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AN EXAMPLE OF EXPORT CONTROL FOR INTERGOVERNMENTAL DEFENSE R&D COOPERATION: IN CASE OF THE RUSSIAN FEDERATION

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Abstract— The military and technical cooperation (MTC) including technology transfer between the countries is officially carried out in the name of government of the country. That is to say, any defense related cooperation between the countries can be initiated and promoted only under the intergovernmental agreement such as a memorandum of understanding (MoU) and other types of arrangement: one can easily see that such ways are originated from the United Nations' effort for world peace. That is because the exchange of things harmful to world peace and security must be thoroughly controlled at the national level. In such context, the export and import of military goods from western countries to the others are being carried out under the UN regulation based export control system. However, the export control system of the Russian Federation (RF), being one of the most powerful countries in the field of hypersonic and supersonic missiles, nuclear warheads and related cutting-edge materials, is still less known. Hence, this work has investigated the RF's MTC system managing domestic and international collaborations, analyzed it and figured out the governmental structure, approval procedure, and necessary documentation work for export strategy and control. Through this work, it is thought that the people of interest have a good opportunity to improve the common sense on export control by understanding the RF's MTC system itself and comparing it to the ones of other countries in knowledge.

Index Terms— ***Export Control of Military Purpose Product, Legal ground for International Defense Cooperation, Military and Technical Cooperation, Russian export strategy*.**

INTRODUCTION

The Russian Academy of Science, as the research and development (R&D) hub of science and technology in the Russian Federation (the RF), has been developing key technologies that do not exist in the world, and very actively conducting international cooperation with various countries such as China, India, the United States, Ukraine and so on. Also, the Federal Service for Military and Technical Cooperation (FSMTC) is creatively leading the development of cutting-edge military technology through military and technical cooperation (MTC) with several domestic organizations in Russia. In particular, such collaboration looks very impressive and outstanding from the viewpoint of its fructifying in 'Total R&D Cooperation' through 'Spin-on- transfer' from the civilian to the national defense field [1]. For this reason, many countries around the world have been constantly trying to cooperate with the RF in the civilian sector as well as the

defense one [1-5].

Like other advanced countries, the RF as a permanent member of the UN Security Council, has been thoroughly managing the military purpose and dual use products at government level, and controlling their transfer to other countries under the UN regulations. The RF has been leading the R&D for advanced military purpose products (MPPs) and technologies, together with the United States, and it is well known for its superiority and export capability, as a top-class country in various fields [6]. However its MTC institutional structure, export policy, strategy and control of MPPs and technologies, are still less known and unfamiliar with us. Therefore, this work is intended to elucidate a procedure-

based methodology on MTC of the RF by investigating, analyzing, and figuring out the details of MTC on MPPs, dual-use products and relevant technologies. In addition, the prerequisite conditions for MTC with a customer country (hereafter, simply called customer) are also identified and clarified on the basis of the international MTC rule, policy and procedure of the RF.

As a reference, I mention that the results of this work has been obtained by not only referring to open literatures on the RF's MTC system and export, but also directly discussing with Russian experts and listening to their explanations, when visited the three major Russian defense related exhibitions such as the army weapon system-related ARMY Forum (Kubinka; nearby Moscow, held annually), the aerospace weapon system-related MAKS (Zhukovsky; nearby Moscow, held annually) and the maritime weapon system-related IMEC of Russia (Saint-Petersburg; held every other year) [3-5].

Features and Considerations on MTC in the RF

In order to initiate MTC with the RF, one should firstly understand its export control on MPPs and relevant technologies, MTC related governance, strategy and policy above all. From such knowledge perspective, one has to figure out the features of international MTC of the RF and subsequently derive the considerations to be taken into account, which are as follows.

Export control: supervisory authorities

According to the Russian law and Presidential Decree, all the international contracts on MTC are under the jurisdiction of Rosoboronexport (ROE) and subsequently belong to ROE's right, and thus only ROE can negotiate and sign the contract. In the case of exporting all the MPP and dual-use products including relevant technologies, it must be approved by the department for licensing import/export of MPP (DLIEMPP) of FSMTC, the supervisory authority of ROE [7-9].

For the case of technology export, the Federal Service for Technical and Export Control (FSTEC) being the supervisory authority under the Ministry of Defense (MOD), reviews and approves the content of technology, after which the related organization can make a negotiation with a customer and sign the contract. From the past, it's been said that even civilian technologies in the RF apparently belong to the dual-use technologies for military purpose [9-16].

MTC governance structure

Figure 1 shows the RF governmental frame for MTC together with relevant activity flow [7-9]. As an agency subordinated to FSMTC, ROE is authorized to practically fulfill all the activities for domestic and foreign MTC for the RF: for instance, the receipt of MTC proposals, guidance of MTC procedure, briefing for a customer's understanding, cost estimation and price negotiation with a customer, completion of official documents for each step of overall MTC procedure, taking approval from government, signing contract, guide to end user certificate (EUC), oversight and monitoring after delivery, and so on.

In Fig. 1, the MTC affiliated entities are comprised of ROE (role for State intermediary agency), Rostec (role for representative of MTC affiliated entities), and several defense industries (role for R&D and manufacture). ROE is in charge of cooperation channel for export in the name of a state-owned enterprise called Rostec, and leads the R&D for MPPs and relevant technologies by coordinating the Russian defense industries specialized for them. In addition, ROE plays a very important role in MTC with foreign customer by supporting the federal government authorities for MTC policy which is also guided by FSMTC. Therefore, FSMTC led MTC affiliated entities and the federal government authorities for MTC policy are directly involved in the review and approval of domestic and foreign MTC activities, and thus they should be considered for clarifying the detail of each activity in MTC procedure and predicting the period required for the completion of individual activity

MTC Strategy and policy: Laws and regulations

The RF's export strategy (i.e., export itemization) is planned by dividing into several items such as the establishment of Joint Venture with other countries, the joint development of full scale product, the sale of large/small- scale completed product and payload/subsystem with the integration up to system, etc. All of them also include technology transfer (i.e., technical education, permission of intellectual property rights, etc.) [7-9]. Saying the features of customer's import from Russia, the customers with large economy scale (China, India, Brazil, the Middle East countries, the countries that lent economic loans, etc.) import the very advanced, priceless technologies in the field of aerospace, hypersonic, high energy warhead and new emerging material. The customers with small economy scale import the large-/small- sized complete product whereas the customers with world- class technologies (European countries, Fareast Asian countries, etc.) import payloads or subsystems. Also the RF is known to prefer the export worth tens of M$ or more. By the way, one thing important is that all the countries want to construct their own domestic R&D capability and competence for fielding what they want. This is the current trend of worldwide military market.

The RF, as an UN permanent member, has enacted its laws and regulations related to exports to well reflect the UN Charter and spirit [14-16]. From [14] to[16], one can easily see that all the RF's export of MPPs and dual-use purpose products is strictly controlled and managed by FSMTC, and the export of military and dual use technology is also thoroughly done by FSTEC under the export regulations of the UN and the RF. Simply mentioning about the RF control details, the authorization based procedure includes the list of MPPs permitted to be transferred to

foreign customer (by FSMTC), the list of states to which MPPs transfer is authorized (by MOFA), the special procedure for obtaining right to fulfill foreign trade activities regarding MPPs (the Presidential Decree N°1602), the special procedure for deciding on the supply of MPPs to foreign customer(the Presidential Decree N°1602), the special procedure for licensing for MPP import and export (the Presidential Decree N°1602), the special procedure for customs control over the MPPs when moving across the customers border (the Customs code for control and clearance) [9-13].

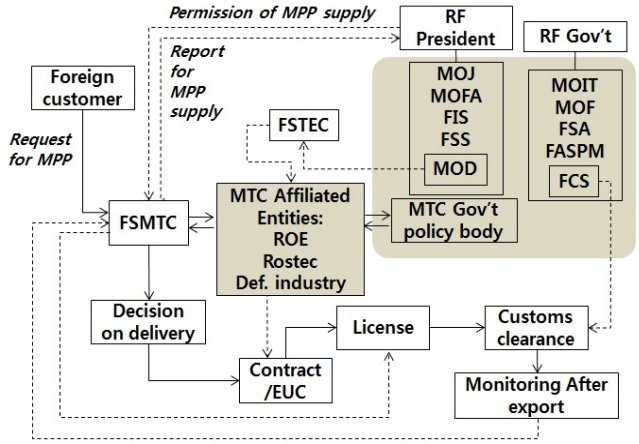

Fig. 1. MTC governance and activities for Russian export control: all full names of the shorts are shown in Chapter II and III.

Work flow in Russian MTC and Security

MTC on how to initiate the MTC in the RF

As shown in Fig. 1, the MTC activities are conceptually connected to the RF government institutes and agencies. In this figure, their roles with functional relations are also visualized, which are explained in relation to the task done under the jurisdiction of each organization, as follows [9-16].

a) A customer (foreign country) officially requests for international MTC to FSMTC by submitting an official request letter (hereafter, OR): the contents of MTC is generally the import of MPPs and/or technologies from Russia.

b) FSMTC requires MTC affiliated entities to review the OR through ROE..

c) MTC affiliated entities send its review result on the OR to MTC Government Policy Consultative body comprised of several RF government institutes (hereafter, MTC policy body) for their approval.

d) MTC affiliated entities receives the approval from the MTC policy body and then submits it back to FSMTC.

e) FSMTC request for the permission by reporting the approval of MTC policy body to the federal President and the federal government.

f) Federal President and government permit this report; the process is of course stopped if rejected.

g) FSMTC notifies and instructs the MTC affiliated entities (its practical leader, ROE, on behalf of FSMTC) to undertake the negotiation with the customer on the basis of the permission decided by federal President and government.

h) ROE organizes a negotiation team representing the RF side and starts discussion and negotiation about the contents of OR and its price with the customer.

i) If the contents of OR and its price are agreed by both ROE and the customer, the technical commercial offer (TCO) to the OR is written and determined.

j) ROE and the customer sign a contract based on the TCO.

k) Within one month after the contract is signed, the customer should submit the end user certificate (EUC) to FSMTC via ROE.

l) ROE should acquire the export license (EL) on what the customer wants from FSMTC on the basis of the EUC, which is prerequisite for ROE to legally deliver the deliverable (MPPs and/or technologies) to the customer after the completion of contract.

m) ROE delivers the deliverable to the customer according to the procedure set by Federal Customs Service (FCS).

n) ROE and related authorities conduct monitoring and oversight after delivery in order to ensure if deliverable is used only for the purpose specified in the contract together with the EUC.

Security level and its application

The security level in the military field is normally divided into four levels: Level 1 (Top Secret), Level 2 (Secret), Level 3 (Confidential), and Restricted. Although such classification is in most countries similar to one another, the weapon systems and technologies assigned to each level are not the same in every country and they are obviously kept under the secret. In the RF, most of conventional weapons and technologies belong to one of these 4 levels because creative technologies are newly applied for improving their function and performance (for e.g., Man portable air defense missile system, Man portable antitank, Guided missile system, Hand held antitank grenade launchers, Rocket flame throwers, etc.). Such kinds of things are classified as the goods under the oversight after export, which is what FSMTC must severely monitor to avoid the re-export, smuggle and something like that [7-9].).

TABLE I: REQUIREMENTS FOR VISIT TO RUSSIAN DEFENSE FACILITIES AND PARTICIPATION IN TECHNICAL MEETINGS

Event	Deadline for application	Security level	Comment

Visit to defense industry (facility)	Before 50-60 days	Highest	Subject to Approval
Participation in technical meeting	Before 40-50 days	High	Subject to Approval
Visit to government institute	Before 30-40 days	Restricted	Subject to Approval
Participation in Forum/conference /exhibition	Before 20-30 days/on the day	Business restricted day/ Public trust day	Subject to Approval /Open

Owing to the security rule, the events such as visit to defense related institutes and participation in technical meetings are prohibited without permission from Russian government. Some conditions required for those events are listed in Table I, together with their relevant security levels. Saying one more tip here, the visit to a special military facility is 100% impossible, but it may be allowed only after a MTC project is contracted [3-4].

A procedure based MTC in the RF

In this Chapter, a procedure based methodology for MTC with Russia is to be derived by logically setting up the functional relationship in-between the organizations of MTC policy body and MTC affiliated entities with the help of considerations (Chapter II) and activity flow (Chapter III) for MTC with the RF [6-16]. To do that, the function of each organization is figured out from the viewpoint of its role and task (in section IV-*A,* below), and subsequently a procedure- based methodology for MTC with Russia is established (in IV-*B,* next).

Functions of MTC policy body and MTC affiliated entities

The role and task appointed to each organization of MTC policy body are illuminated as follows. MOD establishes a policy for acquiring MPPs with related technologies by considering their security level, and its subordinate institutes (FSMTC and FSTEC) implement them practically. In detail, FSMTC supervises and controls the acquisition and export of MPPs and dual-use products in accordance with their procedure and security level, and FSTEC establishes the procedures for export of military and dual-use technologies and subsequently deliberates, approves and controls their export. The Ministry of Industry and Trade (MOIT) recommends the leading and participant companies conducting foreign MTC, among the MTC affiliated entities

(usually, about 10 companies per project). And the Ministry of Finance (MOF) selects the payment method of the contract price (absolutely bank-to-bank transfer for international projects) and transparently supervises and oversights its flow in-between the two sides. The Ministry of Foreign Affairs (MOFA) identifies and counts out risky countries by listing the countries proper or improper to export. In addition, the Ministry of Justice (MOJ) judges and interprets the international law and the legal status of the consumer's law in comparison to Russian law governing foreign MTC. The Federal Customs Service (FCS) transparently monitors and supervises the import and export of MPPs according to customs clearance procedures, and the Federal Security Service (FSS) thoroughly inspects, tracks and manages the leakage of not only technical data but also personnel information (i.e., Russian researchers), and subsequently implements legal measures against violation.

In addition, the Foreign Intelligence Service (FIS) monitors and crosschecks all the documents such as the qualification, identification, EUC, and something like that which the customer submitted to Russia to avoid smuggling and misuse of exported MPP, etc. The Federal Space Agency (FSA) is in charge of space development projects such as spaceships, satellites, ground launcher, and satellite communication networks, etc. Those projects belong to the top-secret in Russia because they are also utilized for military purpose. So it participates as a member of the MTC policy body. The Federal Agency for State Property Management (FASPM) reviews and approves the customer's request to use Russia federation assets (for e.g., use of test sites or lease of buildings for military purposes, etc.), with reference to the recommendation of the relevant government institutes and/or supervisory authority.

Meanwhile, ROE plans the domestic/foreign MTC process, military export strategy with market survey, and then implements the export of MPPs and R&D services to the customer, and in parallel manages them on schedule in the name of the RF government, by simultaneously supporting FSMTC and MTC policy body. The work done by ROE is always to be reported even up to the President, through the sequence of ROE→FSMTC→MOD→RF President. For doing that, ROE practically coordinates and manages all the activities of MTC affiliated entities on behalf of FSMTC. What is of importance here, ROE has the right to sign all the international contracts, which was empowered by the Presidential Decree. In addition, the MTC policy body comprised of several government institutes collaborates with FSMTC by reviewing the report of MTC affiliated entities from the perspective of their own role and affairs. All the results derived through this process are of course reported to the President.

A procedure based methodology for MTC with Russia

Step I: Customer's request

1) Official request for MTC;

An OR for MTC is a request that a customer proposes to the RF government in order to import the MPPs (with related technologies and/or technical aspects), and it should be submitted to FSMTC through ROE. Here, the customer must exactly record all the details such as the title of MPPs and its contents, etc., in the OR plus the appendix (if necessary). If the customer wants to confirm the RF's participation in the OR project, it should officially express the request for an

LOI (Letter of Intent) to ROE, therein.

2) Selection of the leading organization (in most cases, company) by the RF side;

FSMTC selects (tentatively) the leading company among Russian defense organizations with the help of ROE and MTC affiliated entities. This company usually supports ROE to technically analyze the OR contents suggested by the customer. Thus this company prepares a technical analysis report on the OR for international MTC between the customer and the RF side. The analysis report provided by the RF side(for e.g., ROE), is a sort of reference help material for the customer's preparing the statement of work (SOW): it's not compulsory duty of the RF side but a kind consideration of ROE in order to reduce the time needed for the customer's preparing the SOW.

3) Selection of participant organizations (in most cases, company);

FSMTC selects participant companies in addition to the leading company with help of ROE and MTC policy body. Although the customer's requirement is limited on the subsystem/assembly level (not the system level), the RF side additionally organizes other necessary companies because the subsystem/assembly will be integrated up to the system/ higher level.

4) Preparation of MPP description;

The leading company prepares the MPP description (explanation on MPP which a customer wants) based on the customer's OR and the technical analysis report, and then FSMTC instructs ROE to negotiate with the customer based on the MPP description.

Step II: Negotiation

Negotiations are fulfilled between the two countries until 'supply of MPPs to a customer' is decided by the President and most of the negotiation takes place at this step, and additional details are still to be negotiated just before the contract is signed.

1) Initiation of negotiation; Registration of the OR in the international MTC list;

Based on the MPP description and technical analysis report on the OR, FSMTC judges the feasibility of export and subsequently registers it in the international MTC list. For your reference, this registration does not mean the final permission for export yet, but it is just a tentative approval by FSMTC because the final decision is to be made by the President (see Fig. 1).

2) Draft of statement of work (SOW);

A customer prepares an SOW (together with an execution list, sometimes) based on the OR and technical analysis report, of course, with the help of the leading company. At this step, the SOW may not be completed if the customer does not open its budget information to ROE. In general, the RF side prepares a fully sentenced SOW with lots of consideration and analyses because Russian researchers instinctively seek for the perfect response to the OR, irrespective of the budget. That is thought to be originated from their mindset and traits to do thoroughly R&D based on their pure mind toward S&T.

3) TCO draft and price negotiation based on work scope;

ROE drafts the TCO based on the draft of SOW written without consideration of budget. In

this TCO draft, the price details on each item are also specified. So some items may be removed to meet the customer's budget if it's not enough to cover all items. Anyhow the price and SOW can be adjusted between the sides, through the negotiation. If the SOW and the price are reasonably set up by the two sides, this work is to be transferred to the next step.

Step III: Approval

1) Finalization of TCO and SOW;

When the negotiation on TCO is satisfactorily completed, the SOW together with the price is determined and finalized accordingly. Actually the SOW is a document that the customer should write down and submit to the RF. So, only the customer must sign it (Of course, the Russian leading company is to explicitly be written in the SOW.). This finalized SOW is in general included as special conditions to the contract. Then FSMTC reports the final negotiation results up to the President and the federal government in order to take their decision.

2) Permission on MPP export;

The President and the federal government notify their decision on the MPP export to FSMTC and order FSMTC to officially start the work related to MPPs export (Fig. 1). At this step, both sides can start to write down the contents of contract and they can also sign it with condition, where the `condition` means that something is still left as discussion points before signing the final contract. Such things are introduced below.

3) Approval of export passport and material inspection;

The export passport (EP) is a kind of 'identification on MPP export' that the RF MOD approves in response to the request for supplying MPP to foreign customer. ROE must obtain the EP approval from MOD. For the reference, the EP is to be written by the leading company and then ROE submits it to MOD through FSMTC. The material inspection (MI) is a kind of certificate evidencing whether the MPP delivery complies with security regulations or not, and it is also what MOD approves. ROE must obtain the MI approval from MOD. As a reference, the MI is also prepared by the leading company and then ROE submits it to MOD through FSMTC.

4) Preparation for export license (EL);

ROE prepares some essential documents in order for acquiring the EL and then submits them to FSMTC in advance. FSMTC crosschecks them from the viewpoint of the execution accuracy of the documents, the completeness of information written in them, their reliability and compliance to the contract details, and even the customer's legal qualification/competence for foreign business trade on behalf of the customer's government. These things must be prepared beforehand and verified for issuing the EL, which generally takes long time. Of course, the EL can be officially issued subject to the end user certificate (EUC) that the customer must submit to FSMTC.

Step IV: Contract

1) Confirmation of contract details and signing contract;

A contract stipulates and specifies the 'rights and obligations' in-between the import and export sides, and thus it should be thoroughly reviewed. Since the laws/formats for the contract of both sides are different from each other, such things in the contract should be agreed through

consultation and open-minded negotiation. If the sides insist on their own laws/formats too strongly, the contract will be hardly made. So both sides are recommended to respect each side's position and try to reach an agreement.

2) Agreements on IPR use and non-disclosure of information;

Separately from the contract, the RF side hopes to sign a country-based comprehensive IPR (Intellectual Property Right) use agreement and NDA (Non-disclosure Agreement) with the customer, under the intergovernmental MOU. This means that the RF side does not want to separately sign those agreements every contract.

3) EUC submission;

Submission of the EUC is the duty of the customer (exactly saying, the end-user). The customer must submit it to FSMTC within one month after the contract is signed. If the customer recommends its agency to sign the contract on its behalf, the certificate that the agency is qualified to sign the EUC, must be submitted to FSMTC, together with the EUC.

4) Submission of certificate on the customer's qualification /competence for foreign trade activity related to MPPs;

The customer must evidence its qualification/competence that it can do foreign trade activity related to MPPs with reliable capability [9]. So it has to submit the certificate that the customer is legally qualified for and capable of foreign trade of MPPs. If the customer wants its agency to sign the contract, the agency must submit the certificate on qualification/competence for foreign trade of MPPs to FSMTC.

5) Submission of identification/certificate on customer's mission, task, duty and right;

The customer must prove its mission, task, duty and right to fulfill the work for MTC with foreign country under its jurisdiction [9]. If the customer wants its agency to sign the contract, the agency must submit the certificate evidencing its mission, task, duty and right for international MTC.

6) Notarization of the documents submitted by a customer;

All documents submitted to FSMTC must take the consular legalization given by the RF consulate, which is absolutely necessary to avoid smuggling MPPs and counterfeiting the official document such as EUC, the certificate for MPP related foreign trade and something like that.

Step V: Monitoring after export; Oversight after delivery

The RF government may monitor and do oversight after delivery (customs clearance) of MPPs to the customer according to the rules agreed by both sides, which are specified in the contract, the EUC, and the RF export control laws.

Meanwhile, all activity details involved at each step are summarized in Table II, together with the basic period required to complete an individual activity.

Preparation of negotiation points

For the MTC with the RF, it is necessary to know the Russian MTC system, export policy, strategy and control mentioned in the previous section, which subsequently leads to saving the time and pricing reasonable for contract. Saying in detail, it is important for the customer to do the followings: the first, the customer should accurately express what it wants in the documents

such as the OR, SOW and so on; the second, it must show its qualification/competence for foreign trade based on the conformity to the RF export rules; the third, if the customer has its agency to sign the contract, even the agency must evidence its qualification/competence to negotiate and sign the contract on behalf of the customer; the fourth, it is hopefully recommended to know the MPP valuation and to prepare the strategy for reasonable negotiation of MPP *vs* its pricing; the fifth, it is 100% necessary to set up the details on definitions of terminology, rights and obligations to be specified in the contract beforehand.

TABLE II: RUSSIAN MTC PROCEDURE, IN-STEP ACTIVITIES AND REQUIRED PERIOD (TOTALLY AROUND 1 YEAR AND 6 MONTHS)

Step	Detail No. (DN)	Activity	Period (days) for DN	Comment
	D1	Submission of OR letter	T0	Customer
Customer's Request	D2	Selection of leading/participant companies of RF side (tentative) Draft of technical analysis report	T0+70	MTC affiliated entities with approval of MTC policy body
	D3	Submission of MPP description		
	D4	Registration of OR (tentative)	T0+100	FSMTC
Negotiation	D5	Draft of SOW by customer with help of RF leading company	T0+160	Customer

	D6	Draft of TCO by ROE	T0+220	ROE
	D7	Finalization of SOW & TCO	T0+280	ROE/ Customer
Approval	D8	Decision of MPP supply		President
	D9	Approval of export passport	T0+440	MOD
		Approval of material inspection		
	D10	Preparation of EL		FSMTC
Contract	D11	Signing contract, IPR use, NDA	T0+500	Customer /ROE
	D12	Submission of EUC, the certificates of qualification/ mission notarized by customer's government	T0+530	Customer
Monitoring after export	D13	Oversight after delivery (customs clearance) RF's Permission on re-export of MPPs by customer	After delivery	FSMTC/ Customer

Discussion: application and issues

In case of international MTC of the RF, FSMTC can initiate it after/by signing an MOU with an equivalent government institute of the customer country. Here, the MOU means the legal basis for international MTC between the two countries, under which both sides conduct the detailed MTC activities such as the exchange of information/personnel, joint R&D project and establishment of joint venture, etc., on the basis. If there is already an MOU for MTC between the customer (country) and the RF, the RF (especially FSMTC) can say that even the customer's agency is prohibited not only to sign the contract but also to fulfill any MTC activity on its behalf without its official request for MTC to the RF [7-9]. In this case, the agency should propose the MTC in the name of customer, or the agency must prove that it has legal qualification/competence capable of signing the contract for foreign military trade. This is the 1st difficult issue that the agency has to overcome. Moreover, as ROE is currently under the economic sanctions from the USA, it is almost impossible for the customer to finally pay the project price through the bank-to-bank transfer being the RF's payment rules. This is the 2nd issue to be solved for making MTC with the RF.

Reminding of the RF's MPP export strategy, it has been said that the export could be generally permitted by FSMTC when the contract size is over tens of M$ or more: the RF government prefers the contract of project worth more than tens of M$. In this case, there is an alternative (called a package deal) that the customer could weave several small projects together in order to meet the total budget of ~ tens of M$, but the contents of the small projects are recommended to be related to one another (Fig. 2). This is the 3rd issue and it can be solved with help of a package deal.

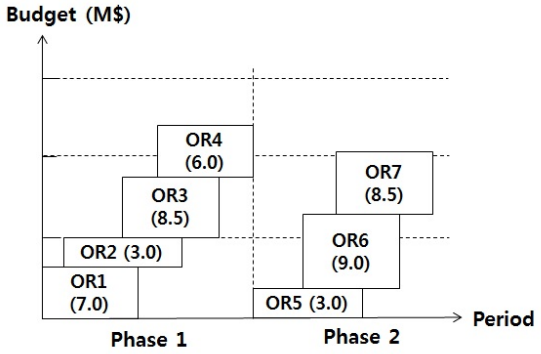

Fig. 2. A concept of package deal for negotiation

The equation (1) is an example to calculate the total budget based on the package deal concept (Fig. 2), where the total budget results in 45 M$. With this way, several smaller projects can be combined to meet the budget set by the RF government.

$$price_{total} = \sum_{i=1}^{4} OR_i\big|_{phase\ 1} + \sum_{j=5}^{7} OR_j\big|_{phase\ 2} \quad (1)$$

In general, the valuation of MPPs and technologies (i.e., the estimation of the budget) can be made by appropriately compromising several well-known methods such as the market approach, the cost approach, and the income approach [20]. They are quite useful for making negotiation advantageously, but give little effect on price negotiation. Instead, it is more feasible that the price could be determined based on the customer's desperate need and the supplier's political necessity. For contracting with a limited budget, the most textbook like method is to apply the CAIV (Cost As an Independent Variable) concept to negotiation and then to select the essential activities to meet the total budget based on the data of individual budget allocated for each activity [19,20].

The 4th issue arises from the discrepancy in the way of doing the R&D [22] between the two countries. If the customer is not accustomed to the RF's R&D procedure-based cooperation, it may prolong the negotiation and delay signing the contract accordingly. In particular, all documents submitted to the RF must be clearly and timely written by the customer. Especially, the title of the subject of cooperation (for e.g., Development of XX) written in the OR must be kept consistent through the whole period from the OR-submission to the project-end once it is registered (so, be careful for it.).

In addition, when the MTC policy body (especially MOIT) recommends the leading and participant companies, the customer may suggest a certain company as its opinion, but it may not be chosen. The reason is why such selection obviously belongs to the authority of the RF, and the suggested company may have already been participated in the RF government-led other on-going project. If the suggested company is not selected as the leading company, the RF government may include it as a participant one by respecting the customer's opinion. One thing clear here is that the Russian government absolutely guarantees the success of the customer's project, since the RF government is controlling and managing all MTC project under the RF MTC laws.

The 5th issue is that the RF government (especially FSMTC) is to monitor the use of MPPs after the export in order to avoid smuggle and disasters due to misuse. This is a kind of evidence that RF's international MTC guideline complies with the regulation and spirit of the UN [13-15]. As for the military technology protection in the RF, there are main agreements related to the non-disclosure of information (NDA) and the use of IPR (IPR agreement). By the way, the RF government wants to sign a country-based comprehensive IPR agreement and NDA with the customer, under the intergovernmental MOU, which means that the RF does not want to separately sign the individual IPR agreement and NDA on each contract. As another example for Russian technology protection, the meetings with Russian scientists and engineers (whether it is formal or informal) can be made only under the permission from FSMTC. That is because the RF law on processing personnel and technical information strictly restricts and controls the leakage of such information to the 3rd sides. According to the laws mentioned in [23], it is

absolutely necessary for a foreigner to prove that he/she received and handled such information without any violation against Russian laws and that he/she used them under the permission of the RF government. Of course, such information must be clearly deleted on foreigner's environment within one month just after receiving them although it was done under the permission of FSMTC and/or FSTEC. Violation against the RF laws will inevitably results in imprisonment for Russian as a treasoner and in deportation for foreigner as a spy. As mentioned above, the RF law and rules for international MTC seem to be so much rigid but they are very similar to those of other countries, as everyone knows. Therefore, it is recommended that the customer deliberately consider the 5 issues and legally design their solutions before starting MTC with Russia.

Meanwhile, there is a good example of Russian export strategy: the establishment of joint venture (JV), called BrahMos [24]. It was jointly established by the RF and India, which is of great achievement for Indian self-reliant national defense and export to the 3rd countries. The legal ground of the establishment of this company is the MOU signed by Indian defense R&D organization and NPO-M on behalf of Indian and Russian government, respectively, dated February 1998. It is also well known that this company jointly developed a Mach 3.0 supersonic missile (called BrahMos1), successfully test-fired it (May 2001), and fielded it to Indian military (2005-2007) [24-26]. BrahMos1 is well known as a successor of Yakhont of NPO-M (see Table III), and BrahMos2 (successfully test-fired 2 years ago) is also known to be Indian version of Zircon (Mach 10) developed by NPO-M.

TABLE III: FEATURES AND ENGINEERING BUDGETS OF YAKHONT [27,28]

Parameter	Features and engineering budget
Flight range (km)	300 (E), 600 (M), 800 (disclosed) with varieties flight trajectories
Height (km)	300 (high altitude); 200 (low altitude)
Total weight/Length/ Body diameter/Wing span	3 ton / 8.9 m / 0.7 m / 1.7 m
Thrust engine and rocket booster	Ramjet engine for supersonic speed of Mach=~3.0(2.6); Solid Rocket booster for first step of Mach=1.0

Launching P/F	Universal for multiple P/F such as Land, Aircraft, Ship, Submarine
Height during terminal guidance	5~10 m(low: sea skimming), 14 m(high: stealth approaching) with pinpoint accuracy
Seeker for terminal guidance & pinpoint accuracy	active RADAR homing (w/ EO & IR)
Navigation during the flight	INS (inertial navigation system) / GLONASS(Global Navigation Satellite System) signal receiver for long flight to point/hit a target
Warheads	200 kg for Land, Aircraft, Submarine; 300 kg for Aircraft
Maneuvering capacity	endurable at 10G for changing its speed and direction
Deployment	Test-fired in 1987, fielded in 2002
Sale price; taken from BrahMos1 [24]	2.73 M$ taken from Brahmos1 (indigenous rate: 80% for Brahmos1 except the seeker and the Ramjet engine)

Considering the Russian export strategy mentioned in Chapter II-*C*, and the fact that BrahMos1 was developed based on Yakhont 22 years ago, let's analyze the economic aspects (benefit and drawback) for the 3 different ways of acquiring 200 SCMs (supersonic cruise missiles): the turnkey based-import (way 1), the production through establishment of a joint venture (way 2), and the production using some imported subsystems and technologies (way 3), and then compare their results to one another. To do that in the way of easy-to-understand, if the economic effect is defined as the ratio of outcome to investment, the effect of initial investment (I_i) on outcome (I_o) can be simply modeled into (2), so called oversimplified valuation model

[20] :

$$I_0 = I_i(1+r)^l + \frac{U}{m}n \qquad (2)$$

, where the l, r, U, m and n are respectively the number of years, the interest rate, the price of a SCM product (taken from BrahMos1), the number of investors for JV and the number of SCMs to be fielded, and for calculation l=20 years, r=2%, m=2 for JV-production (in BrahMos case) and m=1 for self-production are assumed.

The relation between I_o and I_i for each way is plotted in Fig. 3, where the price assumptions used for calculation of way 3 are shown in Table IV, together with those for other two ways.

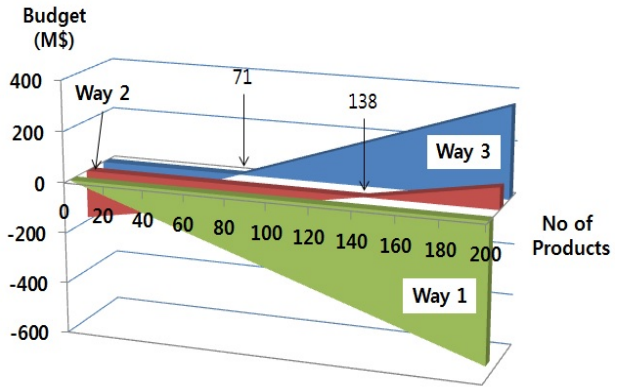

Fig. 3. Budget plotted as a function of the number of product with break- even points: 138 products for way2 and 71 products for way3.

TABLE IV: ASSUMPTION ON INDIGENOUS RATE, PRICE FOR EACH SUBSYSTEM AND INITIAL INVESTMENT FOR EACH ACQUISITION WAY

Acquisition way (w/ subsystem)	Indigenous rate	Price (M$)	Initial investment (M$)
Turnkey-based import (per a Unit) (way 1)	0%	2.73	$I_i = 0$ (now)
Production through establishment of JV (India:Russia = 50.5:49.5) (way 2)	100%	126.25	I_i = 126.25 (established 20 years ago)

Production with the imported subsystems and technology (way 3)	Nose cap	100%	0	I_i = 130 (started 20 years ago)
	Seeker	0%	5	
	INS/GNSS	0%	10	
	Control electronics	100%	0	
	Ramjet engine	0%	100	
	Warhead	0%	10	
	Rocket booster	0%	5	

For way 1, as shown in Fig. 3, the total amount of 546 M$ is required if the turnkey-based 200 SCMs are imported. However it is undesirable for aiming to have the in-house R&D capability and competence. For way 2, the break-even point is calculated to be 138 products being almost double that of way 3, but way 2 is reported to have outstandingly reduced its R&D period into 39 months [24]. That is because Russian side of BrahMos JV shared its high SCM technology with Indian side. This short development duration is well compared to that (~ 20 years) of way 3 (Table IV).

For way 3, the initial investment can be recovered if 71 products (as a break-even point) are produced, but this way normally takes very long time (~20 years in Table IV) since the in-house R&D should go through the formal R&D process including the interface, integration, test and evaluation with iterative feedback, which must be done by the customer alone, where the formal R&D process means the process of Basic principle research(~2 years)→Applied research(~3 years) →Test development(~5 years)→Exploratory development for verification(~5 years)→Full scale development(~5 years). Furthermore, the customer must receive a written consent from the RF when trying to export the SCM products to the 3rd sides because the customer (way 3) used the RF exported subsystems of indigenous rate = 0% (see Table IV).

As discussed above, one can see that the RF government thoroughly controls the MTC with foreign countries under the UN regulations, and simultaneously varies its export strategy for its economical benefit like other countries.

Concluding remark

In this paper [29], the RF's MTC system, export policy, strategy and control have been in detail investigated and figured out, with which a procedure-based methodology for MTC of the RF has been extracted from the customer's viewpoint, for the first time. That turns out to be sequentially comprised of 5 main steps such as a customer's OR to the RF government,

negotiation, approval, contract, and the oversight of deliverable after export. In addition, it is also figured out that the Russia's way of export sale is set up by variously itemizing from the complete MPP system down to the component with relevant technology of each level.

Meanwhile, when the first Russian (Soviet) astronaut (Юрий Алексеевич Гагарин, 1945) saw Earth in the rocket orbiting it around 205 km high (April 12, 1961, aboard the Vostok 1 for 1 hour and 29 minutes), he admired that the universe was very dark, but Earth was blue and everything was clearly visible. In Moscow space museum, one could also read his another thought that Why do human beings conflict and fight with each other on this small planet? In addition to this, when the first American astronaut (Neil Armstrong, 1965) took his first step on the moon, he transmitted his effervescence of 'That's one small step for man, one giant leap for mankind.' His feeling helps us to see the greatness of mankind. Combining impressions of the two space pioneers who respectively represented the RF and the USA at that moment, one can see that the human beings are purely instinctively hoping that science and technology should be well used for the co-prosperity of mankind and world peace. That is read so to all.

Reminding of the above, we believe and anticipate that the day of world peace and security will come soon if the advanced countries such as the RF, the USA, European Union, China, and so on jointly and actively try to solve the world common issues such as a local war, terrorism, and the like by sharing and liking their export control system to one another.

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