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Product Threat Intelligence and the Adjustments of Grounds for Security Concerns

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Abstract: Defense awareness is a matter of ongoing research, not only restricted to military personnel. It is essential for those involved in warfare to consider the unfolding of additional security inputs and safety concerns that technological advancements may impact, especially considering how they become available to civilian society. Society progressively surrounds itself with innovations, gaining new awareness of the impacts on both the natural and man-made environment, as well as understanding the trade-offs associated with the innovations. Health is a crucial driver of scientific motivation and an inviolable condition of power. According to the World Health Organization (WHO, 2024), *t is important to know why people die to improve how people live*. Therefore, data enabling and *measuring how many people die each year helps to access the effectiveness of our health systems and direct resources to where they are needed most.* This aligns with the concept of Product Etiology. This article examines the trajectories that have led society to spot Public and Environmental Health, Trade, Security, Geopolitical concerns and resilience questionings in a product. It has the goal to clear the way towards a more questioning society, where innovations are taking place, and numerous platforms exist where individuals and groups deal with product risks, are affected by them, or affect them, and sometimes are exposed to not yet standardized references of safety, which society must still work to uncover. This discussion contributes to the concept of Product Threat Intelligence.

Keywords: Security, Product Threat Intelligence, Health, Trade

Introduction

> The point is simply to say that human limitations will dog designers at every turn. They will infect every design, every project, and the evolution of every system, however clever.
> Orr (2008)

This article is a result of continued discussions regarding Product Threat Intelligence and Product Etiology and how they have evolved under security and, more currently, under geopolitical aspects that, eventually and radically, are capable of building a turn on the paths of political decision-making based on scientific backgrounds of concerns. The terminologies were proposed on the ACLCA 2022 (American Committee of Life Cycle Assessment), under the title of Product Etiology: LCA (Life Cycle Assessments), PCRs (Product Category Rules), EPDs (Environmental Product Declarations), Trade & Security. The developments of this work have evolved alongside the many questions raised by the ACLCA group of experts which are kept under review, with continuous scientific feedback regarding data and methodological inputs. Those concerns represent the state of the art of science being brought to society as the most refined and precise alternative for what levels of transparency may be offered on the traceability of decision-making.

A Changing World on Decision-Making: From Marrakesh Agreement to Product Threat Intelligence on Trade Deals

On *Design on the Edge* (2008), which had already addressed a building environment engineered under the ISO 14.000 series since the nineties, Orr (2008) placed the following quote regarding our role in the processes of project conception: “We are inescapably ignorant and the reasons are many…we are ignorant because of our own limited intelligence and

because we cannot know in advance the unintended effects of our actions on complex systems."

The understanding of sustainability as of complex nature has improved the full scope of areas in the man-made environment, restricting the decision-making process to any direction other than the one that anticipates the possible externalities, making use of the many methods whichever science has placed available of data modeling, turning results into standards, agreements and recommendations, amongst them provided by Life Cycle Assessments (LCAs) with data that has turned available addressing those impacts. "The Interventions are the beginning of the environmental mechanism that ultimately are related to endpoints, which is when damage occurs to areas or conditions we aim to protect and avoid damage" (Tom Gloria, 2014).

The practice of LCAs has allowed continued update of data since the nineties, while also nurturing additional questions on the long run of scientific findings, including changes in product engineering. A relevant aspect to highlight is how society has evolved from the initial statements of the Marrakesh Agreement to the current strengthening of science in decision-making processes. These processes now present advanced geopolitical negotiations that, in some cases, have become matters of national security.

The Marrarrakesh Agreement

> In Deuteronomy it is recorded that the Hittites suffered in great anguish from the twenty years of pestilence that followed their importation and enslavement of Egyptian prisoners of war.
> McMichael (2001)

In 2023, the World Trade Organization report stated that "With security considerations an increasingly influential factor in trade policy, the report finds that some reshuffling of current trading relationships may result from today's tensions but warns that taking this too far would be counterproductive" (WTO, 2023, in Foreword by the WTO Director-General).

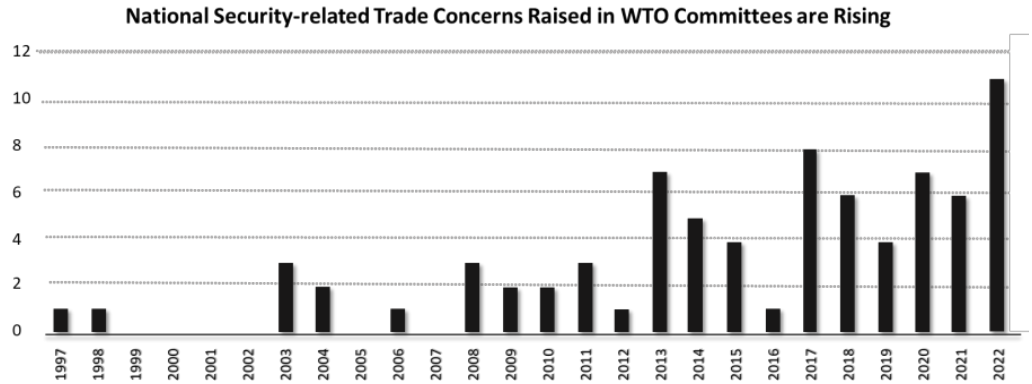

Figure 1: National Security related trade concerns raised in WTO Committee's on the rise

Source: WTO STC Database, https: tradeconcerns.wto.org/en.

Depicts the number of Specific Trade Concerns (STC) relating to national security between 1997 and 2022 raised in the market access import licensing, SPS and TBT Committees. Trade concerns raised at the Council or Trade and Goods (CTG) are not reported in the STC Database.
STC - Specific Trade Concerns
SPS – Sanitary and Phytosanitary Measures
TBT – Technical Barriers to Trade
CTG - Council for Trade in Goods

The signing of the Marrakesh Agreement occurred in April 1994. The following steps were conducted to the Birth of the World Trade Organization on 1st of January 1995. The contents of the agreement were meant to admit the value of relations in the field of international trade. The document described the demand of the agreement based on the understanding that the: "… field of trade and economic endeavor should be conducted with a view to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, while allowing for the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance the means for doing so in a manner consistent with their respective needs and concerns at different levels of economic development" (Marrakesh Agreement Establishing the World Trade Organization. WTO 1994).

The statement explicitly addressed the demand from developing countries for secure integration into international trade, within an environment of reciprocal advantageous agreements, concomitant with the aim of eliminating the discriminatory treatment in international trade relations. Such empowerment has provided the WTO the mandatory ownership of a legal personality, accorded by each of its members, with the necessary legal capacity for the exercise of its functions. At the time it was created, it was already under an environment of deepening concerns and policies regarding security, such as precautionary principles and some already existing international treaties in the environmental area, such as the Basel Convention (1992 Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal). Over time, it has advanced in questioning the local aspect of the national response to global challenges, as well as the need for reframing global concerns to fit within national circumstances. Understanding the worldwide asymmetries has prompted today's concerns regarding the possibilities of supply chain disruptions.

The uncertainty regarding security pressures on trade from the current WTO administration poses a risk of becoming counterproductive and characterizing trade barriers. Despite being based on legitimate concern, it may be argued that those concerns originated from the evidence of anomalies highlighted by scientific findings and scrutiny. Therefore, an investigative approach is required to address and prioritize the valuation of populations and environmental health, as these are justifiable concerns based on the following facts:

- There are inequality gaps in education and deeper scientific background on a worldwide scale as recognized by International Institutions such as the WTO, World Health Organization (WHO), etc.
- Environmental Values are differently valued in decision-making;
- There are risks associated with a lack of governance and varying local capacities for resilience in the face of the unknown technological risks embedded in products.
- The right to health as a human right must not be despised.
- There is a growing risk of organized crime and artificial intelligence (AI), necessitating more aggressive requirements from the WTO. These requirements must be mandatory, and humanitarian rights and ethical principles must be respected.

Fortunately, more aggressive requirements on sustainable attributes transparency are on a permanent and inexorably move on the rise of additional scientific data, highlighting concerns and providing a trustful base of awareness, as clearly noticed in Figure 1 data from the WTO. Despite the new vision appeals that with excessive contentious measures on the shaping of trade policies, the results would not be socially sustainable, under a deeper understanding of the aftermaths of externalities with regards to safety and public and environmental health, security must matter as a priority condition. Not only environmental externalities may be hidden, but social ones, involving child abuse, animal suffering, money laundry, and more. It is required that society improves on the guarantee of safer operational environments on deals,

non-compliance with abuse, valuing respect both to localness capabilities as of its shareholders, and the avoidance of third-party risks.

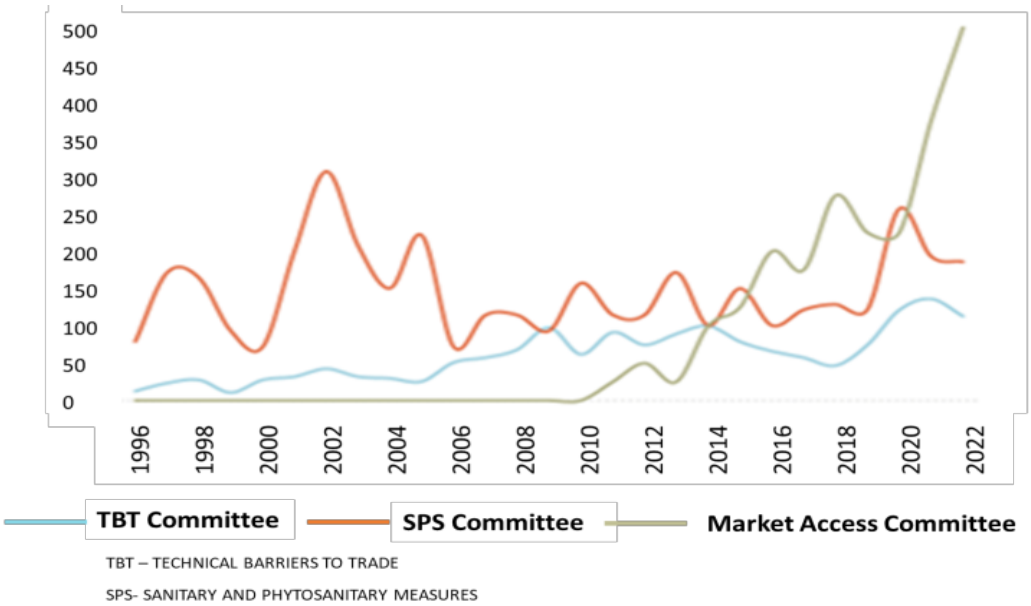

Figure 2: Trade concerns raised in the Market Access, SPS and TBT Committees, 1996-2022
Source: WTO STC Database 2023, https: tradeconcerns.wto.org/en.
SPS – Sanitary and Phytosanitary Measures - TBT – Technical Barriers to Trade
Note: The figure includes both new and repeatedly raised concerns.

The Claim for Security

> For extra precautions, the Pharaoh employed night watchmen to keep watch over homes and towns. These watchmen would then alert soldiers of any dangers. The Cat was a sacred animal to the Egyptians, and many believed it would warn its owners of a burglary through specific movements of its tail and body.
> Security In Egypt

As proposed by Rothschild (1995), the evolved concept of security represents one of the many contributions that raise questions over privileged immunity amongst the platform of international trade and commerce. In the 1990s, security gained an extended version, it added a new sense. According to Rothschild (1995, p. 55), "the concept of security is extended from the security of nations to the security of the international system, or of a supranational physical environment: it is extended upwards, from the nation to the biosphere." Some speculative questions have arisen regarding the security of the individual. Under certain legitimate risks, such as those related to environmental health, disruptions may occur in the name of local sovereignty and human rights.

1.	2.	3.	4.
PROVIDE GUIDANCE	**GUIDANCE OF PUBLIC OPPINION**	**CONTEST**	**TO INFLUENCE**
Sort of guidance to the policies made by governments not by speculative means.	Guidance of public opinion about policy to suggest a way of thinking about security.	Contest of existing policies, oppose an intelligible danger.	To influence directly the distribution of money and power, with the objective of influencing of contesting existing security policies.

Figure 3: The Four Principles of Security presented by Rothschild (1995)
Source: Rothschild (1995)

The extended contribution of the WTO has surpassed the original document it gave birth to and has accompanied the many areas of science and innovations that have landed on the international trade discussions and replied to those inputs from security concerns under the leadership of experts on investigations taking place on a worldwide scale. Multilateral trade agreements evolved under deepened security requests. Those have appeared in the legal arguments displayed in many cases as international litigious complaints, on demand to avoid weak systems, lacking significant structures to perceive damage - especially those yet not embodied under agreements or rules. Those agreements and conventions that convert into pressure for official regulatory bodies become accorded by its members to every partnership the signatory parties belong to. Such is the reason that additional definitions of security are brought up on the following:

Historically, the word secure appeared in the English language in the 16th century. From Latin origin, secures means freedom from anxiety (Baldwin, David, 1997). Security means protection from, or resilience against potential harm or other undesirable status caused by others, by restraining the freedom of others to act.

There are a variety of attributes addressing security, and those may vary according to what is at stake and which are required and selected and prioritized for every modeling purpose, possibly based on previous missteps and driven data which may have resulted from meaningful concerns, whichever are required for further improvements. Additional Definitions of Security are listed below:

- Security is protection from, or resilience against, potential harm (or unwanted coercion) caused by others, by restraining the freedom of others to act. Beneficiaries of security may be of persons and social groups, objects and institutions, ecosystems or any other entity or phenomenon vulnerable to unwanted change (Security, 2024).
- Security is taken to be about the pursuit of freedom from threat and the ability of states and societies to maintain their independent identity and their functional integrity against forces of change, which they see as hostile.
- Security — 1. Measures taken by a military unit, activity, or installation to protect itself against all acts designed to, or which may, impair its effectiveness. (JP 3-10) 2. A condition that results from the establishment and maintenance of protective measures that ensure a state of inviolability from hostile acts or influences. (JP 3-10) 3. With respect to classified matters, the condition that prevents unauthorized persons from having access to official information that is safeguarded in the interests of national security. See also national security. (JP 2-0) (DOD- Directory of Defense – U.S.A. Dictionary of Military and Associated Terms- 2019).
- According to Barry Buzan, the concept must be seen as a: “derivative of power”. It reduces the complex concept of security to a mere “synonym for power”. This view could be considered relevant during the period of the World Wars, where states seemed to be in a constant struggle for power. However, in the post-Cold War era, the concept of Security has become much more multifaceted and complex. Buzan defends a broader framework of security and the incorporation of concepts that were not previously considered to be part of the security puzzle.
- Rothschild´s (1995) on Security: The security of individuals in this sense – the sense of freedom from the prospect, and thus the fear, of personal violation – has been of decisive importance to liberal political thought.
- Buzan´s approach political and military security must be looked alongside with other dimensions which are: economic, societal and environmental or ecological.

The Foreseeing of Security Issues on a Product

The U.S. Dictionary of Military Terms (DOD, 2019) defines a transnational threat as "any activity, individual, or group not tied to a particular country or region that operates across international boundaries and threatens United States national security or interests (JP 3-26)".

The U.S. Dictionary of Military Terms (DOD, 2019) defines "intelligence production" as the process of integrating, evaluating, analyzing, and interpreting information from single or multiple sources into finished intelligence for known or anticipated military and related national security consumer requirements. The concept of intelligence production, addressed to a product, drives investigators to fill gaps of knowledge and comes with scientific and methodological observations and data, data alerts, time, and organized modeling of product etiology data. Product threat intelligence is required, both for international affairs and for the sourcing for domestic intelligence preparedness to commit to identifying risk and harm, provide quick response and bounce back capability – resilience – followed by a structured team with appropriate competence to respond to the outcomes.

The risks of transnational threat to security may occur under the circumstances that the introduction of a product, under the unknown impacts regarding a new process and (or) components or even a way to perform a function, which according to what environmental management standards addresses on LCAs, the category of impacts may affect locally, regionally and on a global scale. The reverse logistics of those impacts may provide intelligence to denounce, for instance, the possible existence of parallel supply chains, illicit trade, and supply chains whichever may lack compliance on best practices of standardization rules, labels and additional criteria and rules that may be applied on a specific site. The following image displays the CMAP of the concept of Product Threat Intelligence and Product Etiology (Gueiros, 2022).

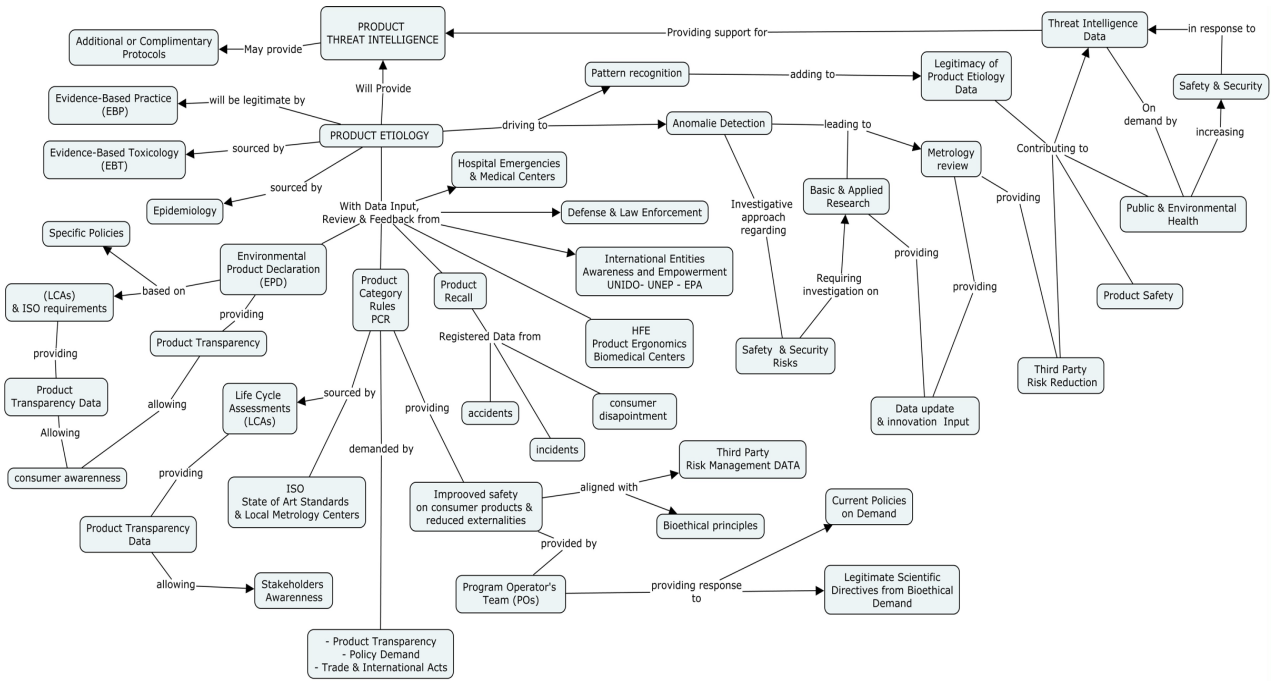

Figure 4: Information System on Product Etiology and on Product Threat Intelligence CMap
Source: Gueiros (2022)

We consider that product etiology data will supply the updates for and from industrialized and consumer products on product threat intelligence while it performs with the feeding of its system itself based on accident registers, recalls, complimentary scientific findings, and the notifying of *on-demand* requirements such as new metrological references to be replaced.

Design for Critical Infrastructure Resilience

> …the construction of both local and the global crucially depends on the production of knowledge and its interaction with power. How we understand and represent environmental problems is inescapably linked to the ways in which we choose to ameliorate or solve them.
> Jasa off & Martello (2004)

It is important to state that populations are not invulnerable, but rather resilient. Nonetheless, one must question: At what levels of resilience may one system not be under suffering or (and) under torture? Resilience, in this case, may be placed as an attribute. This attribute is of further complexity and relevance when modeling Health and Environment, as it affects populations' health differently, and the value of such attribute inexorably addresses both ethical and scientific inputs. Thus, the concept must be approached from a systems perspective. This insight can be illustrated by various cases. As noted by Greenpeace: "Death is not the only damage endpoint as animals may suffer loss of hearing, bodily harm as well as disruption of feeding, mating and migration…. endangered creatures are harmed or displaced by seismic testing or other noise pollution in the oceans. As a first step to bring public awareness to this issue, we determined it critically important to collect and review the limited amount of existing scientific research about noise in the oceans and its impact on marine mammals."

The Energy Sector is one – if not the most – sensitive area on outlining strategic scenarios and international interests regarding power. The Argonne National Laboratory (U.S. Department of Energy Laboratory), Decision and Information Sciences Division has elaborated a work acknowledging the aspects of security under the inputs of resilience concept. The document entitled *Resilience: Theory and Applications* (Carlson, 2012) has provided an understanding of critical infrastructure resilience and offered paths to achieve the objective. Resilience is defined by many experts, and amongst various definitions, Argonne defines it as "the capability to bounce back." Other general definitions are placed as references, such as "the capacity of a system to survive, adapt and grow in the face of change and uncertainty" (Fiksel, 2006, p. 21). The many contributions on the area advanced additional applications of the concept, such as infrastructure resilience and community resilience, "Infrastructure resilience is the ability to reduce the magnitude, impact, or duration of a disruption. Resilience is the ability to absorb, adapt to, and/ or rapidly recover from a potentially disruptive event" (NIAC 2009, p 12).

The advancement of the concept towards local capabilities to confront adverse scenarios is highlighted in the statement, "Community resilience is the capacity of a community, its members and the systems that facilitate its normal activities to adapt in ways that maintain functional relationships in the presence of significant disturbances" (Paton 2007, p.7). The figure below depicts the relationship between components of resilience and resilience-enhancing measures.

ANTICIPATE	RESIST	ABSORB	RESPOND	ADAPT	RECOVER
Preparedness	Mitigation		Response		Recovery
Activities taken by an entity to define the hazard environment to which it is subject	Activities taken prior to an event to reduce the severity or consequences of a hazard.		Immediate and ongoing activities, tasks, programs, and systems that have been undertaken or developed to manage the adverse effects of an event.		Activities and programs designed to effectively and efficiently return conditions to a level that is acceptable to the entity.

Figure 5: Relationship between components of resilience and resilience-enhancing measures
Source: Carlson (2012, p. 22)

The concept of critical infrastructure resilience matters: if no action is provided on the eminence of a threat, if the community is not prepared, its resilience capability will probably fail.

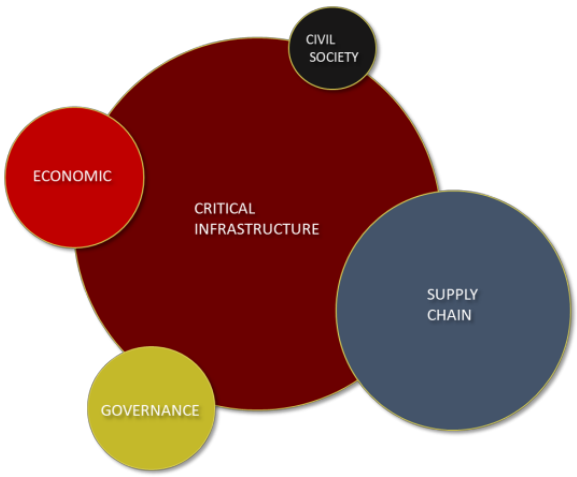

Figure 6: Site Assessment Contribution to Community Resilience Analysis
Source: Carlson (2012, p. 22)

Security, and whatever paths it may take to address local capabilities, must mandatorily contribute to the intent of planning and fostering community resilience. The bearing of security recalls contemporary strategies of war, which require a nation to focus on designing resilience to provide preparedness and capabilities in adverse contexts. This includes addressing topics that may pose risks of compromising local governance and, therefore, local sovereignty, affecting a diversity of aspects and the many scenarios in which they may blend.

Numerous trends have called for adjustments to grounds for security concerns. Among them, the energy sector, for example, has provided incentives for alternative sources of energy over the last decades, contributing to concerns that decision-makers can no longer ignore. Despite compliance, products may not necessarily have had a full report or further extended investigation of their risks fully accessed on the whole supply chain, which can be of minor and of controlled nature, and some may be of a hidden, not yet standardized risk.

Figure 7: Attacks on the U.S. electric grid range from vandalism to armed assaults.

Source: Bloomberg

Current trends that rely on digital systems, AI and nanotechnology applications are recurrent examples, as this area addresses continuous innovative platforms for society. Still, there are uncertainties of yet unknown risks for premiere users and applications. This situation plunges under formal structures of power unawareness and (or); unpreparedness and (or) of parallel power influence, including those from organized crime actions, which may force the

allocation of decision-making on sites locally disowned of comprehensive security, as we understand that the current world status on education, and its access, is globally asymmetrical.

The combat of climate impacts, for instance, has made solar and wind electricity generation systems accessible and economically viable, with cheaper, more efficient and successfully implemented solutions for the electricity generation grid composition. Nonetheless, under product threat intelligence, some registers have forcefully pressured involved parties to move deeper into the product system review, observing a full perspective of Public Health, including use-phase impacts and diverse Supply Chain challenges. For decades, investigations of the negative externalities of wind farms on populations, regarding noise and vibration emissions in the use phase have been researched; publications such as Gill & Taylor (2001) have registered that: "The installation of offshore wind turbines will require the transport of electricity between turbines and to the mainland. Modem day technology transports electricity via submarine cabling which in the process produces electromagnetic fields around the cables. Sharks, skates and rays (subclass Elasmobranch) have long been known to exploit the electric outputs of organisms in saltwater, to detect and capture their prey, and they are also thought to use the Earth's magnetic field for navigation. Therefore, there exists the potential for electrosensitive species to detect and respond to the electromagnetic fields produced by offshore power installations."

Thus some researchers consider the nocebo effect hypothesis (Tonin & Colagiuri, 2016), the negative impact has equally evolved to address the public, environmental health and security appeal on the many areas it may be necessary to the avoidance of safety risks, geopolitical misfortunes and in parallel mapping where the product system and (or) innovation must be required of engineering improvement, further regulated or even disrupted (Ashford & Hall, 2011). Could parties been blinded by political incentives, business opportunities and government deadlines despite not yet having a deep understanding of local populations, geographic characteristics and complementary requirements to further investigate? Such as how power emissions will differently affect local populations, and the many paths this may be translated into national security issues. Scientific uncertainties regarding emissions from both onshore and offshore wind farms have been contemplated, focusing on the reliability analysis of the wind power system industry. The reliability analysis methods have been used for mapping solutions on product systems, however, according to Zhu and Li (2018), those have "mainly focused on gear transmission systems of wind turbines and ignore the influences of other systems."

The adverse impacts have been alarmed and researched, becoming available as scientific routes for responsible decision-making in society. However, uncertainties remained on the subject, which depend on the courage of policymakers to require adjustments based on these concerns. In most cases, this will require that standards and (or) possibly methods on metrology may be mandatorily reviewed. According to Frederiksen (2013), "In addition to the traditional methods for microphone sensitivity and frequency response calibration, new development areas, like for example wind power, has created needs for low-frequency and infra-sound calibration, down to 0,1 Hz."

Conclusions

The amount of ISO standards that are periodically dispatched and turned available (and reviewed) on the regulatory environment, have improved access for safer decisions, therefore, edged for improved trade relations and transparency on geopolitical warnings. Without a proper environment of awareness, the losses may place critical security challenges, that may remain unsolved for longer periods. When dealing with inequalities, "If we do not have a transparent system where there is trust, we will get to the bottom because everyone will try to subsidize, and developing countries will lose because they will not have the fiscal space to be

able to join the subsidies race. Specific subsidies make complicate for others to compete an issue (WTO Report, 2023, Ngozi).

Among the diverse case studies that may be further investigated under reviews that call for adjustments on security concern, we must remember that those are relevant concerns. Some cases remain unsolved and require deeper investigations, such as the assessments of certain categories of emissions' impact on health. For example, the increased consumption of electrical energy has subjected the environment to noise, vibration, and electromagnetic pollution. Extra-auditory physiological impacts of low frequency noise on humans and other populations have been researched under Public and Environmental Health. Additionally, in the context of security, emissions have been linked to severe hazards that remain under investigation, such as the known Havanna Syndrome, that has reported unusual noise, abnormal auditory phenomena, possibly violating safety and security and under sonic attack (Baloh & Bartholomew, 2020), affecting U.S. Embassy personnel.

Biological effects resulting from noise and vibration emissions depend on a system approach investigation involving three components: source, path, and receptor (I. L. Vér & L. Beraneck, 2006). The impacts are associated with dosimetry, propagation path and the characteristics of the receptor population. According to Balmori (2009), the dose will indicate long-term accumulative effects, and the dose affects differently among species.

The turning of knowledge into milestones on product performance, nonetheless, requires that the fragmented vision of what is wrong and where it went wrong, to be questioned of what should be done about the perceived harm and threats, considering that, possibly, those findings may be likely to confront adverse political reactiveness.

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