

Behavior Patterns of Three Archetypal Arms Suppliers Based on Empirical Media Analysis of the First Korean Fighter Jet Program¹

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ABSTRACT

Understanding the arms suppliers' strategic intent will contribute to the recipient's agenda-setting efforts. Previous studies address the three types of patterns in their arms export policymaking regarding suppliers' policy objectives: hegemonic, industrial, and restrictive. Despite an intuitive understanding of taxonomy, empirical studies of their behavioral patterns have been uncommon. This is mainly due to the confidentiality of data. This study is to understand the different features of the archetypal suppliers empirically. Open-sourced media data is used to observe how the three supplier types reacted to the arms deal. News articles published in the United States, France, and Russia related to the First Korean Fighter Jet Program are analyzed using topic models. The results indicate how the respective nature of the three archetypal suppliers can be better understood. Understanding their intent is expected to contribute to future agenda-setting efforts.

JEL Classifications: G28

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I. INTRODUCTION

Understanding a seller's strategic intent in a sale or transaction ("deal") will contribute significantly to the buyer's negotiation process. A buyer will predict what actions and reactions will occur in the next round if a seller with clear intentions can be identified. In particular, arms sellers are known to have specific policy goals, and they impact export policymaking (Jan, 2005). Their policy goals transform according to political, economic, and military circumstances, and it takes years for the seller's policy goals to match those of the buyer. For example, it is worth noting that the diesel submarine contract worth 34 billion euros over 25 years between Australia and France in 2016 was canceled unilaterally by Canberra in 2021 (Fathi 2021). The AUKUS pact, a trilateral security pact between Australia, the United Kingdom, and the United States, announced on 15 September 2021, collapsed Paris's aim to develop a partnership. A newly emerging competitor, the US, has a policy goal to augment nuclear-powered submarines in the Indo-Pacific region. Thanks to that, Australia will become the second country to receive nuclear submarine technology from the United States after the U.K. did in 1958. A buyer can acquire operational capabilities and technologies through overseas procurement (Lu et al. 2020), and a seller can project their economic and security orders driven by the supplier-recipient alliance (Vucetic and Tago 2015). The objective of this study is, therefore, to understand the strategic intent of sellers so that buyers can prepare for better deal planning. Accordingly, the target audience for this research is arms buyers, i.e., those who want to understand the seller.

The Stockholm International Peace Research Institute (1979) identified patterns of various arms exporters based on their key policy objectives (SIPRI, 1971). They argued three patterns in suppliers' export policymaking: hegemonic, industrial, and restrictive. Subsequently, Brzoska and Pearson (1994) identified three types of weapons export systems: power-oriented, commercialized, and restrictive (Brzoska and Pearson, 1994). These taxonomies are not very distinct from each other. Literally, "hegemonic or power-oriented" means their policies are established because of political hegemony. Their top policy priority is to maintain international order through military dominance. The second "industrial or commercialized" taxonomy implies that policy is based on industrial and commercial aspirations. This supplier is particularly interested in creating and extending its market share through arms sales. Those who belong to the last "restrictive" taxonomy construct export policies under selective conditions, especially for an exclusive purpose. What they consider most is maintaining regional stability by military means, i.e., not extending market share through collaborative measures or acquiring political hegemony toward a recipient society.

Despite an intuitive understanding of these archetypal arms suppliers and abundant qualitative statements regarding the taxonomy, empirical evidence concerning the three types of arms suppliers (hegemonic, industrial, and restrictive) has been rare. Approximately three decades ago, even before the official collapse of the Soviet Union, Sanjian (1991) released a paper discussing a technique for modeling the three type-specific arms suppliers' decision-making procedures (Sanjian, 1991). He attempted to empirically clarify the features of archetypal suppliers by evaluating the open expressions and statements of public officials using linguistic evaluation methods by assuming that the United States, France, and West Germany were hegemonic, industrial, and restrictive, respectively. Unfortunately, there has been a substantial gap between the typologies of

these political theories and the empirical evidence to explain them for decades.

The reasons behind the scarcity of empirical research include limited access and the confidentiality of data. The lack of empirical data makes it challenging to demonstrate supplier's type-specific behavioral patterns in practice. In this field of research, it is not easy to deduce hypotheses from measurable observations. Accordingly, the objective of this study was to understand the different features of archetypal suppliers. We attempted to analyze their corresponding media agendas in specific contexts. Their behavioral patterns in a historical arms deal were analyzed. Open-sourced media data were used to observe how such archetypal sellers responded to the arms deal. Understanding their peculiar behaviors, which primarily depend on their strategic intent, is expected to help establish better arms deal discussion agendas for recipients (Kim and Sheikh, 2018).

II. METHODS OF STUDY

A. Background and Selection of the Case

Most arms recipients have a powerful ally backed by a traditional tie, and their military and political influence impact their import policymaking. Recipients, however, also generally want to encourage trade and collaboration with a non-traditional ally for more competition in the deal. A case study of South Korea may better elucidate this position.

South Korea is heavily dependent on the U.S. for its arms imports. The U.S. has an enormous military complex that is incomparable to others. The various intangible knowledge and expertise generated from this military complex offer the strength to sustain their domestic industrial backbone. The complex acts as a competitive edge in military capabilities and puts latecomers in a position where they must constantly catch up with it. In recognition of these strengths, Washington DC develop an arms export policy. They assess Seoul's situation. To South Korea, the US is a hegemonic supplier. They may want to project their political hegemony by transferring their weapons. They provide military assistance to allies through arms transfers, gain access to overseas bases, and discourage the recipient from alliances with others.

Seoul also imports significant weapons from other nations based on technological and economic understandings (Bitzinger, 1995). For example, the Republic of Korea (ROK) forces invested in a technology collaboration program with France's Thomson-CSF (now Thales) in the 1990s to create low-altitude radar and related navigation and tracking systems for anti-aircraft missile systems. More recently, in the 2010s, ROK purchased the Falcon-2000EX reconnaissance aircraft from Dassault, France, and is considering further introduction (Kim, 2019). In particular, among many other nations, France has established an export policy based on industrial objectives (Sanjian, 1991). In their export policymaking, a greater emphasis is placed on commercial aspirations. Different cooperative techno-industrial measures and investment vehicles are designed, but their top priority is usually to gain access to a new market for more significant or additional business opportunities.

In the past, Korea has actively introduced Russian-made arms as one of the ways to resolve the debt issue between the two countries (Ahn, 2009). Driven by the Brown Bear program to repay Moscow's debt, Seoul has introduced the T-80U tank, BMP-3 armored vehicle, Metis-M anti-tank missile launcher, KA-32A helicopter, and Murena-class hovercraft from Moscow since the 1990s. Interestingly, these suppliers have

developed an arms export strategy for limited and specific purposes under particular circumstances. They differ from industrial suppliers because they do not pursue commercial ends by actively selling arms to the area linked to the superpower, e.g., the U.S. Instead, they try to balance the stability of the specific import region, i.e., the Korean peninsula. If their arms sales contribute to suppressing the expansion of the superpower's influence, they evaluate that the best policy goal has been achieved.

As discussed, Korea has depended primarily on arms imports from the U.S. but sometimes imports arms from other nations for different purposes. Among the many arms import programs, the US, France, and Russia, which most evidently reflect the nature of the taxonomy as mentioned earlier, competed in the early 2000s to win a fighter jet deal code-named the first fighter jet eXperimental (1st F-X) program. There were three F-X programs in South Korea. However, the focus of this research is on the period between 1996 and 2002. It was the first and last significant time when the three competitors competed fiercely. We can understand the 2nd F-X program between 2008 and 2012 as an extension of the 1st F-X considering additional orders for the same platform that was decided in the 1st program, with some engines or mission equipment replacements. Finally, the 3rd F-X program between 2011 and 2014 was limited to competition between two American companies, Boeing and Lockheed Martin. To this day, no arms deal has been as salient and competitive as the 1st F-X program. Due to the issue's high salience, information on the changing situation was well-publicized through the media. The three archetypal suppliers had distinct understandings, and no one wanted to serve the winner, i.e., they wanted to demonstrate that their warplane was superior to their rivals. To leverage the deal, suppliers suggested benefits such as improving regional stability, initiating bilateral ties, transferring technology, ensuring financial feasibility, supporting subsequent logistics, and engaging in joint research and development programs.

B. Data Gathering and Preprocessing

South Korea's F-X program was conceived in 1993, and the match started earnestly in 1996. The initial program called for 120 fighter jets, but Seoul decided to purchase 40 warplanes at \$3.1 billion, owing to the Asian financial crisis and the International Monetary Fund bailout. At first, Boeing F-15 from the United States, Dassault Rafale from France, Sukhoi from Russia, and EADS (the Eurofighter consortium of the United Kingdom, Germany, Italy, and Spain) competed to win the deal. Boeing was about to stop their military production line if there was no additional order from foreign buyers, owing to their defeat in the Joint Strike Fighter program in competition with Lockheed Martin. France also desperately needed Rafale's first foreign sales record to promote themselves in the Asian market, such as Singapore, Egypt, and India. Russia had tremendous Soviet debt and was desperate for arms sales in the post-Cold War period under changing political dynamics. By establishing diplomatic ties with neighboring countries that had previously been unfriendly, they sought to check the region's balance as it tilted toward the United States. For the newly launched country under the name of Russia, the arms trade with a new partner is an excellent opportunity to curb U.S. influence. By 2002, the competition was full-blown, and ultimately, Boeing won the contract. For this case, the newspaper article data were collected from the English news media from the relevant countries from 1996 to 2002. The availability of data primarily depended on the issue salience. The strength of news media interest was reflected in the observation frequency, as it differed

from country to country by period, as shown in Table 1.

Table 1
Number of articles for analysis

Year	Republic of Korea	USA	France	Russia	UK
1996	9	7	6	3	3
1997	2	1	2	3	1
1998	18	7	2	4	
1999	22	3	2	1	1
2000	5	8	2	7	2
2001	61	19	21	47	5
2002	94	57	86	7	11
Total	211	102	121	72	23

For preprocessing, the following work was performed on the original data. The aim was to address the problem of dimensionality in the matrix. We wanted to reduce the number of words in the columns. Lowercasing, punctuation removal, stop word elimination, and word stemming were performed. Numbers were deleted. We then performed n-gram preprocessing to organize repeated combinations of words into a single word (called uni-gramizing). Finally, the words that continued to appear in every document without substantial meaning were addressed. For example, the word 'Korea' continued to appear in every document. However, it did not contribute to topic detection. We, therefore, needed to filter it out using the term frequency-inverse document frequency (TF-IDF).

Capturing a high-value topic in content analysis comprises finding a higher product of the T.F. and IDF. Mathematically, the TF-IDF is defined as the term frequency multiplied by the inverse document frequency. If a term has a considerable TF-IDF value, attention is required. On the other hand, if a term has a small TF-IDF value, it may not have substantial meaning. From the T.F. function (Table 2), T.F. (t, d) is the proportion of the count of term t in document d, where n is the number of distinct terms in document d. N is the number of documents in the corpus in the IDF equation. Therefore, it is constant in the same corpus. In the meantime, count(t) is the number of documents in the corpus where the term t appears.

Table 2

Term Frequency-Inverse Document Frequency(TF-IDF) equation	
Total Frequency	Inverse Document Frequency
$TF(t, d) = \frac{freq(t, d)}{\sum_i^n freq(t_i, d)}$	$\log\left(\frac{N}{count(t)}\right)$
$\therefore TF-IDF(t, d) = \frac{freq(t, d)}{\sum_i^n freq(t_i, d)} * \log\left(\frac{N}{count(t)}\right)$	

The only way we obtain a more considerable TF-IDF value is to get a smaller count(t). The count(t) value is smaller when a particular word is concentrated uniquely for a specific document. In this case, we could inversely use this TF-IDF equation to find the words that need to be deleted. That is, we eliminate terms with low TF-IDF values. For example, articles and pronouns usually have very low TF-IDF values. The low TF-IDF-valued words included Korea, fighter, and south in this research.

We built the final dataset according to these preprocessing procedures. We then

used the document term matrix (DTM) function in R for each corpus to construct a matrix consisting of documents and words. Eventually, we visualized the distribution of latent topics assigned to documents to see how topics transformed over time using topic models. We also captured the topic landscape by viewing the topic correlation map. The following section discusses the topic models in the media agenda analysis.

C. Topic Model Methods for Media Agenda Research

Topic models have drawn the attention of researchers in various fields, based on "the growing interest in automated content analysis for agenda-setting studies" (Korenčič, Grbeša-Zenzerovi, and Šnajder 2016). Scholars in computer science and political science have demonstrated the utility of conducting agenda analyses by employing topic models (Quinn et al., 2010; Kim et al., 2014). Many scholars have used topic models to analyze news media agendas. The analysis of newspaper coverage has been considered to provide insights into what the current elite was thinking and doing. Because of that, newspapers have been regarded as instruments for communicating public policy. Scholars have noted that Congress's press releases can be transmitted directly to the electorate and are sometimes handed over to the public as an "expressed agenda of the government" (McCombs and Shaw, 1972). Therefore, a media content analysis of the newspapers published for one recipient *and* three suppliers could help us identify what expressed agendas existed between the participant governments and how such actors developed them over time.

Topic models are statistical text mining techniques for estimating the likelihood of the appearance of a topic that is latent in a document, based on a matrix of documents and words (Blei and Lafferty, 2009). They are favored because they allow us to discover patterns that cannot be found via hand-coding. When detecting latent topics, we rely on a document term matrix (DTM), a matrix consisting of M documents (d_m) and N words (w_n), with the documents arranged in rows and the words in columns (Blei, Ng, and Edu, 2003). Our unit of analysis is the collection of all of the documents, a.k.a. the corpus, denoted as the set of documents, $D = \{d_1, d_2, d_3, \dots, d_m\}$ and a document comprising a set of words, i.e., $d_n = \{w_1, w_2, w_3, \dots, w_n\}$, where no occurrence is equal to zero (Baek, 2017). We assume that the probability of a topic can be inferred from the observed words. The observed words are presumed to depict the hidden structure of a latent topic, i.e., the topics themselves and how much the documents demonstrate them.

The feature of the topic model is that we use posterior inferences to infer the hidden structure of topics. It implies that the posterior value k_t , i.e., the number of topics, will change the classification level of the topics seated in the corpus and influence the likelihood that the observed word will generate the corresponding topic. Because of this, the topic model is also called a generative probabilistic model (Zhao et al. 2011). We should be able to appropriately infer the unknown posterior value from the collection of documents. In assuming the range of the unknown values, we can refer to the proposed parameters using a series of cross-validation tools (Taddy, 2012). These tools include hierarchical clustering analysis, k-means analysis, and facts comparisons. The assumption is that a collection of topics is incorporated into a higher agenda level. A topic itself can refer to an event and a social problem with different scales *and* interdependencies in the corpus. In that sense, an agenda can be regarded as a collection of relevant topics occurring in a context (Koltsova and Koltcov, 2013). A series of cross-

validation methods can help us infer an appropriate classification level of the posterior value k_t , the number of topics, indicating each media agenda.

In particular, estimating each posterior value of a country when the number of articles collected by the country is different is closer to art than science. We assume that the number of topics will be proportional to the number of publications in each country and the coverage period. It is hard to believe that the same information will be published at different times with no events. As the number of news articles increases, the number of topics (k_t) increases. Another assumption is the applicability of cross-validation. In that sense, hierarchical clustering analysis and kmeans, which are helpful for fact comparison of agenda-level topic clusters, were used. In the case of hierarchical clustering analysis, collections of articles were visually displayed through dendrograms, which facilitated fact-comparison between different classifications. Kmeans analysis was helpful because we could check the saturation point of the value of the within-cluster sum of squares (Between Sum of Squared/Total Sum of Square = BSS/TSS ratio) after relevant sets of articles were sufficiently classified. The marginal increase of BSS/TSS becomes minute after a certain point of grouping k . The values of k_t obtained from these two methods were compared with historical facts and, finally, the number of k_t per country was estimated.

Latent Dirichlet allocation (LDA) and correlated topic models (CTMs) were used in terms of topic models. LDA was the first topic model and is the most intuitive to understand, as the data components are assumed to be independent of each other. A Dirichlet distribution is used to generate the probability. The CTM is similar to the LDA as it is a generative probability model, but it differs because it assumes a logistical normal distribution when estimating a topic probability. Certain events may occur in conjunction with past events, and a topic may have been generated in association with a particular category of documents. We use the logistic normal distribution to reflect this, which allows for determining topic occurrences with correlations. We attempt to demonstrate a complete map of topics using the CTM and consider how they relate to each other as a meta-analysis of the topics. Complemented by computational methods, we can observe the types of topics surrounding the arms deal. Space-wise, the topic model enables us to determine potential intergovernmental policy agendas drawn from media sources, and timewise, it allows us to capture the evolving aspects of agendas according to the stages of the deal.

III. RESULTS

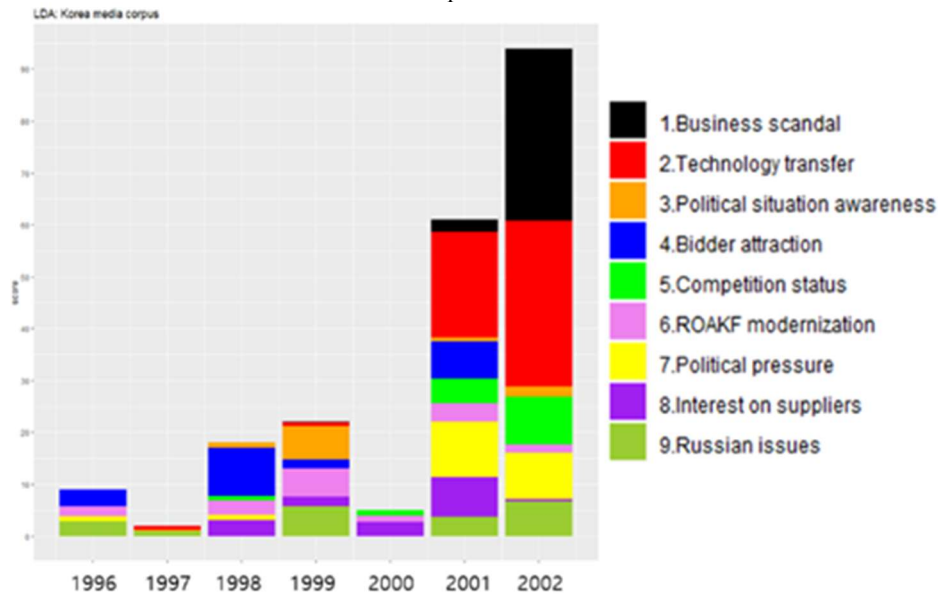
A. South Korea

Before investigating the media agendas of the three archetypal suppliers, we first analyzed a recipient's media agenda, i.e., South Korea. It allowed us to comprehend the dynamics of the dyadic interactions with bidders during the development of the deal. The library *topicmodels* were used to run the LDA, and the titles of each topic were assigned. The findings are summarized as follows.

Nine topics were identified, and the name of each topic was given based on the assigned 40 keywords. One interesting point is the emergence of "Russian issues" (Topic 9) in an earlier phase, i.e., in 1996. The proportion of Russian issues was noteworthy in 1996, 1997, and 1999, and the salience remained until 2002, whereas the relative

importance weakened over time. We can also see the constant topic leading to "Bidder attraction" (Topic 4). This topic arose from the first Seoul International Air Show in 1996. The news media depicted the intense interest of Russian and French aerospace officials. This interest continued for 1998, 1999, and 2001 air shows and is related to Seoul's initiatives to attract prospective bidders from overseas. "Russian issues" (Topic 9) and "Bidder attraction" (Topic 4) show the Korean government's efforts to attract non-US participants, particularly Russian fighter jets, to air shows. A very detailed description of Sukhoi's combat capabilities and performance, including specifications, is unprecedented in previous media.

Figure 1
Korea's Media Latent Topic Transformation Over Time

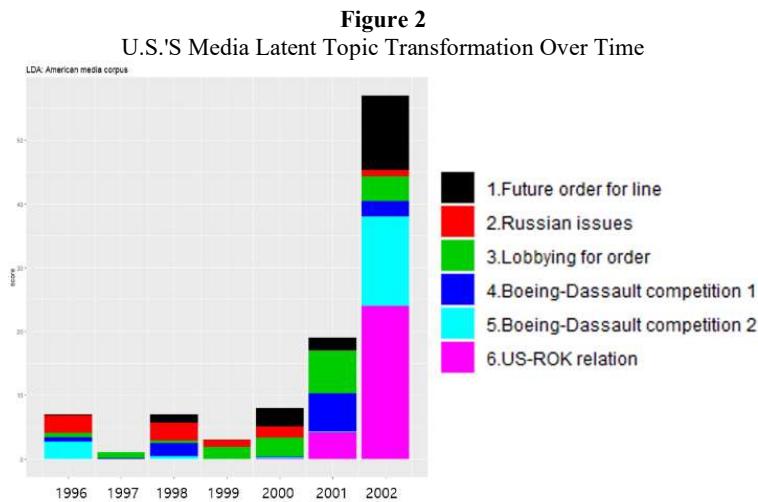


Another notable point is the emergence of new topics, e.g., "Modernization of the ROK Air Force" (Topic 6) and "Technology transfer" (Topic 2). Seoul started to emphasize the significance of acquiring aerospace technology, aiming to create an indigenous industrial base for aircraft manufacturing. Then-president Kim Dae-Jung proclaimed his vision for constructing military aerospace power in the 21st century. He stressed that the Air Force is the sum of a country's national science, technology, and economic strength. Consequently, the "technology transfer" topic formed a media agenda in 2001. To this end, France's Dassault and EADS promised to transfer technology to Seoul. Shortly after that, the press announced the large-scale offset plans of Boeing, including collaboration with the Korean government in the aviation sector and related technology transfers. It is also remarkable that since 2001, "political pressure" (Topic 7) has been one of the main topics. The US-ROK relations and interoperability issues were broadly discussed with various political figure-related events in 2001 and 2002. As Boeing agreed to transfer technology to some extent, the topic of "technology transfer" developed into a form not just for France; during this period, the French competition

faced the topic of "Business scandal"² (Topic 1).

B. The United States

Six topics were identified using the same methodology as in Korea, based on the 40 words assigned to each topic (see Fig. 2). The first notable point concerns the changing aspects of political issues. For example, the "US-ROK relation" (Topic 6) is absent or insignificant initially but has gained momentum over time. It emerged in 2001 and showed significant expansion in 2002, which is very analogous to the U.S.'s growing "Political pressure" (Topic 7) in Korea's media in the same time frame. The following context helps us understand the topic of "US-ROK relations" (Topic 6) in the United States.



We should first note the following two topics, i.e., "Lobby" (Topic 3) and "Future order for lines" (Topic 1). They appeared in 1998 and seemed to reflect the U.S. situation at that time. In 1993, the U.S.-initiated Joint Strike Fighter (JSF) program was essential to the survival of defense contractors. The competition was joined by McDonnell Douglas, Northrop Grumman, Lockheed Martin, and Boeing. At first, Lockheed Martin and Boeing were awarded agreements to produce prototypes in November 1996. In December of the same year, Boeing purchased McDonnell Douglas. After years of

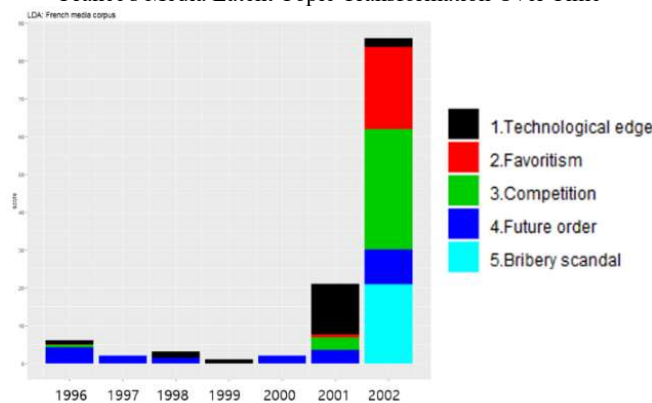
² The scandal is as follows: On 9 March, 2002, Colonel Cho, an officer of the Korean Air Force and leader of the F-X test evaluation team, was arrested. The allegation was a military secret leak. Then, during the investigation, it was revealed that he received a total of 11 million won (10,000 USD) six times over two years from the allegedly known business partner of Dassault, Mr. Lee. Mr. Lee was known to be the brother of Colonel Cho's Military Academy alumni, whom he had known since 1975. Another problem was that this incident happened right after Colonel Cho publicly announced that he had been under pressure to select the F-15K as a next-generation fighter through Korea's major TV broadcast media MBC on 3 March, 2002. While this became a hot issue in Korea, a Dassault spokesman said in an interview with the Financial Times that Dassault was nothing to do with Colonel Cho. He claimed the case was suspected of being manipulated by someone who was envious of Rafale's superiority, becoming the top model over Boeing's F15K.

competition, Boeing did not win the contract for system development for the JSF, whereas Lockheed Martin secured decades of work. As St. Louis was the home of the former McDonnell Douglas' F-15 platform, they had to struggle for their survival. Without foreign contracts, St. Louis's production line was discontinued. As a result, Missouri's political giants began lobbying for voters. This "Lobbying for order" topic was reaffirmed in the Korean media's topic "Political pressure," which included words/phrases such as USFK commander, state governor, U.S. Representative, and U.S. Senator. Such pressure was well-represented by the U.S. media descriptions favoring Boeing's F-15.

C. France

Five topics were recognized, and the names were assigned based on the 40 corresponding words. The results are summarized as follows. Notably, since 1996, the topic of "Technological edge" (Topic 1) has been ongoing in French media. To expand the Asian market for future overseas orders, France seems to have been actively engaged in the air shows. Furthermore, they have emphasized the options of creating a joint venture to offer unlimited technology transfers and partnering in developing the Korean aerospace industry.

Figure 3
France's Media Latent Topic Transformation Over Time



However, since 2001, different types of topics have appeared. For example, "Competition" (Topic 3) appears, followed by "Bribery scandal" (Topic 5). When the competition heated up, a Korean Air Force officer who is the leader of the F-X test team was arrested on charges of leaking a military secret in exchange for bribes. Another issue was that this incident occurred immediately after the suspect officially announced that he was under pressure to pick the F-15K as the next-generation fighter through Korea's main T.V. broadcast media MBC. While this became a popular topic in Korea, a Dassault spokesman said in an interview with the Financial Times that they had nothing to do with the suspect. Instead, according to the spokesman, the case was suspected of being manipulated by someone who envied Rafale's superiority over Boeing's F-15K during its initial testing phase.

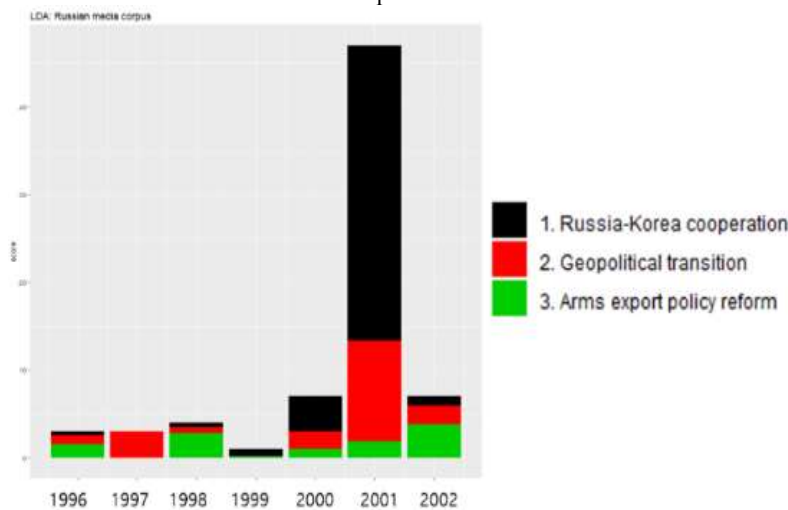
The series of events helped weaken the comparative strength of the topics "Technological edge" (Topic 1) and "Future order" (Topic 4). Fascinating is that France's bragging about "Technological Edge" (Topic 1) increased steadily by 2001 but decreased significantly in 2002. It was when something other than technology started being represented in the media. The long-held favor of Seoul on American weapons and its competitive status with the US F-15K (Topic 3) emerges. Since then, "Favoritism" (Topic 2) has formed France's mainstream media agenda, with information on competitions between bidders.

D. Russia

Three topics were recognized, and the corresponding 40 words were assigned to each topic. The findings are summarized as follows. First, in 2001, there were many news articles regarding collaborative ambiance between the two, i.e., "Russia-Korea cooperation" (Topic 1). Various bilateral cooperation agendas emerged, including debt discussions, joint trans-Siberian rail projects, and economic cooperation projects linked to President Putin's visit to Korea. These topics began to expand in 2000 and exploded in 2001 but did not retain their strength through 2002.

Russia's media agenda shows its full awareness of "Geopolitical transition" (Topic 2). Except in 1999, it was persistent and extended most when a summit was held between Moscow and Seoul. The topic's keywords appear to be discussing possibilities for global market sales, given their evolving geopolitics. Seoul is one of them. We can visually verify that Russia is constantly conscious of who might be interested in their arms while recognizing the potential buyer's approach to Russian arms. In addition to their awareness, they show a steady topic of the "Arms export policy reform" (Topic 3) for more sales. However, it is not evident what the media agenda has generated. We cannot confirm what sort of discussion agendas these efforts have yielded in arms deals with Seoul.

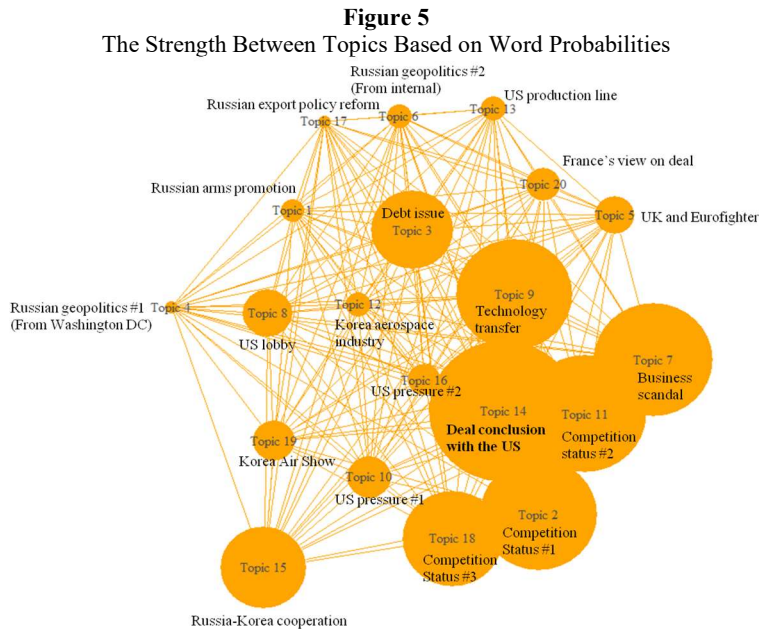
Figure 4
Russia's Media Latent Topic Transformation Over Time



E. Total Media Agenda Analysis Using Correlated Topic Model (CTM)

In text-mining, the construction of linkage between keywords to illuminate the interrelationship has been used for various purposes (Gerdri and Kongthon 2018). In this research, the Correlated Topics Model (CTM) was employed to check the correlations between topics inferred from relevant terms found in all countries. The CTM extends the LDA model by which correlations between topics are allowed. The CTM revises the baseline model of LDA by assuming the logistic normal distribution instead of the Dirichlet distribution to calculate the topic proportions exhibiting correlation (D. M. Blei and Lafferty 2007).

The dataset we apply the CTM is 529 news articles; a 239,518-word count was analyzed, including the U.K. media. As there was one article per year (1997, 1999) or no data at all (1998) in the U.K. media (see Table 1), it was excluded from the individual analysis. A fundamental reason for the lack of data seems to stem from the feature of the multinational entity, e.g., the EADS consortium. After the preprocessing procedure, the document term matrix constructed 530 rows of documents and 7,124 columns of terms. The R's library, FindTopicsNumber, produced 20 topics from the dataset. Each topic is named, referring to assigned terms. A critical step is to calculate the probability score matrix of 20 topics that shows correlations among them. We can now visualize the resultant correlation matrix using a network map representing the topics' relationships. It shows the strength of the correlation between topics as the distance (using links) between nodes. The closer the nodes, the more correlated they become. The node itself represents the topic with its size, i.e., the larger the size, the more intense the topic becomes. The procedure is similar to a meta-analysis that investigates the interrelationships between all media topics (see Fig. 5).



The giant bubble is "Deal conclusion with the U.S." (Topic 14). It implies that many articles describe the final decision of the Korean government to purchase U.S. aircraft. The nodes that are very close to topic 14 are remarkable, including "Technology transfer" (Topic 9), "Competition status" (Topic 2, 11, & 18), "U.S. pressure" (Topic 16), and "Business scandal" (Topic 7). These bubbles were considered important topics for each participant during the same time frame and had high issue salience.

Another interesting point concerns the "U.K. and Eurofighter" node (Topic 5). It was not included in the individual analysis, owing to a lack of data. However, the node is very close to "France's view on the deal" (Topic 20). The French's winning this contract, and thereby damaging the credibility of the EADS Eurofighter, was the greatest disaster for the EADS consortium. It led the U.K. media to cover France's business scandals in detail. The best-case scenario for the EADS was the postponement of the deal. Once delayed, they calculated that Boeing's old F-15 production line would finally stop, owing to no orders. Then, the Eurofighter could become a more serious competitor and eventually beat its French counterpart.

The Russian issues are minor in intensity but very multifaceted. It creates a unique peripheral pattern. For example, "Russian arms promotion" (Topic 1), "Russian export policy reform" (Topic 17), and "Russian geopolitics #2" (Topic 6) were produced by Russia's media. Discussions on reforms of multiple Russian defense-industry entities, including state-owned arms exporters, are being conducted to promote arms sales. It includes marketing measures for displaying and advertising Russian weapons at trade fairs to participate in potential arms deals worldwide and adapting to a new order through relations with non-traditional allies such as South Korea. A bigger node connects these peripheral nodes, "Debt issues" (Topic 3) inherited from the Soviet Union. Another Russian-related topic, "Russia-Korea cooperation" (Topic 15), is also located on the network's periphery, despite its size. It is far from "Deal conclusion with the U.S." (Topic 14). However, it was influential in formulating a new game topography, such as "Korea Air Show" (Topic 19), "U.S. Pressure" (Topic 10), and "Competition status #3" (Topic 18). These dynamic patterns in the network's periphery appear to have affected the future development of the arms deal.

We could also highlight some of the topics that Seoul intentionally pursued. These include "Korea Air Show" (Topic 19), "Korea aerospace industry modernization" (Topic 12), and "Technology transfer" (Topic 9). Among them, "Korea's agenda for modernizing the aviation sector" (Topic 12) is at the core of the network. Moreover, this particular node is very close to other crucial media agendas, e.g., "Korea Air Show" (Topic 19), "U.S. lobby" (Topic 8), "Debt issue" (Topic 3), "U.S. pressure #1" (Topic 10), and "U.S. pressure #2" (Topic 16). The fact that "Korea's agenda for modernizing the aviation sector" (Topic 12) is at the center of many agendas already being seriously discussed in other countries implies different efforts made by the Korean government to increase benefits from the deal.

IV. FINDINGS AND DISCUSSION

In this research, the United States, France, and Russia represent the policymaking practices of hegemonic, industrial, and restrictive suppliers, respectively. First, Korea's media analysis results confirm that they know their counterparts' strategic advantages. For instance, the Seoul media discusses how the U.S. influences the peninsula's political

and military environments. Specifically, if a non-US platform were to be introduced, the problem of interoperability in joint operations with the U.S. would be a concern. For recipients, one of the critical requirements of a foreign arms program is to pursue greater interoperability with the political alliance to enhance combat lethality (Palavenis 2021).

Regarding the French competitor, Seoul's media heavily discusses the techno-industrial ramification of the deal. The media agendas of the ROK Air Force's modernization plan through technology transfer signaled the then-industrial supplier. Technology transfer is also a critical agenda in the arms deal to the extent that another alliance is devised to transfer core technologies. The recent case of AUKUS is considered an exemplar by which a supplier will transfer technologies of building nuclear-powered submarines to a recipient society. (Tadjeh 2021).

Also, Korea's media has experimented with political opportunities with Russia. Moscow was considered helpful in overcoming sole-source dependence. Among many others, the one-most critical moment was the participatory atmosphere of the restrictive supplier. The Korean government has encouraged Russia to be part of the game, instigating industrial suppliers like France to consider this deal more seriously. It suggests that competition is not pre-determined and serves as a driving force for a more contested topography. It had tremendous impacts on the arms-deal landscape.

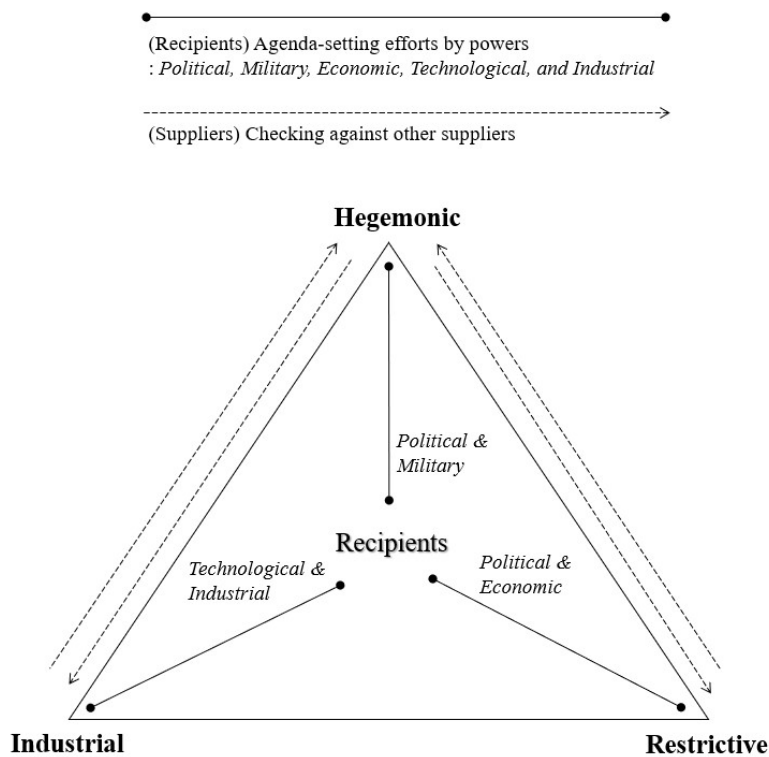
From the supplier's point of view, the U.S. media agenda demonstrates political and military interests that vary significantly from the recipient. Since its emergence in 1998, the media coverage of "Future order for production line" has gradually expanded, along with significant patterns of "Lobbying for order," that is, domestic political pressures are magnifying. These agendas must relate to internal assistance from the U.S. government, for example, a significant level of congressional support and presidential and administrative leadership. It is not a coincidence that President Bush's visit to Seoul was planned right before the deal was concluded, recognizing South Korea's anti-American sentiment (Kim, 2003). As the F-15 program was directly related to the industrial base of St. Louis, they leveraged the hegemonic power in creating their export strategy.

Meanwhile, the fact that Washington DC cautiously observed the growing impact of Moscow on Seoul's policymaking is interesting. While Seoul was watching for increased dependence on American-made weapons, Washington DC was concerned more with Moscow's possible influence in the region. The differing interests between the two have been instrumental in shaking the existing power balance around the deal to a large extent. As shown in Figure 6, a recipient in the middle pursues type-specific agenda-setting efforts in the dynamics of three competitors, e.g., politico-military agendas for a hegemonic supplier, techno-industrial agendas for an industrial supplier, and politico-economic agendas for a restrictive supplier. It worked that way in the case of the 1st F-X program of South Korea.

The recipient shares the same interests with the hegemonic power from a political and military point of view. On the other hand, a recipient who wants to reduce too much dependence on the hegemonic supplier desires another supplier to participate. Then-emerging country Russia understood the changing political environment and Seoul's situation very well. When Russian issues appeared in Seoul's media, Moscow also generated vast media agendas regarding collaboration between Russia and Korea. In particular, efforts to reinforce political and economic cooperation between Seoul and Moscow created various bilateral agenda-setting activities in 2001. It, of course,

provoked two other types of bidders. As shown in Figure 5, the CTM results demonstrate, among other things, that Moscow-related issues are minor in size but very diversified and are directly and indirectly related to U.S. policymaking. It indicates that a restrictive supplier confirms its contrasting position, mainly when checking against the hegemonic supplier. They seek *political* and *economic* cooperation within a limited scope, focusing on strengthening regional influence *and* restricting the expansion of hegemonic power. In this process, the debt issue between the two countries appears to have worked as a plausible negotiating vehicle.

Figure 6
Conceptual Understanding Of The Three Archetypal Suppliers And Their Power Balance



The Industrial supplier, France, was trying to penetrate the Asian market through the technological edge. They intended to expand the global supply chain for future orders while leveraging multiple conduits of technology transfers, e.g., knowledge and hardware transfer, international supply network participation, industrial collaboration package, co-production, and joint venture. At the same time, the French media emphasizes power balance and stability to tackle the vulnerability of the recipient. They recommend the recipient to overcome the U.S. influence. A substantial demand was asked to deviate from the political pressure of the hegemonic supplier while emphasizing fairness and accountability. We can find France's media coverage "Favoritism" for proposing measures to tackle the U.S.'s influence stemming from politico-military ties. As in Figure 6, the recipient discusses the *technological* and *industrial* agenda with the industrial

supplier, which is different from those of the hegemonic supplier. The industrial supplier suggests superior technical performance and cooperation opportunities than the hegemonic suppliers.

The hegemonic supplier may want to review various measures to counter the possible contenders. The first is to neutralize the offer of the industrial supplier. In fact, the U.S. agreed to raise the rate of offset contracts, designed for technology transfers by subcontracting, from 64% to 70% of the total amount in return for purchasing arms (Sung 2002). As a result, domestic companies can manufacture vital technologies for 32 fighters under license (Lee 2002). The KAI, Samsung Techwin, LG Innotek, Hanwha Corporation, Daewoo General Machinery produced main/tail wing, front fuselage, aircraft engine parts, inertial navigation system, jammer, and radar warning receiver. They are now the main contractors of the KF-21, a South Korean indigenous fighter development program. The second is to leverage political power. The Defense Secretary, Donald Rumsfeld, emphasized the importance of interoperability in joint operations at the annual Security Consultative Meeting between the ROK and the U.S. in Washington in November 2001 (Park 2001). In February 2002, President Bush visited, and the fighter jets was one of the main discussion agenda. And the contract was signed in March of the same year. The introduction of US-made weapons at this time is, of course, militarily far-reaching. The influence continued in the subsequent decision-making of the 2nd and 3rd F-X programs.

Suppose recipients' agenda-setting efforts correctly meet the respective powers of different suppliers, which reflect their political, military, technological, industrial, and economic interests. In that case, it may lead to subsequent suppliers' efforts to balance out powers among them. The actions and reactions that follow one after another among the contenders influence the competitive landscape of an arms deal. Finally, the agreement is made if the hegemonic supplier offers conditions that neutralize either the industrial or restrictive supplier. However, it is always a challenging game. Eventually, it is how the deal is decided in a situation that leans towards either supplier.

V. LIMITATION, CONCLUSION, AND FUTURE RESEARCH

This study examined the behavioral pattern and features of hegemonic, industrial, and restrictive suppliers in arms deals through media agenda analysis. However, the media agendas may not be a direct discussion agenda regarding the arms deal. Moreover, the open media may not fully disclose or be identical to the complete aspects of the story (Dalton, Allen Beck, and Koetzle 1998). It is also a pity that we could not use up-to-date data, as large-scale arms sales drawing all three types of contenders rarely happen. A large-scale arms deal is likely to be politically driven, making it difficult for the other two participants to pay attention, and a small-scale arms deal does not receive media attention. Furthermore, this study has a fundamental limitation because we cannot rule out the possibility of backroom decision-making by very few head officials, which is not uncommon in arms agreements. Nevertheless, lack of clarity and uncertainty are also part of the game.

Ultimately, we empirically investigated sellers' typical approaches and buyers' responsive measures through their media texts. This open-sourced data helps us understand how actors behave in a deal. Thus, this study provides arms recipients with better knowledge of creating a competitive landscape and responsive policy measures.

Arms recipients should not stop examining the potential interests of their suppliers and incorporate them into the agendas of their possible deals. Strengthening ties via arms import from the traditional alliance is significant for joint prosperity in the long run. At the same time, however, the search for an appropriate negotiation agenda that non-traditional allies may be interested in at a certain point is a force to broaden the horizons of arms deals. Recipients' efforts to make Figure 6 into a triangular shape are the driver for maximizing their bargaining power. However, a recipient may be bounded in creating agendas because of the type of arms they are interested in and military situations. Then, negotiation with the unilateral counterpart may be inevitable. However, the 1st F-X (and the recent AUKUS) case shows that they can flexibly adapt to amorphous situations *and* maximize politico-military and techno-industrial gains at the same time in collaboration with a traditional ally. As far as an arms deal is concerned, lengthy and discontinuous negotiations should be regarded as a game with many twists and turns before the final contract. In intermittent negotiations, it is more advantageous to have several agenda packages for various plan Bs for the recipients. They can leverage the findings in this study for better positioning. The empirical case study of the 1st F-X gives a concrete example of how it would help in practice.

Future studies will need to examine how this worldview unfolds in other nations. Compared to two decades ago, today's text data are produced on an enormous scale through various sources. It may also affect the arms-deal landscape. Thus, more substantial outcomes are expected in future research. We hope to find a typical policymaking pattern that differs according to the power dynamics of the arms deal.

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