West (West Japan Railway Company), JR Shikoku (Shikoku Railway Company)	Sunrise Izumo & Seto	Tokyo and Izumo-shi (Izumo), Tokyo and Takamatsu (Seto) (“Izumo” is connected with “Seto” in the section between Tokyo and Okayama)	Tokaido main line, Sanyo main line, Hakubi line**, Sanin main line**, Seto-Ohashi line***

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JR West, JR East, JR Hokkaido	Twilight Express	Osaka and Sapporo	Tokaido main line, Kosei line, Hokuriku main line, Shinetsu main line, Uetsu main line, Ouu main line, Tsugaru-Kaikyo line, Hakodate main line, Muroran main line, Chitose line
JR East, JR Hokkaido	Hamanasu ****	Aomori and Sapporo	Tsugaru-Kaikyo line, Hakodate main line, Muroran main line, Chitose line

\* The section between Morioka and Metoki is IGR line, and the section between Metoki and Aomori is Aomori line.

\*\* “Sunrise Izumo” runs only

\*\*\* “Sunrise Seto” runs only

\*\*\*\* “Hamanasu” is Express. Trains other than “Hamanasu” are Limited Express.

As well, “Moonlight Nagara” or rapid service overnight trains was relegated to extra trains in specific seasons. And abolitions of “Hokutosei” and “Twilight Express” were decided. After inauguration of JR group, frequencies of overnight trains have decreased.

Well, how much are revenue and expense of overnight trains? We calculate revenue and expense of overnight trains operated in January 2014 in the cases of operating overnight trains by JRF (Japan Freight Railway Company) and newly-established pure overnight train operating company. Our trial calculation shows Table 2. And verifications of Table 2 show Appendix Table 1 or 6.

In our calculation, Train operating cost is 2,312.25 yen per km (= 17,371 thousand yen (JR East standard cost in 2012)<sup>2</sup> ÷ working kilometers 7,512.6 km) and rail access charge is 247,386 yen (annual) (= annual rail access revenue of IGR company 1.42 billion yen ÷ frequencies of freight trains 49 trains ÷ working kilometers 82.0km × 0.7 (adjustment factor to “avoidable cost”))<sup>3</sup>.

**Table 2** Revenue and Expense of Overnight trains

(Unit: Yen)

	Load Factor60%	Load Factor70%	Load Factor80%	Load Factor90%	Calculation Base
Total of Operating Revenue	10,629,641,389	12,084,589,678	13,810,959,632	15,537,329,586	Total of Annexed Table 1 or 6
Total of Operating Expense	11,615,729,687	11,688,477,102	11,774,795,599	11,961,114,097	Total of Annexed Table 1 or 6
Train Operating Cost	8,571,699,430	8,571,699,430	8,571,699,430	8,571,699,430	Total of Annexed Table 1 or 6
Rail Access Charge	2,512,548,188	2,512,548,188	2,512,548,188	2,512,548,188	Total of Annexed Table 1 or 6
Commission Expense	531,482,069	604,229,484	690,547,982	776,866,479	Operating Revenue × 5%
Advertising Cost	48,000,000	48,000,000	48,000,000	48,000,000	400 million yen per month × 12 months
Operating Profit or Loss in case of JRF	-986,088,298	396,112,576	2,036,164,033	3,676,215,489	Operating Revenue – Operating Expense
Operating Expense in case of Pure Overnight Trains Operator	577,400,000	577,400,000	577,400,000	577,400,000	
Rent Expense	57,600,000	57,600,000	57,600,000	57,600,000	40 floor space × ¥20,000 × 12 months × 6 branches
Allowance and Bonus to Directors	70,000,000	70,000,000	70,000,000	70,000,000	10 million yen per person × 7 people
Allowance to Employees	385,000,000	385,000,000	385,000,000	385,000,000	5.5 million yen per person × 70 people
Utility Expense	36,000,000	36,000,000	36,000,000	36,000,000	0.50 million yen per month × 12 months × 6 branches
Communication Expense	21,600,000	21,600,000	21,600,000	21,600,000	0.30 million yen per month × 12 months × 6 branches
Miscellaneous Expense	7,200,000	7,200,000	7,200,000	7,200,000	0.20 million yen per month × 12 months × 6 branches
Operating Profit or Loss in case of Pure Overnight Trains Operator	-1,563,488,298	-181,287,424	1,458,764,033	3,098,815,489	

We calculate revenue and expense of overnight trains in the case that load factor is 60%, 70%, 80%, and 90%, respectively. According to Table 2, operating profit or loss in the case of operating overnight trains by JRF in the case of 70% of load factor is above break-even. While in the case of 70%, operating profit or loss in the case of operating overnight trains by newly-established pure overnight train operating company is below break-even. The important point is that operating overnight trains by newly-established pure overnight train operating company causes 577 million yen of additional cost.

In sum, to establish pure overnight train operating company, load factor of overnight trains in pure overnight train operating company must above that of JRF. But in real life, newly-established pure overnight train operating company hard to attain high load factor of overnight trains. Hence option of newly establishing pure overnight train operating company is rejected.

What are the merits of operating overnight trains by JRF? If JRF as “the Type II railway operator” of Railway Business Act in Japan operates overnight trains, JRF pays rail access charge to JR passenger companies, on the other hand, JRF can get full amount of fare and charge revenue of overnight trains.

Then again, if JR passenger companies operate direct communicative overnight trains to other JR companies, fare and charge revenue of overnight trains must be allocated among JR passenger companies. In this instance, a JR passenger company in charge of short distance of operating overnight trains must take a lot of tasks, but because of receiving low fare and charge revenue, then the JR passenger company can’t find merit of operating overnight trains.

	Tokyo	Atami	Maibara	Kojima	Takamatsu
	104.6km	341.3km	314.8km	44.0km	
	JR East	JR Central	JR West	JR Shikoku	
Fare	1,470 yen	4,797 yen	4,424 yen	618 yen	
Charges	1,404 yen	4,581 yen	4,225 yen	591 yen	
Total	2,874 yen	9,378 yen	8,649 yen	1,209 yen	

**Figure 1** A Example of Allocation of Fare and Charge Revenue of Operating Overnight Trains in the case of Economy Class Sleeping Room “B-Sindai Single” of “Sunrise Seto”—The Section between Tokyo and Takamatsu, Working Kilometers 804.7km, Fare is 11,310 yen, Limited Express & berth charges are 10,800 yen, Total Amount is 22,110 yen—

If JRF operates overnight trains, to exceed break-even point, load factor must attain 70%. As well, If JR passenger companies operate overnight trains, instead of paying rail access charge, JR passenger companies must pay rail conservation cost, cable run conservation cost, train car conservation cost, train transportation cost, and maintenance cost. On the other hand, If JRF operates overnight trains, JRF have to pay rail access charge to JR passenger companies.

As seen earlier, declination of overnight trains is significant. Factors of declination of overnight trains are problems of receiving low fare and charge revenue by allocation of fare and charge revenue in the case

of operating overnight trains among above two JR passenger companies. Operating overnight trains by JRF leads to avoid problems of allocation of fare and charge revenue among JR companies. And JR passenger companies and JRF are under a holding company or “Japan Railway Group Holdings Company (JRHD)”, and JRHD will be able to coordinate revenue and expense among JR companies.

Overnight trains give some benefit of activating regions along railway lines of running overnight trains. And for the regions without Shinkansen lines, there is a possibility that abolishing overnight trains weaken this region<sup>4</sup>.

Next section, we consider a plan of activating overnight trains based on cooperation among stakeholders of overnight trains.

### **3. Ways for Activating Overnight Trains based on “Stakeholder Approach”**

Operating overnight trains give some benefit of activating regions along railway lines of running overnight trains. Passengers on overnight trains make a consumer of accommodation fee, souvenir and shopping cost, and so on. For example, in Hokkaido, average consumption amount of visitors from other prefectures (except for travel cost in Hokkaido) is 50,996 yen<sup>5</sup>. We think that railway companies and regions along railway lines of running overnight trains have to discuss to establish the train car holding company and purchase new cars of overnight trains based on “Stakeholder Approach.”

Business corporations including railway companies have to increase shareholder value and also have responsibility to give benefit of other stakeholders<sup>6</sup>. Husted, et al.[2011] indicated that the contemporary firm can best be understood as a purposeful social institution that responds as fully as possible to the needs of its stakeholders, increasing the total good created for those stakeholders<sup>7</sup>.

We think “stakeholder approach” is needed to coordinate among stakeholders. Boutilier [2012] shows that “A stakeholder is someone who is either affected by a company or can have an effect on the company”. Based on Boutilier [2012]’s definition of a stakeholder, we define “stakeholder approach” is a methodology of coordinating among the interests of stakeholders<sup>8</sup>. Hereafter we make a discussion of new cars of overnight trains based on “Stakeholder Approach.”

As discussed above, discussing cooperation among railway companies and regions along railway lines of running overnight trains are very important and lead to activate overnight trains.

In the past, in Japan train car holding companies were established. For example, for Yamagata Shinkansen, “Yamagata JR Direct Express Train Car Holding Company” (Yamagata JR Chokko Tokkyu Hoyu) was established in 1988. And for Akita Shinkansen, “Akita Shinkansen Train Car Holding Company” (Akita Shinkansen Sharyo Hoyu) was established in 1995.



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Appendix Table 1 Revenue and Expense of "Akebono"

(Unit:Yen)

Revenue	(1)Charge per one person	(2)Number of Seats	(3)Annual Revenue (= (1) × (2)) × 2 trains × 365 days	Load Factor60%	Load Factor70%	Load Factor80%	Load Factor90%
First Class Berth	16,800	11	134,904,000	80,942,400	94,432,800	107,923,200	121,413,600
Economy Class Berth	9,450	212	1,462,482,000	877,489,200	1,023,737,400	1,169,985,600	1,316,233,800
Economy Class Seat	3,150	60	137,970,000	82,782,000	96,579,000	110,376,000	124,173,000
Average Fare Revenue	9,030	283	1,865,507,700	1,119,304,620	1,305,855,390	1,492,406,160	1,678,956,930
Total of Operating Revenue			3,600,863,700	2,160,518,220	2,520,604,590	2,880,690,960	3,240,777,330
Expense	(4)Piece Rate	(5)Km	(6)Annual Expense(= (4) × (5)) × 2 trains × 365 days				
Train Operating Cost	2,312.25	776.2	1,310,180,969	1,310,180,969	1,310,180,969	1,310,180,969	1,310,180,969
Rail Access Charge	247,386	776.2	384,042,026	384,042,026	384,042,026	384,042,026	384,042,026
Total of Operating Expense			1,694,222,995	1,694,222,995	1,694,222,995	1,694,222,995	1,694,222,995
Operating Profit or Loss in case of JRF			1,906,640,705	466,295,225	826,381,595	1,186,467,965	1,546,554,335

\*Piece rate of Rail Access Charge is annual amounts. Hence Expense =(4)\*(5)\*2 trains

Appendix Table 2 Revenue and Expense of "Hokutosei"

(Unit:Yen)

Revenue	(1)Charge per one person	(2)Number of Seats	(3)Annual Revenue (= (1) × (2)) × 2 trains × 365 days	Load Factor60%	Load Factor70%	Load Factor80%	Load Factor90%
First Class Berth 1	20,330	4	59,363,600	35,618,160	41,554,520	47,490,880	53,427,240
First Class Berth 2	33,000	8	192,720,000	115,632,000	134,904,000	154,176,000	173,448,000
Economy Class Berth 1	18,900	33	455,301,000	273,180,600	318,710,700	364,240,800	409,770,900
Economy Class Berth 2	9,450	37	255,244,500	153,146,700	178,671,150	204,195,600	229,720,050
Economy Class Berth 3	9,450	94	648,459,000	389,075,400	453,921,300	518,767,200	583,613,100
Average Fare Revenue	11,970	217	1,896,167,700	1,137,700,620	1,327,317,390	1,516,934,160	1,706,550,930
Restaurant Revenue	10,000	60	438,000,000	262,800,000	306,600,000	350,400,000	394,200,000
Total of Operating Revenue			3,945,255,800	2,367,153,480	2,761,679,060	3,156,204,640	3,550,730,220
Expense	(4)Piece Rate	(5)Km	(6)Annual Expense(= (4) × (5)) × 2 trains × 365 days				
Train Operating Cost	2,312.25	1,214.7	2,050,343,755	2,050,343,755	2,050,343,755	2,050,343,755	2,050,343,755
Rail Access Charge	247,386	1,214.7	600,999,548	600,999,548	600,999,548	600,999,548	600,999,548
Total of Operating Expense			2,651,343,303	2,651,343,303	2,651,343,303	2,651,343,303	2,651,343,303
Operating Profit or Loss in case of JRF			1,293,912,497	-284,189,823	110,335,757	504,861,337	899,386,917

\*Piece rate of Rail Access Charge is annual amounts. Hence Expense =(4)\*(5)\*2 trains

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Appendix Table 3 Revenue and Expense of “Cassiopeia” (Unit:Yen)

Revenue	(1)Charge per one person	(2)Number of Seats	(3)Annual Revenue (= (1) × (2) × 2 trains × 365 days	Load Factor60%	Load Factor70%	Load Factor80%	Load Factor90%
First Class Berth 1	57,280	7	125,099,520	75,059,712	87,569,664	100,079,616	112,589,568
First Class Berth 2	40,660	1	12,685,920	7,611,552	8,880,144	10,148,736	11,417,328
First Class Berth 3	33,000	77	792,792,000	475,675,200	554,954,400	634,233,600	713,512,800
First Class Berth 4	29,190	1	9,107,280	5,464,368	6,375,096	7,285,824	8,196,552
Average Fare Revenue	11,970	172	642,358,080	385,414,848	449,650,656	513,886,464	578,122,272
Restaurant Revenue	10,000	60	187,200,000	112,320,000	131,040,000	149,760,000	168,480,000
Total of Operating Revenue			1,769,242,800	1,061,545,680	1,238,469,960	1,415,394,240	1,592,318,520
Expense	(4)Piece Rate	(5)Km	(6)Annual Expense(= (4) × (5) × 2 trains × 365 days				
Train Operating Cost	2,312.25	1,214.7	876,311,303	876,311,303	876,311,303	876,311,303	876,311,303
Rail Access Charge	247,386	1,214.7	256,865,560	256,865,560	256,865,560	256,865,560	256,865,560
Total of Operating Expense			1,133,176,864	1,133,176,864	1,133,176,864	1,133,176,864	1,133,176,864
Operating Profit or Loss in case of JRF			636,065,936	-71,631,184	105,293,096	282,217,376	459,141,656

\*Piece rate of Rail Access Charge is annual amounts. Hence Expense = (4) × (5) × 2 trains × 156 days / 365 days

Appendix Table 4 Revenue and Expense of “Twilight Express” (Unit:Yen)

Revenue	(1)Charge per one person	(2)Number of Seats	(3)Annual Revenue (= (1) × (2) × 2 trains × 365 days	Load Factor60%	Load Factor70%	Load Factor80%	Load Factor90%
First Class Berth 1	57,280	2	59,112,960	35,467,776	41,379,072	47,290,368	53,201,664
First Class Berth 2	23,480	8	96,925,440	58,155,264	67,847,808	77,540,352	87,232,896
Economy Class Berth 1	22,620	23	268,454,160	161,072,496	187,917,912	214,763,328	241,608,744
Economy Class Berth 2	29,190	12	180,744,480	108,446,688	126,521,136	144,595,584	162,670,032
Economy Class Berth 3	9,450	60	292,572,000	175,543,200	204,800,400	234,057,600	263,314,800
Average Fare Revenue	11,970	130	802,947,600	481,768,560	562,063,320	642,358,080	722,652,840
Restaurant Revenue	10,000	60	309,600,000	185,760,000	216,720,000	247,680,000	278,640,000
Total of Operating Revenue			2,010,356,640	1,206,213,984	1,407,249,648	1,608,285,312	1,809,320,976
Expense	(4)Piece Rate	(5)Km	(6)Annual Expense(= (4) × (5) × 2 trains × 365 days				
Train Operating Cost	2,312.25	1,495.7	1,784,551,080	1,784,551,080	1,784,551,080	1,784,551,080	1,784,551,080
Rail Access Charge	247,386	1,495.7	523,090,038	523,090,038	523,090,038	523,090,038	523,090,038
Total of Operating Expense			2,307,641,118	2,307,641,118	2,307,641,118	2,307,641,118	2,307,641,118
Operating Profit or Loss in case of JRF			-297,284,478	-1,101,427,134	-900,391,470	-699,355,806	-498,320,142

\*Piece rate of Rail Access Charge is annual amounts. Hence Expense = (4) × (5) × 2 trains × 258 days / 365 days

Appendix Table 5 Revenue and Expense of "Sunrise Express" (Unit:Yen)

Revenue	(1)Charge per one person	(2)Number of Seats	(3)Annual Revenue (= (1) × (2)) × 2 trains × 365 days	Load Factor60%	Load Factor70%	Load Factor80%	Load Factor90%
First Class Berth	16,500	12	144,540,000	93,951,000	101,178,000	115,632,000	130,086,000
Economy Class Berth 1	21,000	8	122,640,000	79,716,000	85,848,000	98,112,000	110,376,000
Economy Class Berth 2	14,420	16	168,425,600	109,476,640	117,897,920	134,740,480	151,583,040
Economy Class Berth 3	10,500	156	1,195,740,000	777,231,000	837,018,000	956,592,000	1,076,166,000
Economy Class Berth 4	9,450	40	275,940,000	179,361,000	193,158,000	220,752,000	248,346,000
Economy Class Seat	3,150	56	128,772,000	83,701,800	90,140,400	103,017,600	115,894,800
Average Fare Revenue	9,870	288	2,075,068,800	1,348,794,720	1,452,548,160	1,660,055,040	1,867,561,920
Total of Operating Revenue			4,111,126,400	2,672,232,160	2,877,788,480	3,288,901,120	3,700,013,760
Expense	(4)Piece Rate	(5)Km	(6)Annual Expense(= (4) × (5)) × 2 trains × 365 days				
Train Operating Cost	2,312.25	1,025.4	1,730,816,240	1,730,816,240	1,730,816,240	1,730,816,240	1,730,816,240
Rail Access Charge	247,386	1,025.4	507,339,209	507,339,209	507,339,209	507,339,209	507,339,209
Total of Operating Expense			2,238,155,448	2,238,155,448	2,238,155,448	2,238,155,448	2,238,155,448
Operating Profit or Loss in case of JRF			1,872,970,952	434,076,712	639,633,032	1,050,745,672	1,461,858,312

\*Piece rate of Rail Access Charge is annual amounts. Hence Expense =(4)\*(5)\*2 trains

Appendix Table 6 Revenue and Expense of "Hamanasu" (Unit:Yen)

Revenue	(1)Charge per one person	(2)Number of Seats	(3)Annual Revenue (= (1) × (2)) × 2 trains × 365 days	Load Factor60%	Load Factor70%	Load Factor80%	Load Factor90%
Economy Class Berth	7,560	64	353,203,200	211,921,920	247,242,240	282,562,560	317,882,880
Economy Class Seat with reservation	1,770	121	156,344,100	93,806,460	109,440,870	125,075,280	140,709,690
Economy Class Seat without reservation	1,260	128	117,734,400	76,527,360	82,414,080	94,187,520	105,960,960
Average Fare Revenue	5,250	313	1,199,572,500	779,722,125	839,700,750	959,658,000	1,079,615,250
Total of Operating Revenue			1,826,854,200	1,161,977,865	1,278,797,940	1,461,483,360	1,644,168,780
Expense	(4)Piece Rate	(5)Km	(6)Annual Expense(= (4) × (5)) × 2 trains × 365 days				
Train Operating Cost	2,312.25	485.5	819,496,084	819,496,084	819,496,084	819,496,084	819,496,084
Rail Access Charge	247,386	485.5	240,211,806	240,211,806	240,211,806	240,211,806	240,211,806
Total of Operating Expense			1,059,707,890	1,059,707,890	1,059,707,890	1,059,707,890	1,059,707,890
Operating Profit or Loss in case of JRF			767,146,310	102,269,975	219,090,050	401,775,470	584,460,890

\*Piece rate of Rail Access Charge is annual amounts. Hence Expense =(4)\*(5)\*2 trains

## 「ステークホルダーアプローチ」に基づく夜行列車活性化への一試案

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### 【抄録】

日本国有鉄道（国鉄）の分割民営化後、JR 会社間の経営格差は拡大し、地方交通線問題は深刻さを増すとともに、夜行列車の衰退を招いた。

国鉄分割民営化後、JR グループは資本関係のない別個の法人となり、会社間をまたがる直通列車について、JR 会社間の運行調整を必要とするようになった。この調整のために、追加コストが発生することとなった。

本論は、夜行列車の収支試算を行った上で、「ステークホルダーアプローチ」に基づいて夜行列車の活性化を図る方法を提示する。

### 【キーワード】

ステークホルダーアプローチ      日本貨物鉄道      車両保有会社