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THE PEDDLING PERIL INDEX: A RANKING OF STRATEGIC TRADE CONTROL SYSTEMS

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ABSTRACT

The Peddling Peril Index (PPI) for 2021/2022 is the latest edition of the Institute's biennial comprehensive ranking of national strategic trade controls (STC), following the 2017/2018 edition and the 2019/2020 edition. It quantitatively ranks 200 countries, territories, and entities according to their capabilities and demonstrated success in implementing export, import, transit, and transshipment controls of strategic goods and technologies. To arrive at its ranking, the PPI evaluates a broad set of more than 100 indicators that build on an extensive survey of states' international commitments, national legislation, enforcement, ability to monitor and detect illicit trade, and ability to prevent proliferation financing. The PPI also assesses STC implementation among groups of countries with similar supply potential, and thematically. While other systems exist to measure threat, no other public methodology exists to evaluate national strategic trade control systems on a regular basis and identify global trends as well as specific gaps, facilitating efforts to improve strategic trade controls. The PPI also provides a basis for countries to improve their efforts. It is useful to governments in evaluating their own country prioritization and impact assessments. The 2021/2022 edition shows an overall positive trend towards improved STC worldwide, when compared to previous PPI editions. At the same time, all countries have room for improvement, and proliferation financing and enforcement are two areas where improvement is needed globally. Additionally, more than seventeen years after the passing of United Nation Security Council Resolution 1540 (2004), which mandated the development and implementation of strategic trade controls, more than half of all countries are still lacking comprehensive export control legislation incorporating relevant control lists of dual-use items and technology. The 2021/2022 PPI shows that implementation of strategic trade controls remains bimodal, well-embraced by countries in the Northern and Western Hemispheres, but with the bulk of countries lagging behind. A positive development in the 2021/2022 PPI is that important progress has been made in a few regions where STC has been largely absent until recently.

THE PEDDLING PERIL INDEX 2021/2022

The *Peddling Peril Index*'s scores are pictorially represented in Figure 1 for each country, territory, or entity. Dark blue represents higher scores, and light blue represents lower scores. In

general, the scores in the Northern Hemisphere were higher than in the Southern Hemisphere, and developed nations scored higher than developing countries.[1]

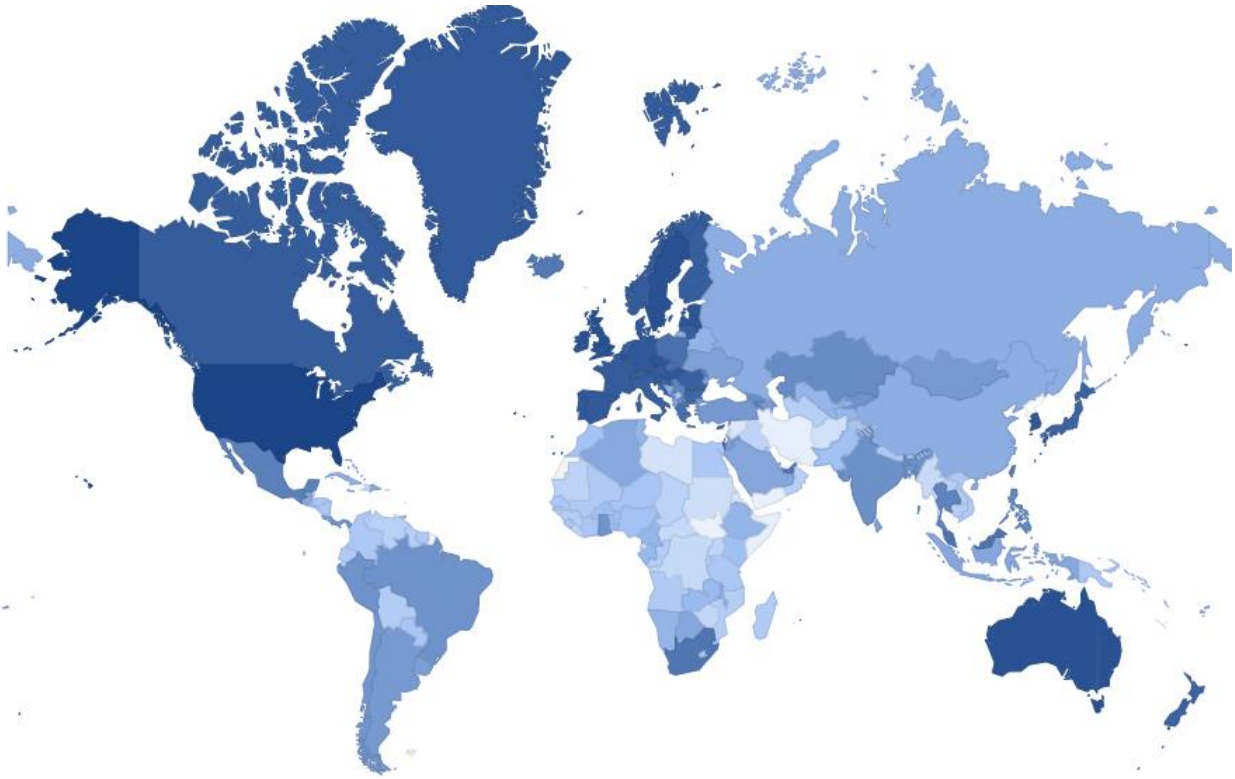

Figure 1. The PPI scores represented by country, where darker blue indicates a higher score.

Countries could receive a total of 1,300 points. The overall average score is 546, up from 489 points in 2019, and the overall median is 508, up from 443 points. The average score thus improved by 57 points from the last PPI edition published in 2019.[2]

Figure 2 shows that scores varied between about -170 and 1,080, meaning that no country received more than 83 percent of the possible points, and a few countries had very low scores. The figure also shows that the score distribution remains fundamentally bimodal in shape, as in the 2019 ranking. Like the 2017 and 2019 PPIs, the 2021 edition found that only a fraction of the world's national trade control systems received more than 50 percent of the available points.

However, an upward trend in points is visible this year. In Figure 2, this trend is visible in a shift toward the left in the chart, to higher scores, compared to the scores in the equivalent figure in the previous edition. For example, while in 2019 only two countries had a score of 1,000 points or higher, there are six in 2021 that exceeded that mark.

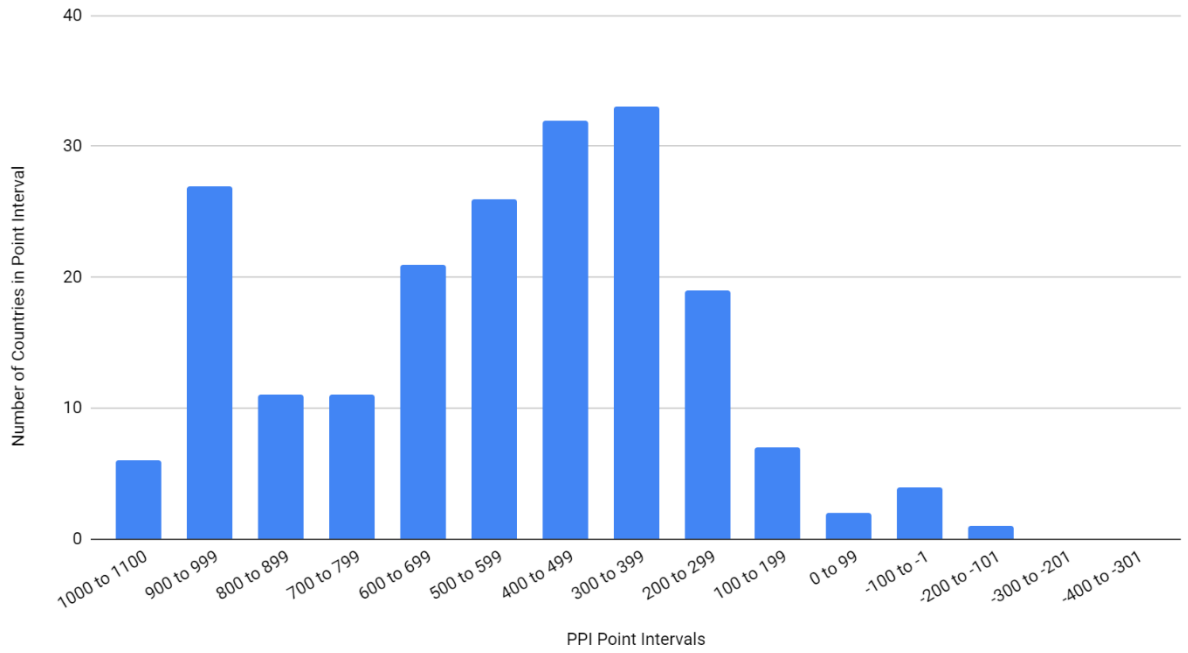

Figure 2. Distribution of total PPI points in intervals of 100 points.

Thirty-six countries, up from twenty-nine in 2019, achieved two-thirds or more of the available points, and an additional 33 countries (up from 21) achieved more than half but less than two-thirds of the possible points. However, the remaining 131 of the 200 evaluated countries received less than half of the available points. Eighty countries (down from 96) received less than one-third of the total points. Given the unstoppable pace of globalization and the central importance of strategic trade controls in stopping proliferation, this wide range of performance is alarming.

A deeper look into the scoring reveals several reasons for the many relatively low scores. The 2021 PPI uses 105 indicators to calculate a final score, which are categorized into five pillars, called "super criteria" in the PPI, of strategic trade controls:

1. **International Commitment** to preventing strategic commodity trafficking;
2. **Legislation** in place that regulates and oversees trade in strategic commodities, and criminalizes and aims to prevent strategic commodity trafficking;
3. **Ability to Monitor and Detect Strategic Trade**;
4. **Ability to Prevent Proliferation Financing**; and
5. **Adequacy of Enforcement** against strategic commodity trafficking.

Proliferation financing has not traditionally been considered when debating the efficacy of strategic trade controls. However, the PPI finds that it should be a central part of any such deliberations. In recent years, this view appears to be increasingly adopted by other groups, organizations, and governments.

The average scores for all countries together were highest in *Legislation*, followed by *International Commitment*, and lowest in *Ability to Prevent Proliferation Financing*. Yet, only

62 percent of the possible points are collectively achieved under *Legislation*. This number drops to 54 percent in *International Commitment*; 52 percent in *Ability to Monitor and Detect Strategic Trade;* 41 percent in *Adequacy of Enforcement;* and 25 percent in *Ability to Prevent Proliferation Financing.* Compared to 2019, this average percentage increased most in *Ability to Prevent Proliferation Financing* and in *Ability to Monitor and Detect Strategic Trade.*

Figure 3 shows the fraction of points achieved in each super criterion for all countries, where a stacked blue and red bar represents the total points available in each super criterion, after weighting. The blue portion represents the achieved points by all countries, and the red bar shows the missing points. As can be seen, the *Proliferation Financing* and *Enforcement* super criteria are the most heavily weighted in this analysis, and the super criteria missing the most points.

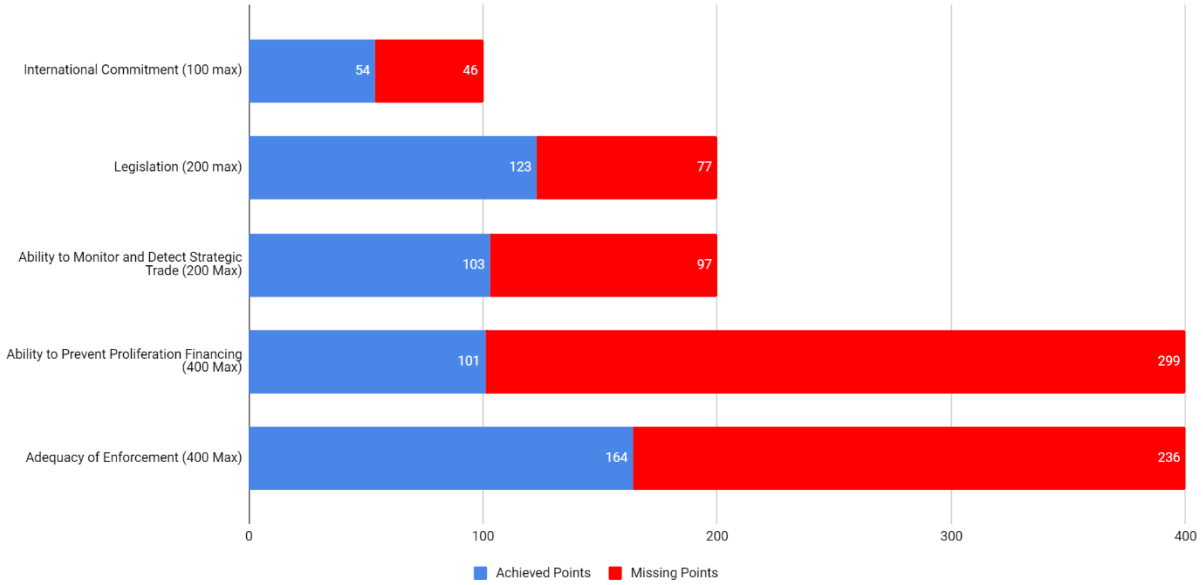

Figure 3. Collective average PPI scores for all countries by super criteria.

Beyond the scores, the PPI found that under the *Legislation* super criterion, which examines national laws on import, export, transit, and transshipment controls separately, only 76 countries, up from 74 in 2019, have export control legislation with the desired comprehensiveness in place, covering exports of nuclear direct and dual-use items. That means the majority of countries do not have adequate strategic trade control legislation in place, regardless of how well it is implemented.

To make more realistic country comparisons, the full ranking is also divided into three distinct sets of countries, termed "tiers," as discussed above. The three tiers are organized based on their potential for supplying strategic commodities and their likelihood of being exploited by illicit procurement networks as transshipment points. In brief, as discussed in more detail later, Tier One in the PPI includes those nations that can supply, at least partially but significantly, the wherewithal to make nuclear weapons, other WMD, or the means to deliver them. Tier Two includes countries of transshipment concern, and Tier Three includes the remainder of the countries. Figure 4 shows the average scores for the three tiers. Tier One scores are, on average, considerably higher than the scores achieved by countries in Tiers Two and Three. The bimodal

shape of the score distribution in Figure 2 can be explained to first order by the difference in the average scores in the tiers.

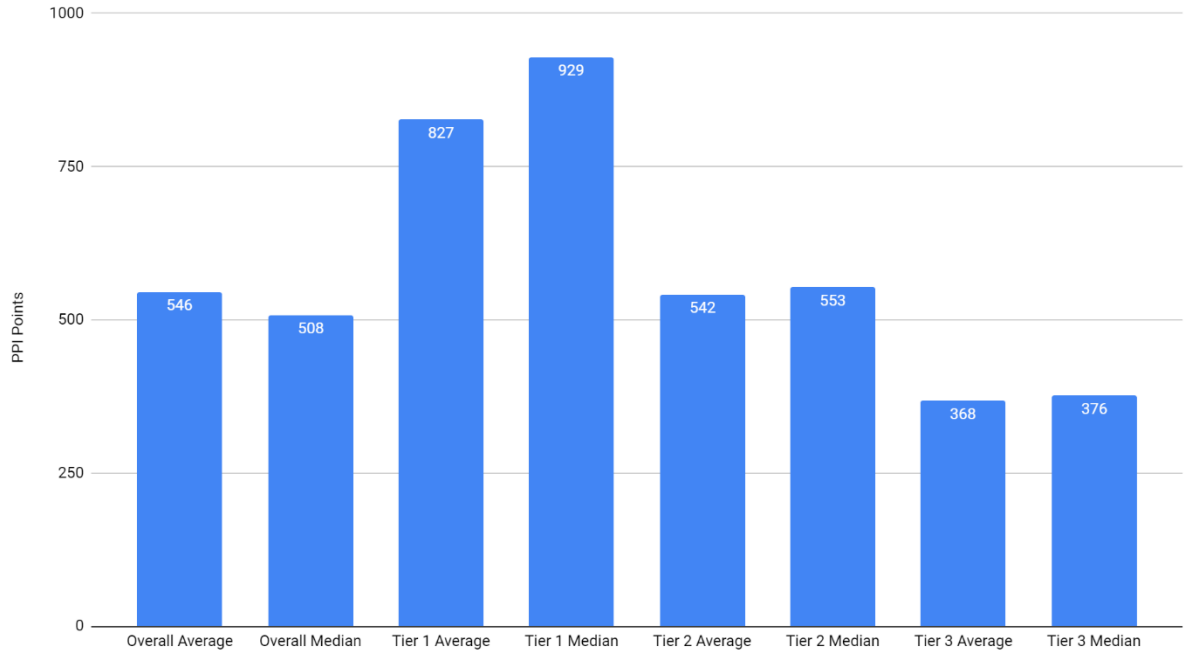

Figure 4. Average and median scores for the overall PPI and the three tiers. The overall average is 546, up from 489 points in 2019, and the overall median is 508, up from 443 points. As can be seen, Tier One did considerably better than Tiers Two and Three, where a high median in Tier One suggest a bimodal distribution within the Tier as well.

A natural question is how the scores relate to evaluations about the effectiveness of national strategic trade control systems. This question is complicated by the need to constantly counter more sophisticated efforts to thwart trade controls and sanctions, which necessarily involves improving controls, even in the highest-scoring countries. However, within that context, countries also need to know if they are on the right track.

To address this set of issues, the PPI project decided to identify relatively high-scoring countries which have a strategic trade control system score above a certain point cutoff. The cutoff was weighted toward realistic expectations of the tiers. It was selected at two-thirds of the total points for Tier One countries and one-half for Tiers Two and Three. In Tier One, 33 out of 55 countries, up from 27 in 2019, achieved over two-thirds of the points, and in Tier Two, 15 countries out of 59, up from only six in 2019, achieved over half of the total points. In Tier 3, five of the 86 countries met the cutoff of fifty percent. In total, 53 out of 200 countries, or roughly a quarter, satisfied these cutoffs.

How to choose and characterize these initial cutoffs was intensely debated by the PPI team. It was decided that these levels do not signify adequacy of strategic trade controls but simply serve to highlight the highest-scoring countries. This placement in the leading-score group does not mean that these countries' trade control systems do not need improving or are somehow free of significant gaps. The overall scores do not support that view.

Many other countries with scores lower than those of this high-scoring group are on the right track. However, some countries that scored relatively low likely need significant improvement, and on an expedited basis. For those few countries that fall at the very bottom of the scoring, strategic goods supplier countries and businesses need to exercise extreme caution or in some cases avoid trading with these countries.

Despite emphasizing tiers, this edition of the PPI also includes a "cluster analysis" of the scores and ranks. The goal is to better understand the structure of the scores. In essence, this statistical method groups scores around a set of relative peaks in the scores, which in this case numbered four. This method allows for a more effective look at the structure of the scores than the simple bimodal analysis conveyed in Figure 2.

Figure 5 shows the results of the cluster analysis. Cluster 1 (Group 1) includes the ranks 1 to 46; Cluster 2 (Group 2) includes the ranks 47 to 102; Cluster 3 (Group 3) includes the ranks 103 to 177; and Cluster 4 (Group 4) includes the ranks 178 to 200. It is noticeable that Group 3 includes 75 countries, which is more than any of the other groups. Group 1 has 46 countries; Group 2 has 56 countries; and Group 4 has 23 countries.

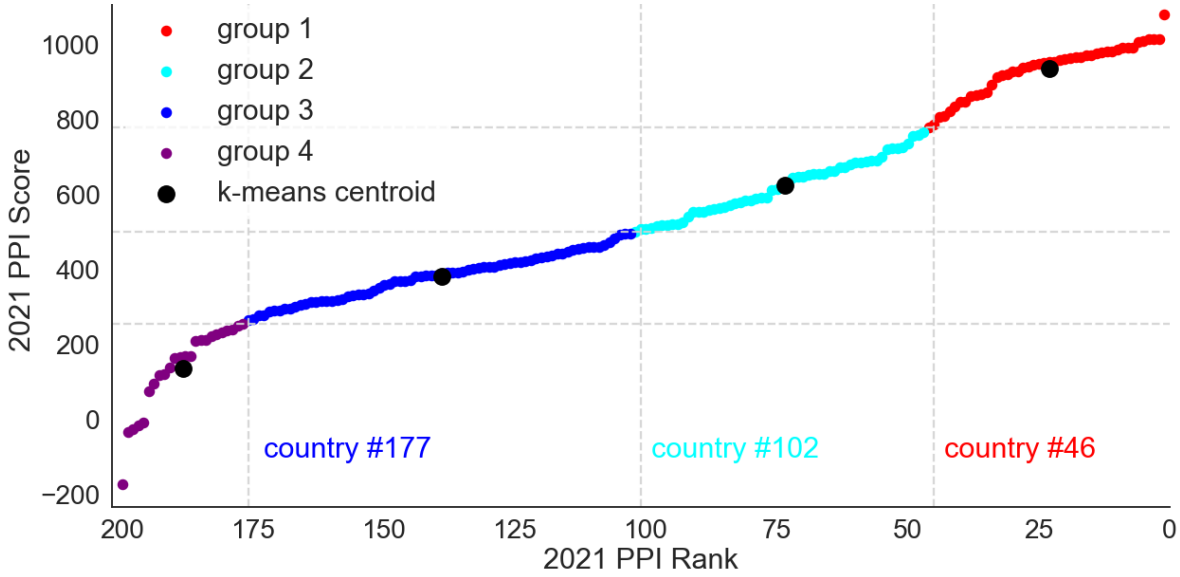

Figure 5. The 2021 PPI countries plotted by rank and score clustered into four groups.

A key value in each cluster is its "centroid," identified as "k-means centroid" in Figure 5. Group 1 has a center of 937 points and an average score of 933 points; Group 2 has a center of 625 and an average score of 620 points; Group 3 has a center of 383 and an average of 379 points; and Group 4 has a center of 136 and an average score of 130 points. The corresponding score ranges are 1,080 to 779 for Cluster 1, 766 to 500 for Cluster 2, 497 to 255 for Cluster 3, and 249 to negative 172 for Cluster 4.

Of the 46 members of Cluster 1, the highest-scoring cluster, 39 are Tier One countries. Thirty-three of these 39 Tier One countries are leading-score countries. The seven remaining members in Cluster 1 are Tier Two countries, all of which are leading scorers. Cluster 2 has 56 members

and is comprised of a mix of 13 Tier One, 30 Tier Two, and 13 Tier Three countries. Ten Tier Two countries and five Tier Three countries met the cutoff score of their tier (50 percent of the total points) to be considered a leading-score country in this cluster. Eight of the 13 Tier One countries also received 50 percent or more of the points, but the score cutoff to be considered a high-scoring country in Tier One is two-thirds of the total points. Clusters 3 and 4 have 75 and 23 members, respectively, none of which are high-scoring countries. In Cluster 3, only one country is from Tier One, 18 are from Tier Two, and 56 from Tier Three. Cluster 4 is comprised of two Tier One, four Tier Two, and 17 Tier Three countries. The Tier One countries in Cluster 4 are Iran and North Korea.

In an ideal world, there would only be one, high-scoring cluster. At least, the cluster with the most countries in it would be the highest-scoring cluster, and not, as is currently the case, Cluster 3, where the mean score is only 379 points, or 29 percent of the total points. As strategic trade controls gradually improve, and PPI scores rise, we hope to see low-scoring clusters shrink in size in future PPI editions. Indeed, a comparison between 2019 and 2021 PPI editions shows that this is happening, consistent with a shift to higher scores overall discussed earlier. High-scoring clusters are growing and at the same time progressing to higher average scores. From 2019 to 2021, Cluster 1 increased by five countries, Cluster 2 by one, and Cluster 3 by three, while Cluster 4 shrank by nine countries. The centroid score in Cluster 1 rose by 58 points, in Cluster 2 by 83 points, and in Cluster 3 by 53 points. The average score in Cluster 1 rose by 45 points, in Cluster 2 by 57 points, and in Cluster 3 by 28 points, while it dropped by 31 points for Cluster 4. Although uncertainties should be borne in mind, placement in the first and second clusters represents possession of more effective strategic trade controls than placement in the third and fourth clusters.

HOW TO IMPROVE PPI SCORES

The PPI provides a way for states to reflect on their own strategic trade control systems and compare their performance to other countries. Intrinsic to the PPI is that all countries need to improve their scores, where the scoring stands as a reminder against complacency by all, including trade control officials, national decision makers, and budgetary authorities.

A Tool for Assistance Providers

The PPI identifies strengths and weaknesses in a country's system, which can be used to determine which countries need assistance and what type of assistance would be most beneficial. Importantly, the PPI not only looks at the existence and enforcement of strategic trade controls, but also at the general environment in which controls are implemented. Therefore, among countries that do not yet have strategic trade control legislation in place, the PPI score, rank, and country-profile offer an evaluation of the foundation upon which strategic trade controls can be built.

The PPI can also serve as a supplement to an assessment of a country by assistance-offering countries. The evolution of a country’s score and rank through updates of the PPI can be used by assistance-giving countries or organizations as an objective way to monitor progress and measure success.

The PPI can be integrated into maturity models developed by assistance providers to plan and track progress. The idea of maturity models to assess a country's strategic trade control level stems from the World Customs Organization (WCO) and has been subsequently adopted by other assistance providers.[3] It facilitates the identification of steps and prerequisites before a country can move on to the next level, and allows for measuring and acknowledging of step-by-step improvements. Maturity models prevent countries from prematurely enacting strategic trade control laws with less ability to implement or enforce. The PPI, through its Tier system, Tier-specific recommendations, and cluster analysis, supports the idea of improving systems within a maturity-level framework.

How to Improve a PPI Score

Improving a score entails fulfilling many of the sub-criteria or indicators that the project has determined to be of importance. If a country is interested, the PPI team would be happy to provide its points profile and information that led to it, and consult with relevant representatives for a follow-up report. We encourage interested countries to contact us.

With 91 positive, point-earning criteria and 1,300 possible points, a single criterion cannot "make or break" a country. Rather, the final PPI scores indicate that creating an effective strategic trade control system relies on many actions, large and small, in several areas. Nonetheless, focusing on improvement or implementation of 24 "high-impact" indicators defined in the PPI, some from each super criterion, lays out a strategy for improving a country's strategic trade control performance.

Moreover, despite overall low performance in the super criterion *Ability to Prevent Proliferation Financing*, this area offers great rank improvement opportunities for individual countries as well as a path to improved trade control implementation. Together with *Adequacy of Enforcement*, it is one of the two most heavily weighted super criteria in the PPI. A path to better performance is closely tied to working with the Financial Action Task Force (FATF). From 2019 to 2021, thirty-one countries increased their score under the Proliferation Financing super criterion through improved compliance with FATF standards. There are many other international organizations, such as the WCO, that countries should cooperate with more closely on trade control implementation. Implementing the trade control provisions of UNSCR 1540 (2004) and submitting detailed implementation reports would also boost a country's score.

CONCLUSION

For an individual country, the result of the PPI scoring and weighting scheme is its total score and final rank, supplemented by its scores in each super criterion, a rank in one of three Tiers, and a placement by score in one of four clusters. The PPI also paints a global picture, revealing the current state of strategic trade controls worldwide and serving to remind the international community of the pressing need to more widely implement and enforce STC systems throughout the world.

In identifying gaps and trends in STC implementation, the PPI aims to assist governments and organizations in better targeting assistance and capacity building efforts, as well as to assist industry in supply-related risk assessments. The PPI also provides an indication of a state's vulnerability to illicit procurement schemes and measures the extent of a country's compliance with international obligations, such as United Nations Security Council resolution 1540.

Political will, bilateral and multilateral cooperation, and innovative ideas to set up new systems and close gaps in strategic trade controls remain vital. The PPI 2021/2022 shows that strategic trade controls have improved slowly, but steadily, compared to the previous PPI versions. We hope the PPI is a useful starting point for discussions, an incentive for countries to improve their STC systems, and ultimately a benefit for nonproliferation and global security.

ACKNOWLEDGMENTS

Many people contributed to the PPI, which required thousands of hours of methodological research, data collection, and analysis by Institute for Science and International Security staff, past and present. The 2021/2022 PPI builds on the two previous editions and is forever indebted to those who contributed to earlier versions. For this version, we wish to especially thank Institute staff Junaid Siddiqui, Camilla Zhang, and Michael Frank, for their research and contributions, along with several subject matter consultants. We also thank the contributions by Pacific Northwest National Laboratory staff in the development of statistical analysis of the PPI's data, and Anna Lea Albright for performing the cluster analysis. Finally, we are grateful to all those who wish to remain anonymous that contributed to improving the PPI.

REFERENCES

1. From September 20, 2021, the full PPI 2021/2022 report is available on Amazon as an e-book and paperback and on the Institute's website, www.isis-online.org, as a pdf file. Conference participants are welcome to contact the authors for a copy of the report in digital formats.

2. From a strict data science standpoint, making direct, quantitative comparisons between the 2019 and 2021 PPI presents challenges due to small changes in the underlying model, such as the elimination and addition of some sub-criteria. However, when the PPI evaluated average scores achieved in over 80 sub-criteria that remained exactly the same, there was an increase in global average points, affirming our qualitative conclusion that STC systems worldwide improved slowly but steadily.

3. World Customs Organization, "Strategic Trade Control Enforcement: Implementation Guide," 2019, http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/enforcement-and-compliance/tools-and-instruments/stce-implementation-guide/stce-implementation-guide_en.pdf?db=web; Todd Perry, "Reducing Proliferation Risk Through Export Control Outreach: Assistance Providers' Use of Maturity Model-Based Approaches," *Strategic Trade Review*, 2019, Vol 5, Issue 7, pp. 5-24, https://strategictraderesearch.org/wp-content/uploads/2019/01/Strategic-Trade-Review-Winter-2019.pdf.