A Study on Changes in the International Export Control Regimes and Measures for Strengthening Nuclear Export Controls

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1. Introduction

Recently, the international security and export control environment has been changing rapidly due to the rapid development and technological innovation of advanced technologies such as artificial intelligence (AI) and quantum computing. These changes are also emerging as important issues in the nuclear energy field, and there is a growing need to effectively control the transfer and proliferation of nuclear energy technologies that are directly related to national security.

In addition, the influence of the four major international export control regimes (WA, NSG, AG, MTCR), which have been the center of export control implementation, is gradually weakening, and the export control system centered on cooperation between individual countries is showing a trend of strengthening.

Nuclear related technologies and goods are subject to stricter control and cooperation because of their potential for military use and their powerful capabilities.

Therefore, this study analyzed the changing international export control environment and studied export control measures for the domestic nuclear energy field to respond to this.

2. Analysis of changes in the export control environment and response measures

2.1 Analyzing changes in the export control environment

In the export control environment, which focused on goods and traditional military technology such as conventional, chemical, and biological weapons, international export control was operated around multilateral cooperation systems. The four major export control regimes (WA, NSG, AG, MTCR) have played an important role in maintaining global security by preventing the transfer of goods and technologies of military and strategic use to countries or entities of concern.

However, structural problems and limitations of multilateral export control regimes are emerging in the rapidly changing environment. Decision-making takes a long time in multilateral export control regimes due to consensus between member states. For this reason, some agendas have been ongoing within the Nuclear Suppliers Group (NSG) for more than 10 years, and many agendas have not been agreed upon and have been withdrawn. The time-consuming consensus based decision-making method is challenging to respond to rapidly advanced technologies such as AI and quantum computing.

As a result, many countries have recently established export control systems centered on independent or small-scale inter-state cooperation. This ensures that each country prioritizes its national security interests while strengthening export controls on rapidly developing technologies. For example, the United States introduced the Export Control Reform Act (ECRA) in 2018 to strengthen the administrations' export control authority and designate emerging and foundational technologies for export control. [1]

The European Union (EU) also approved a revised version of the strengthened export control of dual-use items in July 2023 and is implementing strengthened export controls on new technology fields such as AI and advanced semiconductors. [2]

In addition, small-scale cooperation systems are being formed for specific areas, such as AUKUS (a trilateral security alliance between Australia, the United Kingdom, and the United States) and the Chip4 Agreement (a four-party alliance related to semiconductors between the United States, the ROK, Taiwan, and Japan). Export control cooperation, such as the relaxation of export controls between allied countries, is being carried out.

As such, countries establish independent or small-scale cooperation bodies on a case-by-case basis, considering their security interests and strengthening a more flexible cooperation method than the existing multilateral export control regimes.

The limitations of the existing export control system are becoming apparent in the rapidly advancing high-tech and changing export control environment centered on small-scale cooperative systems. To respond to these changes, it is necessary to strengthen self-regulation at the private level and improve efficiency by introducing an Internal Compliance Programs (ICP) specialized in the trigger list items. In addition, it is necessary to implement effective and strengthened export controls on specific issues or technologies through Nuclear Cooperation Agreements (NCA).

2.2 Introduction of ICP for the trigger list items

Recently, the focus of export control has shifted from goods to technology. In the case of technology, there are difficulties in export control, such as the diversity of previous forms and methods compared to goods and the ease of editing, such as copying and deleting. Many countries, including the ROK, have introduced and are operating an ICP to efficiently and effectively control the export of technologies with limited human resources and resources.

In the ROK, the ICP is in operation for dual-use items but not for the trigger list items. Recently, the nuclear power market has been revitalized worldwide, and the ICP for the trigger list items is needed to strengthen technology-oriented export controls and efficiently implement technology export controls.

Due to differences in the scale of exporters and the export licensing system, it is not easy to apply the ICP for dual-use items to the trigger list items.

For example, in the case of dual-use items, about 5,000 companies receive export licenses annually, and about 2,200 companies operate ICP. [3] Since many companies operate ICPs, there are five categories according to the type and scale of their business. Self-compliance traders are divided into three grades, and incentives are applied differently. [4] However, the number of annual exporters of the trigger list items is around 20, and most institutions are public corporations or public institutions. Dividing the types and grades around 20 institutions may be inefficient. Therefore, operating exporters as a single grade may be an efficient management plan without dividing them into types and grades.

The most significant incentive for ICP of dual-use items is the permission to be issued a comprehensive export license. However, the comprehensive export license system does not apply to the trigger list items. Therefore, developing and operating incentives specific to the trigger list items can help improve the utilization rate of ICP. A good example would be to allow self-classification for TL items not currently subject to self-classification or to provide incentives such as the emergency transfer system and extended reporting periods under a nuclear plant technology export license. [5]

Introducing and operating the ICP specialized for the trigger list items can be a way to effectively export control technology and respond to rapidly changing global situations.

2.3 Strengthening export control through the NCA

The nuclear energy field has implemented export controls based on the NSG guidelines. In addition, the countries have implemented cooperation and export control regarding the use of nuclear energy between countries through the Nuclear Cooperation Agreement (NCA). For example, Section 123 of the U.S. Atomic Energy Act generally requires the conclusion of a peaceful nuclear cooperation agreement for significant transfers of nuclear material or equipment from the United States. [6]

The ROK has signed NCAs with 28 countries and supplementary administrative agreements with four (the United States, Canada, Australia, and the UAE) to specify Items subject to the agreements (ISA) for each country and implement export controls by the administrative agreements. However, the NCA has focused on nuclear energy cooperation rather than strengthening export controls or non-proliferation. However, in an environment where multilateral export control regimes have recently weakened, and export controls through small-scale cooperation have been strengthened, there is a growing need to consider the NCA as an important factor in strengthening export controls.

The existing NCA can be amended, or an administrative agreement can be signed to strengthen export control and non-proliferation. In particular, when a large-scale transfer of nuclear-related items to a specific country is expected, it is desirable to seek to strengthen export controls or conclude an agreement focused on non-proliferation or, if an agreement has already been concluded, to seek to strengthen export controls by additionally concluding an administrative agreement.

In addition, it is necessary to develop and upgrade the NCA-based export control system. The export control system is being developed and operated with a focus on the Foreign Trade Act and the Public Notice of Exportation and Importation of Strategic Items. However, the Foreign Trade Act and the Public Notice of Exportation and Importation of Strategic Items are based on the guidelines of the multilateral export control system, making it challenging for the NCA to implement export control.

KINAC developed the Obligation Tracking System (OTS) for managing imported ISAs in 2024. [7] By advancing the OTS, it is possible to establish a management system for the ISA, such as implementing NCA's export control procedures through import and export management for the entire ISA and system linkage with the partner country, and to seek to strengthen export control.

3. Conclusions

This paper analyzes the limitations of the existing multilateral export control regime and proposes new measures to strengthen export control based on the ICP and NCA, considering the characteristics of the nuclear energy field.

Existing export control systems, which are centered on multilateral export control regimes, have shown a

limitation in that they are challenging to respond to rapid technological development due to the time-consuming consensus-based decision-making method. As a result, there is a shift toward export control systems centered on independent or small-scale cooperative systems.

To overcome the limitations of the existing multilateral export control system and respond to rapid technological development, the introduction and operation of the ICP specialized in the trigger list items are proposed. In addition, it presented a plan to utilize NCA to strengthen export control in line with the shift to implementing export control through a small-scale cooperation system.

Aside from the methods presented in this paper, further research is needed to develop new cooperation methods or systems to strengthen export controls.

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