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The Import Structure of LNG from Russia to Japan by Cognitive Map and Text Analysis

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Abstract

Japanese energy policy was shifted to natural gas use due to drastic situation domestic and international energy situation, such as the Fukushima Daiichi nuclear accident. Accordingly, this study analyzes the structure of natural gas development project and trading between Japan and Russia, as Russia is increasingly becoming an important major supplier of natural gas, which is reflected in the bilateral trade. This study will analyze the two LNG projects as a representative case of the multinational development project of natural gas from the perspective of energy security, economy, technology, and politics. The method of this analysis is “cognitive map” and “text analysis” to quantify the qualitative data collected from four major Japanese newspapers during the period of 1991-2017. One of the findings of this study is that, the Russian government has strengthened exporting LNG to East Asia as a state project since the first Putin administration especially after the US Shale revolution and the Ukrainian crisis, while the Japanese side is driven by major private corporations such as the construction of infrastructure which is little affected from international politics.

Keywords:

Energy policy; LNG import; Russia; Japan; LNG projects

1 INTRODUCTION

In Japan's energy policy, the importance of natural gas is considered important and expected to remain unchanged. In Japan, the introduction of renewable energy will be halted due to difficulties in securing safety and resuming operation of nuclear power plants after the Fukushima Daiichi Nuclear Power Plant accident, changes in power transmission networks and fixed price purchasing systems, and so on. On the other hand, the dependence on fossil fuel energy, which has risen since the shutdown of nuclear power plants, is expected to increase. The proportion of thermal power generation, which was 65% in 2010, will be 83% in 2016.

Japanese oil import is hugely dependent from the Middle East where geopolitical risks are high due to instability in the region. Also, Japanese domestic demand and demand from neighboring countries, South East Asian countries, are rising. Japan is one of the important destinations for Russia which has close geographical distance. Therefore, it is possible to obtain the suggestion of the stable gas import for Japan by the case analysis of the past gas import from Russia where import volume of Japan is expected to increase in the future. Therefore, in order for Japan to take lower risk policy decisions in the natural gas import business from Russia, we will clarify

causal factors and the factors that have been influenced by past case analysis of Russian natural gas exports.

In this study, we conducted case studies on the Yamal LNG Project and the Sakhalin 2 Project. The Yamal LNG Project is a gas development project on the Yamal peninsula in the northern part of the Yamal-Nenets Autonomous Region on the Russian West Siberian Arctic coast, and its interest is broken down as of 2018 by Novatek, Russia's private natural gas, and hydrocarbon integrated company. 50.1%, 20% of total French-based international oil capital, 20% of CNPC (China National Petroleum Corporation), and 9.9% of the Chinese government's Silk Road Foundation. The estimated reserves are 698 BCM (billion cubic meters) of natural gas and 120 million BBL (barrel) of condensate, and exports by three LNG baselines with a capacity of 5.5 million tons are planned.

The Sakhalin 2 Project is an oil and natural gas development project in the Piltun-Astokhskoye Block and the Lansky Block on the east coast of Sakhalin Island in the Far East of Russia. And the share of the interests of Sakhalin Energy Co., Ltd. Gazprom, the largest integrated natural gas company, has 50% + 1 share, Royal Dutch Shell of international oil capital has 27.5%-1 share, Mitsui & Co. has 12.5%, and Mitsubishi Corporation has a 10%

stake. The estimated reserves are about 750 billion BBL for crude oil and about 500 BCM for natural gas.

Common points in these two projects include the fact that Japan supports export in the form of LNG currently established as a natural gas import system, and that Japanese companies are participating in the plant construction process of each project, etc. As of 2017, Japan imported at least 7.27 million tons of LNG, 8.7% of the total, from the Yamal LNG Project with a long-term contract. The diversification of suppliers and the development of the Arctic Ocean route are expected to increase imports of the Yamal LNG Project and gas from the region. As for research questions, we will focus on two points: the turning point of Russia's natural gas export strategy and the pros and cons of possessing Japanese interests in terms of energy security in development projects in Russia.

2 QUALITATIVE ANALYSIS: COGNITIVE MAP

2.1 Methodology

The software "KH Coder" used in this study was developed by Associate Professor Koichi Higuchi of Ritsumeikan University and is free software that has published all the processing contents since 2001. As of 2018, this software has been used in more than 2000 research cases, and the fields range from policy evaluation, media analysis, and verification of educational effects.

Among the functions provided in KH Coder, the following functions were used in each process in this study.

- Process (1): "extraction word list" "extraction word: hierarchical cluster analysis"
- Process (2): "extraction word: co-occurrence network" "coding: cross tabulation"

Using a database of four major newspaper companies (Nikkei, Yomiuri, Asahi, and daily) as information sources, we will extract important terms by text analysis and create a "cognitive structure map" based on that. It is possible to extract highly relevant related factors in each period.

2.2 Setting period

In the process of qualitative analysis (1), "cognitive structure diagram" was created using the functions "extracted word list" and "extracted word: hierarchical cluster analysis" of KH Coder.

We extracted words that show remarkable appearance throughout the text, and words that show correlations between events and events of each policy trend such as "promotion," "growth," "interference," and "deterioration" that are essential for creating cognitive structure maps. In the process of collecting information, words such as "Russia" and "Natural gas" are

automatically extracted in large numbers, so we chose not to disturb the analysis.

The function "extraction word: hierarchical cluster analysis" is to output combinations of similar words and phrases of appearance patterns in the form of dendrograms. Analyze all the articles, grasp the features of the appearance pattern for each frequent phrase, and automatically connect the words with similar appearance patterns with closer branches. It is possible to trace the dendrograms back together and group them together with words connected by close branches as factors that have influenced the policy. Hereinafter, it is called a related factor.

These factors are then organized into a matrix of this information. At this time, related factors affecting other related factors are placed in the leftmost column of the matrix, and related factors affected in the top row of the matrix. After that, based on the words "promotion" and "prevent" in the sentence, the relationship between related factors is based on the words "promotion" and "interference", and if the correlation is positive, then "+1" or negative Enter "-1" for correlation, and enter "0" if there is no correlation.

For the Yamal LNG Project, the period was set as follows. In Russia, the end date of the term and the arrival date of the new president will be the same day, but the term of the new president will start from the day after the arrival date to classify articles based on the date. The second Putin administration has more articles than the other administrations, so it was divided into two parts, the first and the second, and five periods were set as shown below.

- Period (1-1): The Yeltsin government, July 10, 1991-December 31, 1999
- Period (1-2): The first Putin administration, January 1, 2000-May 7, 2008
- Period (1-3): Medvedev administration, May 8, 2008-May 7, 2012
- Period (1-4): The second Putin administration first semester, May 8, 2012-May 7, 2014
- Period (1-5): Second Putin administration late, May 8, 2014-December 31, 2017

For the Sakhalin 2 Project, the period was set as follows. Since the first Putin administration has more articles than other administrations, it was divided into three parts; first, middle, and second quarters. The boundary points between period (2-2) and period (2-3) are classified before and after the Natural Resources Supervision Bureau of Russia filed a lawsuit for suspension of construction on September 5, 2006. In addition, with regard to the boundary point between period (2-3) and period (2-4), it is the first report in an article dated December 22, 2006, that an agreement has been reached for Gazprom's entry into the Sakhalin 2 project.

- Period (2-1): The Yeltsin administration, July 10, 1991-December 31, 1999
- Period (2-2): First Putin administration first semester, January 1, 2000-August 27, 2006
- Period (2-3): The first Putin administration, August 28, 2006-December 21, 2006
- Period (2-4): The first Putin administration late, December 22, 2006-May 7, 2008
- Period (2-5): Medvedev, 2nd Putin administration, May 8, 2008-December 31, 2017

Factors \ Results	JIBC	Sakhalin 2	oil spill accident in Sakhalin 2	banking for Sakhalin 2	financing for Sakhalin 2	Sakhalin Projects	development in Sakhalin	development in Siberia	foreign capitalization	development in Far East Area	state government: integrated infrastructure	limitation for terms of producing power industry	support for advance of companies in Hokkaido	JPN	advance of Japanese companies	change Hokkaido into a near base dynamization for north east Asian economy	RUS	beneficially for Russian presidential election	Results
JIBC : financing for Sakhalin 2		-1		1															
Asia Energy Community initiative																			
gas long term contract		-1				-1		1	1									1	
environment of Sakhalin												1					1		
Sakhalin 2																			
PS contract of Sakhalin 2		1											1						1
provisional sealing Sakhalin 2						1													
sealing for Sakhalin 2																	1		
Sakhalin Projects												1							1
additional attending for Sakhalin																			
Hashimoto Yetsin Plan						1	1		1						1				
declining oil price			-1									1							
countermeasure for oil spill accident																			
MTTI : expanding gas thermal power							1												
Japan and Russian foreign ministers' conference							1							1					
Japan and Russian summit conference							1												
RUS : financial deficit										-1									
RUS : rejection relevant laws in Upper House			-1																
RUS : legislation						1				1						1			
RUS : lack of legislation			-1													-1		-1	
Results : number of related factors	3	25	2	4	2	4	3	2	3	2	2	3	2	3	2	4	2	2	2

From the information in Table 1, the following can be interpreted as features of each period.

- Period (2-5): Russia-Russia Strengthening Asia (2-5-2, 2-5-6) / Japan-Russia Summit Meeting (2-5-3) / New Gas Field Development (2-5-8, 2-5-9)

No.	term	related factor	frequency	No.	term	related factor	frequency
2-1-1	term(2-1)	Sakhalin 2	37	2-3-7	term(2-3)	interception by dep. of resource	9
2-1-2	term(2-1)	sealing Sakhalin 2	14	2-3-8	term(2-3)	search by dep. of resource	7
2-1-3	term(2-1)	change Hokkaido into a rear base	9	2-3-9	term(2-3)	interception Sakhalin 2	5
2-1-4	term(2-1)	oil accident in Sakhalin 2	7	2-3-10	term(2-3)	restoring Sakhalin 2	5
2-1-5	term(2-1)	Sakhalin Project	6	2-3-11	term(2-3)	environmental assessment	5
2-1-6	term(2-1)	JBTC : financing for Sakhalin 2	5				
2-1-7	term(2-1)	environment of Sakhalin	5	2-4-1	term(2-4)	adjustment interest of Sakhalin 2	20
2-1-8	term(2-1)	foreign capitalization	5	2-4-2	term(2-4)	interception Sakhalin 2	16
2-1-9	term(2-1)	Hachimoto and Yeltsin Plan	5	2-4-3	term(2-4)	Sakhalin 2	8
2-1-10	term(2-1)	RUS : legislation	5	2-4-4	term(2-4)	increase oil price	8
2-1-11	term(2-1)	RUS : lack of legislation	5	2-4-5	term(2-4)	JPN : renewing Basic Energy Plan	6
				2-4-6	term(2-4)	BP : selling interest of gas field in Kovykta	3
2-2-1	term(2-2)	Sakhalin 2	36	2-4-7	term(2-4)	EBRD: repay for financing	3
2-2-2	term(2-2)	increase operating cost	12	2-4-8	term(2-4)	JBTC : financing for Sakhalin 2	3
2-2-3	term(2-2)	Tokyo Gas : purchase Sakhalin gas	8	2-4-9	term(2-4)	METT : strengthen export insurance	3
2-2-4	term(2-2)	environmental assessment	7	2-4-10	term(2-4)	Japan and Russia summit conference	3
2-2-5	term(2-2)	RUS : nationalize natural resource	7	2-4-11	term(2-4)	investment between Japan and Russia	3
2-2-6	term(2-2)	JPN : diversify resource	6	2-4-12	term(2-4)	RUS: exclusion foreign capitalization	3
2-2-7	term(2-2)	Gazprom: attending negotiation	5				
2-2-8	term(2-2)	environment of Sakhalin	5	2-5-1	term(2-5)	Sakhalin 2	17
2-2-9	term(2-2)	Sakhalin Project	5	2-5-2	term(2-5)	RUS: advance for Asia Pacific Area	10
2-2-10	term(2-2)	increase oil price	5	2-5-3	term(2-5)	Japan and Russia summit conference	7
2-2-11	term(2-2)	Chubu Power : purchase Sakhalin gas	5	2-5-4	term(2-5)	adjustment interest of Sakhalin 2	4
				2-5-5	term(2-5)	interception Sakhalin 2	2
2-3-1	term(2-3)	RUS: cancel Sakhalin 2 plan	41	2-5-6	term(2-5)	construction Vodi Sakhalin pipeline	3
2-3-2	term(2-3)	Gazprom: attending negotiation	16	2-5-7	term(2-5)	restoring Sakhalin 2	3
2-3-3	term(2-3)	increase oil price	11	2-5-8	term(2-5)	cooperating between Gazprom and Shell	3
2-3-4	term(2-3)	filling suit by dep. of resource	10	2-5-9	term(2-5)	development in East Sibilia	3
2-3-5	term(2-3)	lack of environmental countermeasure	9	2-5-10	term(2-5)	311 crisis	3
2-3-6	term(2-3)	RUS : nationalize natural resource	9	2-5-11	term(2-5)	stagnation on economic cooperation	3

2.4 Result (Yamal LNG Project)

Factors	Group 1		Group 2		Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11	Group 12	Group 13	Group 14	Group 15	Group 16	Group 17	Group 18	Group 19	Group 20	Group 21	Group 22	Group 23	Group 24	Group 25	Group 26	Group 27	Group 28	Group 29	Group 30	Group 31	Group 32	Group 33	Group 34	Group 35	Group 36	Group 37	Group 38	Group 39	Group 40	Group 41	Group 42	Group 43	Group 44	Group 45	Group 46	Group 47	Group 48	Group 49	Group 50	Group 51	Group 52	Group 53	Group 54	Group 55	Group 56	Group 57	Group 58	Group 59	Group 60	Group 61	Group 62	Group 63	Group 64	Group 65	Group 66	Group 67	Group 68	Group 69	Group 70	Group 71	Group 72	Group 73	Group 74	Group 75	Group 76	Group 77	Group 78	Group 79	Group 80	Group 81	Group 82	Group 83	Group 84	Group 85	Group 86	Group 87	Group 88	Group 89	Group 90	Group 91	Group 92	Group 93	Group 94	Group 95	Group 96	Group 97	Group 98	Group 99	Group 100	Group 101	Group 102	Group 103	Group 104	Group 105	Group 106	Group 107	Group 108	Group 109	Group 110	Group 111	Group 112	Group 113	Group 114	Group 115	Group 116	Group 117	Group 118	Group 119	Group 120	Group 121	Group 122	Group 123	Group 124	Group 125	Group 126	Group 127	Group 128	Group 129	Group 130	Group 131	Group 132	Group 133	Group 134	Group 135	Group 136	Group 137	Group 138	Group 139	Group 140	Group 141	Group 142	Group 143	Group 144	Group 145	Group 146	Group 147	Group 148	Group 149	Group 150	Group 151	Group 152	Group 153	Group 154	Group 155	Group 156	Group 157	Group 158	Group 159	Group 160	Group 161	Group 162	Group 163	Group 164	Group 165	Group 166	Group 167	Group 168	Group 169	Group 170	Group 171	Group 172	Group 173	Group 174	Group 175	Group 176	Group 177	Group 178	Group 179	Group 180	Group 181	Group 182	Group 183	Group 184	Group 185	Group 186	Group 187	Group 188	Group 189	Group 190	Group 191	Group 192	Group 193	Group 194	Group 195	Group 196	Group 197	Group 198	Group 199	Group 200	Group 201	Group 202	Group 203	Group 204	Group 205	Group 206	Group 207	Group 208	Group 209	Group 210	Group 211	Group 212	Group 213	Group 214	Group 215	Group 216	Group 217	Group 218	Group 219	Group 220	Group 221	Group 222	Group 223	Group 224	Group 225	Group 226	Group 227	Group 228	Group 229	Group 230	Group 231	Group 232	Group 233	Group 234	Group 235	Group 236	Group 237	Group 238	Group 239	Group 240	Group 241	Group 242	Group 243	Group 244	Group 245	Group 246	Group 247	Group 248	Group 249	Group 250	Group 251	Group 252	Group 253	Group 254	Group 255	Group 256	Group 257	Group 258	Group 259	Group 260	Group 261	Group 262	Group 263	Group 264	Group 265	Group 266	Group 267	Group 268	Group 269	Group 270	Group 271	Group 272	Group 273	Group 274	Group 275	Group 276	Group 277	Group 278	Group 279	Group 280	Group 281	Group 282	Group 283	Group 284	Group 285	Group 286	Group 287	Group 288	Group 289	Group 290	Group 291	Group 292	Group 293	Group 294	Group 295	Group 296	Group 297	Group 298	Group 299	Group 300	Group 301	Group 302	Group 303	Group 304	Group 305	Group 306	Group 307	Group 308	Group 309	Group 310	Group 311	Group 312	Group 313	Group 314	Group 315	Group 316	Group 317	Group 318	Group 319	Group 320	Group 321	Group 322	Group 323	Group 324	Group 325	Group 326	Group 327	Group 328	Group 329	Group 330	Group 331	Group 332	Group 333	Group 334	Group 335	Group 336	Group 337	Group 338	Group 339	Group 340	Group 341	Group 342	Group 343	Group 344	Group 345	Group 346	Group 347	Group 348	Group 349	Group 350	Group 351	Group 352	Group 353	Group 354	Group 355	Group 356	Group 357	Group 358	Group 359	Group 360	Group 361	Group 362	Group 363	Group 364	Group 365	Group 366	Group 367	Group 368	Group 369	Group 370	Group 371	Group 372	Group 373	Group 374	Group 375	Group 376	Group 377	Group 378	Group 379	Group 380	Group 381	Group 382	Group 383	Group 384	Group 385	Group 386	Group 387	Group 388	Group 389	Group 390	Group 391	Group 392	Group 393	Group 394	Group 395	Group 396	Group 397	Group 398	Group 399	Group 400	Group 401	Group 402	Group 403	Group 404	Group 405	Group 406	Group 407	Group 408	Group 409	Group 410	Group 411	Group 412	Group 413	Group 414	Group 415	Group 416	Group 417	Group 418	Group 419	Group 420	Group 421	Group 422	Group 423	Group 424	Group 425	Group 426	Group 427	Group 428	Group 429	Group 430	Group 431	Group 432	Group 433	Group 434	Group 435	Group 436	Group 437	Group 438	Group 439	Group 440	Group 441	Group 442	Group 443	Group 444	Group 445	Group 446	Group 447	Group 448	Group 449	Group 450	Group 451	Group 452	Group 453	Group 454	Group 455	Group 456	Group 457	Group 458	Group 459	Group 460	Group 461	Group 462	Group 463	Group 464	Group 465	Group 466	Group 467	Group 468	Group 469	Group 470	Group 471	Group 472	Group 473	Group 474	Group 475	Group 476	Group 477	Group 478	Group 479	Group 480	Group 481	Group 482	Group 483	Group 484	Group 485	Group 486	Group 487	Group 488	Group 489	Group 490	Group 491	Group 492	Group 493	Group 494	Group 495	Group 496	Group 497	Group 498	Group 499	Group 500	Group 501	Group 502	Group 503	Group 504	Group 505	Group 506	Group 507	Group 508	Group 509	Group 510	Group 511	Group 512	Group 513	Group 514	Group 515	Group 516	Group 517	Group 518	Group 519	Group 520	Group 521	Group 522	Group 523	Group 524	Group 525	Group 526	Group 527	Group 528	Group 529	Group 530	Group 531	Group 532	Group 533	Group 534	Group 535	Group 536	Group 537	Group 538	Group 539	Group 540	Group 541	Group 542	Group 543	Group 544	Group 545	Group 546	Group 547	Group 548	Group 549	Group 550	Group 551	Group 552	Group 553	Group 554	Group 555	Group 556	Group 557	Group 558	Group 559	Group 560	Group 561	Group 562	Group 563	Group 564	Group 565	Group 566	Group 567	Group 568	Group 569	Group 570	Group 571	Group 572	Group 573	Group 574	Group 575	Group 576	Group 577	Group 578	Group 579	Group 580	Group 581	Group 582	Group 583	Group 584	Group 585	Group 586	Group 587	Group 588	Group 589	Group 590	Group 591	Group 592	Group 593	Group 594	Group 595	Group 596	Group 597	Group 598	Group 599	Group 600	Group 601	Group 602	Group 603	Group 604	Group 605	Group 606	Group 607	Group 608	Group 609	Group 610	Group 611	Group 612	Group 613	Group 614	Group 615	Group 616	Group 617	Group 618	Group 619	Group 620	Group 621	Group 622	Group 623	Group 624	Group 625	Group 626	Group 627	Group 628	Group 629	Group 630	Group 631	Group 632	Group 633	Group 634	Group 635	Group 636	Group 637	Group 638	Group 639	Group 640	Group 641	Group 642	Group 643	Group 644	Group 645	Group 646	Group 647	Group 648	Group 649	Group 650	Group 651	Group 652	Group 653	Group 654	Group 655	Group 656	Group 657	Group 658	Group 659	Group 660	Group 661	Group 662	Group 663	Group 664	Group 665	Group 666	Group 667	Group 668	Group 669	Group 670	Group 671	Group 672	Group 673	Group 674	Group 675	Group 676	Group 677	Group 678	Group 679	Group 680	Group 681	Group 682	Group 683	Group 684	Group 685	Group 686	Group 687	Group 688	Group 689	Group 690	Group 691	Group 692	Group 693	Group 694	Group 695	Group 696	Group 697	Group 698	Group 699	Group 700	Group 701	Group 702	Group 703	Group 704	Group 705	Group 706	Group 707	Group 708	Group 709	Group 710	Group 711	Group 712	Group 713	Group 714	Group 715	Group 716	Group 717	Group 718	Group 719	Group 720	Group 721	Group 722	Group 723	Group 724	Group 725	Group 726	Group 727	Group 728	Group 729	Group 730	Group 731	Group 732	Group 733	Group 734	Group 735	Group 736	Group 737	Group 738	Group 739	Group 740	Group 741	Group 742	Group 743	Group 744	Group 745	Group 746	Group 747	Group 748	Group 749	Group 750	Group 751	Group 752	Group 753	Group 754	Group 755	Group 756	Group 757	Group 758	Group 759	Group 760	Group 761	Group 762	Group 763	Group 764	Group 765	Group 766	Group 767	Group 768	Group 769	Group 770	Group 771	Group 772	Group 773	Group 774	Group 775	Group 776	Group 777	Group 778	Group 779	Group 780	Group 781	Group 782	Group 783	Group 784	Group 785	Group 786	Group 787	Group 788	Group 789	Group 790	Group 791	Group 792	Group 793	Group 794	Group 795	Group 796	Group 797	Group 798	Group 799	Group 800	Group 801	Group 802	Group 803	Group 804	Group 805	Group 806	Group 807	Group 808	Group 809	Group 810	Group 811	Group 812	Group 813	Group 814	Group 815	Group 816	Group 817	Group 818	Group 819	Group 820	Group 821	Group 822	Group 823	Group 824	Group 825	Group 826	Group 827	Group 828	Group 829	Group 830	Group 831	Group 832	Group 833	Group 834	Group 835	Group 836	Group 837	Group 838	Group 839	Group 840	Group 841	Group 842	Group 843	Group 844	Group 845	Group 846	Group 847	Group 848	Group 849	Group 850	Group 851	Group 852	Group 853	Group 854	Group 855	Group 856	Group 857	Group 858	Group 859	Group 860	Group 861	Group 862	Group 863	Group 864	Group 865	Group 866	Group 867	Group 868	Group 869	Group 870	Group 871	Group 872	Group 873	Group 874	Group 875	Group 876	Group 877	Group 878	Group 879	Group 880	Group 881	Group 882	Group 883	Group 884	Group 885	Group 886	Group 887	Group 888	Group 889	Group 890	Group 891	Group 892	Group 893	Group 894	Group 895	Group 896	Group 897	Group 898	Group 899	Group 900	Group 901	Group 902	Group 903	Group 904	Group 905	Group 906	Group 907	Group 908	Group 909	Group 910	Group 911	Group 912	Group 913	Group 914	Group 915	Group 916	Group 917	Group 918	Group 919	Group 920	Group 921	Group 922	Group 923	Group 924	Group 925	Group 926	Group 927	Group 928	Group 929	Group 930	Group 931	Group 932	Group 933	Group 934	Group 935	Group 936	Group 937	Group 938	Group 939	Group 940	Group 941	Group 942	Group 943	Group 944	Group 945	Group 946	Group 947	Group 948	Group 949	Group 950	Group 951	Group 952	Group 953	Group 954	Group 955	Group 956	Group 957	Group 958	Group 959	Group 960

Cognitive structure The leftmost column of the figure is the related factor of the cause, the upper row of the figure is the related factor of the affected result, and the positive one is "+1" in the cell The value of O is used to place the cell in blue, and the one in which the relationship is negative is placed in the cell with a value of "-1" and the cell is made red.

- Period (1-1): Attention to Asian exports (1-1-3, 1-1-4, 1-1-6) / Beijing route pipeline construction (1-1-1)
- Period (1-2): Conflict with former Soviet Union countries (1-2-2, 1-2-9) / Japan-Russian-China

relationship (1-2-3, 1-2-6, 1-2 -7, 1-2-8) / Beijing route pipeline construction (1-2-1)

- Period (1-3): Gazprom financial deterioration (1-3-4) / Maintenance of European supply capacity (1-3-7) / Full-scale start of Yamal development (1-3-1, 1-3-2, 1-3-3, 1-3-5)

- Period (1-4): Aftermath of Shale Revolution (1-4-2) / Transition to Asian Policy (1-4-1, 1-4-3, 1-4-4, 1-4- , 1-4-6, 1-4-7, 1-4-8)

- Period (1-5): Ukraine crisis • Economic sanctions (1-5-3) / Strengthening Russia-Japan cooperation (1-5-1, 1-5-2, 1-5-4, 1-5-5)

NO.	term	related factor	frequency	NO.	term	related factor	frequency
1-1-1	term (1-1)	construction Beijing Root pipeline	10	1-3-4	term (1-3)	Gazprom : increasing difficulty for earning	7
1-1-2	term (1-1)	RUS: development new gas field	7	1-3-5	term (1-3)	Mitsubishi Mitsui: examine attending Yamal project	5
1-1-3	term (1-1)	CHN: increase gas demand in urban area	3	1-3-6	term (1-3)	RUS: getting LNG technology	5
1-1-4	term (1-1)	RUS: advance Asia Pacific Area	3	1-3-7	term (1-3)	RUS : strengthen gas export for Europe	5
1-1-5	term (1-1)	RUS : privatization domestic oil companies	3				
1-1-6	term (1-1)	RUS : strengthen for gas exporting	3	1-4-1	term (1-4)	RUS : strengthen LNG export	12
				1-4-2	term (1-4)	USA: Shale development	10
1-2-1	term (1-2)	construction Beijing Root pipeline	6	1-4-3	term (1-4)	development in Far East	8
1-2-2	term (1-2)	RUS: conflict for Ukraine	6	1-4-4	term (1-4)	installing LNG technology in Sakhalin 1	7
1-2-3	term (1-2)	cooperation between Gazprom and CNPC	5	1-4-5	term (1-4)	JGC: receive order of construction	6
1-2-4	term (1-2)	RUS: economic dependent for resource	4	1-4-6	term (1-4)	strengthen energy cooperation	6
1-2-5	term (1-2)	RUS: attending for LNG market	4	1-4-7	term (1-4)	RUS: gas export to East Asia	6
1-2-6	term (1-2)	cooperation between NYK and Sovcomflot	3	1-4-8	term (1-4)	cooperation between Marubeni and Rosneft	6
1-2-7	term (1-2)	resource development cooperation	3				
1-2-8	term (1-2)	economic cooperation between Russia and China	3	1-5-1	term (1-5)	development Artic Sea Line	27
1-2-9	term (1-2)	RUS: adjustment gas exporting price	3	1-5-2	term (1-5)	economic cooperation between Japan and Russia	27
				1-5-3	term (1-5)	economic punishment for Russia	22
1-3-1	term (1-3)	development Artic Sea Line	10	1-5-4	term (1-5)	development Artic Sea Area	10
1-3-2	term (1-3)	RUS: development new gas field	10	1-5-5	term (1-5)	8 Point Economic Cooperation	6
1-3-3	term (1-3)	development in Yamal	8	1-5-6	term (1-5)	decrease oil price	6

Table.2 Top Related Factors of Cognitive Structure Map "Yamal LNG Project"

3 QUANTITATIVE ANALYSIS: TEXT ANALYSIS

3.1 Methodology

Quantitative analysis was performed using the functions "extraction word: co-occurrence network" and "coding: cross tabulation" of KH Coder's function.

The function "extracted word: co-occurrence network" is similar to "extracted word: hierarchical cluster analysis", and automatically draws a diagram that connects highly co-occurring words and phrases based on the sentences of the information source. This co-occurrence refers to the closeness of the appearance pattern of a word, and a diagram showing this relationship is called a co-occurrence network diagram. In this process, the list of related factors created in the process as used as the information source for creating the network diagram. A group of words connected by people with high co-occurrence is called a related factor. In addition, it is possible to create a diagram based on another parameter as

a function unique to this function. In this study, the parameter is the 5 periods, and the characteristics of each period are identified.

3.2 Result (Sakhalin-2 LNG Project)

Fig.3 Co-occurrence network diagram "Sakhalin 2 Project"

related factors	contents	related factors	contents
nuclear power	nuclear & generation	finance of state government	finance & state government
US demand	US & demand & natural gas	countermeasure for oil spill accident	countermeasure & oil & spill
Indonesia demand	Indonesia & demand & natural gas	increase oil price	oil & increase & price
interest adjustment by Shell	Shell & interest & Gazprom	conflict between Europe and Russia	Europe & Russia & conflict
attending negotiation by Gazprom	Gazprom & attending & negotiation	conflict between EU and Russia	Europe & Russia & conflict
induction foreign capitalization	foreign capitalization & induction	environmental assessment	environment & assessment
interruption supply for Ukraine	Ukraine & interruption	interruption construction	interruption & construction
construction pipeline	Sakhalin2 & pipeline	department of resource supervision	resource & supervision
lack of technology	technology & ability & lack	PS construction	PS
financing by JBIC	JBIC & financing	finishing construction	construction & finish
financing by EBRD	EBRD & financing	expanding gas demand	natural gas & demand & expand
diversify resource root	diversify & resource root	insurance benefit	benefit & insurance
economic cooperation	economy & cooperation	summit conference	summit & conference
northern territory issue	northern territory & issue	changing the market	change & market
legislation	law & improvement	increase stock prices	stock prices & increase
construction infrastructure	construction & infrastructure	decrease stock prices	stock prices & decrease

Table.3 Coding file "Sakhalin 2 Project"

Summarizing these results, the construction of basic facilities such as the LNG plant of Sakhalin 2 project will be completed at the beginning of the period (2-5) as the project period, and there will be no significant change in the trends. If the construction of facilities in development projects are completed it is understood that the influence of a third party to LNG trade is unlikely. Next, regarding the temporary freeze of the project by the Russian authorities, which is the biggest turning point of this project, there are many related factors such as environmental assessment, acquisition of LNG technology, expansion of project costs, etc. It is inappropriate to interpret this as pressure for acquiring interests. However, as a result of Gazprom's entry into negotiations and the situation that has led to the securing ownership remains unchanged. On the other hand, not only Russia but Japan, as well as international

organizations, have suggested long-term recommendations for inadequate environmental consideration in the Sakhalin region with regard to environmental considerations that directly caused it. In addition, the balancing between the value of the project itself and the project cost due to the rise in the price of crude oil is also unclear.

Fig.4 Grouping by term "Sakhalin-2 LNG Project"

3.3 Result (Yamal LNG Project)

Fig.5 Co-occurrence network diagram "Yamal LNG Project"

related factor	contents	related factor	contents	related factor	contents
advance for Asia	Asia & advance	Yamal development union of Rosneft EXXON Marubeni	Yamal development of Rosneft EXXON Marubeni cooperation	& Shale development	Shale Shale gas Shale oil
MOL operation	MOL & operation	RUS: induction foreign capitalization	foreign capital attending company	& construction & LNG base	LNG base LNG base & construction
summit conference	summit & conference	economic punishment	economy punishment	& Artic Line	northern territory issue
increase gas price	gas & price & increase	economic cooperation	Japan & Russia & cooperation	& energy area	Artic Sea & Sea Line & development
decrease gas price	gas & price & decrease	ice breaker	ice & breaker	& earning technology	energy & area
increase oil price	oil & price & increase	JBIC financing	JBIC financing	& strengthen LNG export	earning & technology
decrease oil price	oil & price & decrease	earning capital	earning & capital	& expand demand	LNG & Russia
global warming	global & warming	Ukraine & crisis	construction coherence	& decrease demand Europe	expand gas demand
Ukraine Crisis	Ukraine & crisis	JGC receives construction order	construction coherence	& US	gas & demand & expand
getting worse on environment	Ukraine & conflict	Bashkortostan government	construction coherence	& China	Euro & demand & decrease
		China Pipeline	pipeline construction China		US USA
					China

Table.4 Coding file "Yamal LNG Project"

The trend of Russia, which switched its center of gravity from Europe to Asia due to various domestic and foreign reasons, overlapped with Japan's direction of benefiting from the fact that LNG was stably secured. To summarize the whole period in three aspects of politics, economy, and technology. The major turning points were the shale revolution and the Ukrainian crisis in the last twenty years. The Shale Revolution resulted in the sharp increase in fossil fuel supply which greatly reduced the dependence of Russia, which has been ongoing since the collapse of the Soviet Union. This made Russia turn resource trade targets into the Asian region. Also, the Ukrainian crisis has triggered a large-scale expansion of China's capital against Russia. On the other hand, the financial and technical aspects were not affected largely, and stable actions such as the construction of the LNG base, indirect financing, and non-dollar financing continued despite the change of the business location.

Fig.6 Grouping by term "Yamal LNG Project"

4 DISCUSSIONS

4.1 Common points and differences between the two case study results

It is difficult to make a general comparison for these two projects due to the different starting time of the projects and commercialization. But there are still some common and uncommon points.

The common points in these two cases are the first Putin administration's resource nationalism policy, Russia's acquisition of LNG technology, and the worsening of relations with Europe which strengthen its expansion into the Asia-Pacific region. On the other hand, the difference between these two cases is China's entry into business and trends in international oil capital. China has not been encouraged to enter the Sakhalin 2 Project and the Sakhalin 1 Project. Russia was also very cautious about pipeline exports. On the other hand, for the Yamal LNG project, while calling for entry to Japanese general trading companies, etc., it will give Petro China 20% of total interest and add an additional 10% to the Chinese Silk Road Foundation.

4.2 Comparison with past studies

Motomura (2009) stated that the cause of the Sakhalin 2 problem was mainly the expansion of project costs and environmental problems. This analysis also shows that Gazprom's acquisition of interest itself has been fixed since before the business freeze. However, after the entry of the Gazprom appearance of environmental issue articles are decreased. But it is difficult to say the entry of Gazprom is the main cause. On the other hand, it can be said that the LNG technology acquired by Sakhalin 2 is the main cause.

5 SUMMARY

In this study, we analyzed two LNG projects from the perspective of energy security, economy, technology, and politics. The method of we had developed is combining "cognitive map" and "text analysis" to quantify the qualitative data collected from four major Japanese newspapers during the period of 1991-2017.

Even though, Russian natural gas export strategy shifted from Europe to Asia because of many turning points; Shale revolution, Ukrainian Crisis, and so on. Japans entry into a large-scale business as a stakeholder has high risk. It is desirable to enter in the field such as equipment construction like the Yamal LNG project.

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