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A NOVEL DIGITAL SERVICE TAXATION & SUSTAINABILITY LEGAL FRAMEWORK UTILIZING ARTIFICIAL INTELLIGENCE ANALYSIS OF SUBSEA CABLE DATA TRANSMISSIONS

Abstract

The digital economy has led to massive changes in the economy and international trading, where user data have become the cornerstone of new business models. Digital services have become transformational and led to significant revenue generation for these corporations. However, there is a growing perception amongst individuals and governments that these digital services are not taxed fairly, given the ability of companies to shift profits between different countries. Digital service taxes have recently become very attractive and implemented in a variety of countries, but significant challenges remain. Artificial intelligence has become an attractive way of determining patterns across data and has been increasingly utilized in legal environments. I will outline a new legal framework for the integration of artificial intelligence for the determination of digital service taxes and outline the integration of subsea cable communication data into the framework. Furthermore, I will address the legal environmental challenges, specifically related to the South China Sea, and how cost associated with can be incorporated into the digital service tax environment.

Key words: digital services tax, artificial intelligence, environmental challenges, subsea cables.

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1. Introduction

The digital economy has grown significantly with the rise of the internet. The COVID pandemic has outlined more profoundly the importance of the digital economy and the growing digitalization of everyday life. While digital commerce has been a cornerstone of the digital economy, companies such as Google derive most of their revenues from the utilization of user data. These business models represent a considerable challenge to taxation laws due to the fact that the nexus of permanent establishment is not necessary for most instances to provide these services, nor is the value obtained from the users directly quantified and determined at the physical location of the user [Watanabe 2021; Lyutova 2021]. The Asia Pacific region has seen enormous growth in the last 30 years, primarily driven by the rise of the People's Republic of China. While most European countries are connected via land borders with several communication links, the Asia Pacific is characterized by mostly sea borders that connect Japan, South Korea, China, Indonesia, the Philippines, and other countries to each other.

With the rise of e-commerce and services worldwide, extensive communication links have been established in order to supply these services across the South China Sea and Pacific and strengthen commercial ties [Cordesman, Burke 2019]. Digital services, such as those provided by TikTok, or Lazada, represent a significant part of the new economy and incur substantial revenues in countries such as Indonesia. The revenues derived from these services are mostly based on the utilization of user data for generating new business products and services. Submarine cables play a crucial role in connecting various countries with each other via the internet and represent data highways for services to be provided [Kraska 2020]. Given the ever-increasing amount of data that is transferred between these nations, infrastructure challenges remain in ensuring that sufficient capacity is available, as well as that the data transmission is traceable. Subsea cables represent a crucial linkage between the countries bordering the South China Sea, and a significant part of the internet access in the connected countries passes through these cables. While these subsea cables represent a key infrastructure, they have a significant impact on the marine environment. Additionally, most countries in the region aim to incorporate legislation in order to ensure that the value derived from the network traffic in the nation is also taxed in the nation. Given the growing cost to the environment of the digital economy, questions arise on how to accurately incorporate these costs into the taxation of digital services and the utilization of data [Klimley, Putman, Keller, Noakes 2021].

There have been several countries that recently introduced digital services taxation legislation. The challenge with respect to all these legislations is that the measures to

determine the tax amount are rather broad and typically only indirectly relate to the data utilization. Specifically, percentages of the overall revenue of the corporation are utilized in order to determine the total taxation amount, which is a rather imprecise and broad measure [Faulhaber 2019].

Given the challenges of governments to determine an accurate measurement criterion for the determination of value created from the collected user data, taxation regulations that incorporate artificial intelligence for more accurately determining the due taxes have grown in importance [Kovacev 2020]. Furthermore, representing a critical link for the data communication for governments, analyzing subsea data communication becomes essential in evaluating the user-website accesses and quantifying the taxable amounts.

The growing international trade, especially in the Asia-Pacific region, has led to environmental impacts caused by the laying and operation of subsea cables. With increasing operations of subsea cables in order to satisfy the growing demand for data exchange, this necessarily causes challenges to the marine life and may harm species as well as the overall subsea ecosystem. Given the importance of this ecosystem for the local industries, the cost of taking affirmative actions against these environmental effects and reduce their impact becomes significant. Environmental factors have to be taken into account in order to compensate for the effect of subsea cables and attribute acceptable costs to these operations. These costs have then to be subsequently recovered from the digital services taxes.

In this article, I will research and address several legal questions that arise in incorporating environmental effects on digital services taxation, primarily focusing on the impact it may have in the Asia Pacific region, focusing on the South China sea. Furthermore, the article will provide an overview of how artificial intelligence may be integrated to enhance the fairness of taxation of digital services and also accurately associate environmental costs to these digital services. A final part of the article is about the legal measures that have to be incorporated, such as to support the cybersecurity of the artificial intelligence frameworks and avoid manipulation to minimize the digital service tax due.

2. Problem Background

Submarine cables represent the backbone of the digital economy, connecting entire countries and continents with each other and enable the provisioning of digital services and electronic information exchange [Davenport 2012]. Submarine cables are divided into power and communication cables, where the first delivers power undersea and the second

transmit data communication across. These cables are laid and buried in the seabed typically, which may be at hundreds of meters of depth. Submarine cables have a long history back to the 1850s, with the first telegraph cable being laid across the English Channel to transmit a few messages. With improvements in technology, almost the entire world was connected by telegraph cables that allowed to transmit information rapidly. While the telegraph cable industry eventually declined, the telephone industry rose in prominence, and telegraph cables were replaced by submarine telephone cables in the 1930s [Wrench 2000]. Coaxial copper cables formed the backbone of telephone communication across the world. However, this was subsequently replaced by satellite communication due to the relative inexpensiveness and availability. Fiber-optic systems were becoming the norm, replacing the copper submarine cables and allowed to significantly enhance communication across the world [Palais 1988]. With the release of the commercial internet in the 90s, the industry has encountered significant growth in the last three decades. The growing interconnectedness between the world's economy significantly increased the demand for subsea communication cables, taking into account that satellite-based options do not offer the bandwidth capacities that are needed. The South China Sea represents a highly congested area with several submarine cables being operational that transmit data communication between China, South Korea, and Japan and the southeast Asian nations, such as Singapore, Malaysia, and Indonesia [Rahman and Tsamenyi 2010]. The importance of this seabed cannot be understated, both in terms of the significance for the data communication between Asia and America as well as its impact on the environment of the South China sea [Clark 2016]. Millions of e-commerce transactions and important information are transferred via these cables, which represents a significant amount of economic value creation that is supported by these undersea cables. Given the substantial amount of data and energy that is transmitted via these cables, this necessarily may have environmental as well as financial implications [Carter, Burnett, Davenport 2014]. As data have become a crucial element of the modern economy, entire business models are solely based on data exchange. With the COVID pandemic upending international and local travel, virtual communication and online engagement have become even more widespread, with international commerce between the adjacent countries and China being mostly conducted in a virtual form.

Given that data transmission via undersea cables is both more efficient and economical as compared to satellite transmissions, the growing demand for internet-based services will require even more transmission capabilities to satisfy the demand for increased bandwidth and transmission rates. Current satellite internet transmission capabilities are limited in

terms of their bandwidth and transmission speeds they can achieve, which will for a considerable time not significantly improve given the technical constraints in transmission via electromagnetic waves in the air. This clearly renders cables as the most efficient form to transfer the ever-increasing amount of data. Several challenges arise from the transfer of information via undersea cables that may not be encountered with an equivalent land-based fiber optics network. Land-based fiber optics networks run across jurisdictions and are protected by the owners and the laws in the jurisdiction. Typically, these cables can be relatively easily be monitored and also secured in order to ensure that the data traffic is monitored and recorded as well as is free of external modifications [Kota, Pahlavan, Leppaenen 2003]. From an environmental perspective, the impact of the cable and insulation on the local environment is well monitored and observable. Sea-based fiber optics cables do not experience the same protection and ability to easily inspect any environmentally-related challenges as well as breaches in the connection between the undersea cable.

Environmental challenges related to subsea fiber-optics and power cables have been well-researched over the years [Taormina 2018; Jurdana, Ivce, Glazar 2014]. The main environmental effects related to subsea cables stem from the maintenance and other human operations, which causes the fragile subsea ecosystems to be harmed beyond repair. While coastal areas fall within the jurisdiction of country and laws, the subsea area between countries are subject to international law and the Law of the Sea. This legal discrepancy creates significant challenges for dealing with the environmental issues caused by the laying of cables, as well as the operations in the subsea environment. The environmental effects can be generally divided into two phases. The first and last phase is the environmental damage that may occur during the installation or decommissioning of the subsea cable. The second phase are the damages that occur during the operation, such as when the sea cable is removed from the subsea bed, is laying down on the subsea bed or is buried in the bed. The effects may include physical habitat disturbances, the resuspension of sediments, chemical pollution and noise related to the underwater emissions. Physical changes related to the cable laying may lead to significant destructions of the seabed, as first trenches need to be created, where the cables are then laid into [Reda 2017]. This necessarily may damage the significant number of Coral reefs and other vegetation encountered in the South China Sea, and may have a significant effect on fishing and other habitation.

A major challenge arising from the subsea fiber-optic cables is the chemical pollution arising from the cables themselves that may release heavy metals and hydrocarbons. Given

that the insulation and cover of the cables are made of a composite of plastic and metal, these may release contaminants into the water which may be then absorbed by sea animals. This in turn may lead to the integration of these contaminants into the food chain and may damage the fishing-dependent economies of the countries sharing the South China Sea. Other challenges may arise from oil leakages from the installation or maintenance boats, in addition to emissions from lubricants. Oil leakages are significant polluters of the world's oceans, and the South China sea is by no means an exception [Meißner 2006].

Furthermore, the noise emissions resulting from the operations of the fiber optics cables and their vibrations may significantly affect the orientation and communication of fishes and other species. Subsea fiber optic communication utilizes high power light pulses to deliver information over long distances, which causes due to the scattering of the light within the cable considerable sound waves that may interfere with the sonar communication underwater. Another challenge is the electromagnetic radiation that is caused by the subsea cables. The electromagnetic waves are significant heat emitters, and with increasing density may lead to a significant warming of the area around the cables. Given the increasing communication needs between two of the largest countries on earth, the number of subsea cables will increase in the future in order to support the increased demand [Reda 2017].

The legal question arising from the environmental impact of subsea fiber optic cables is which legal framework deals with the resulting costs and implications [United Nations 2021]. The United Nations Law of the Sea Convention [UNCLOS] is the major legal framework regulating the oceans and sea that do not fall within the jurisdiction of individual nations. The UNCLOS convention represents a major milestone in the development of law on the sea, categorizing the marine zones into three different zone. The first zone is the area under territorial sovereignty of the country. The second zone is the area outside the sovereignty of the country but where the national jurisdiction is still applied. The third zone is that which is outside the national jurisdiction. The latter zone encompasses both the high seas and the deep seabed, while the former two zones encompass the exclusive economic zone and the territorial sea. The UNCLOS has become a very contentious topic in the South China Sea where several countries lay claim to small islands that may allow them to lay claim to the area in between. The arising challenges to this affects significantly the laying of subsea cables, given that these cables partially pass through the jurisdiction encompassed by the small islands. The major challenge that arises from this is that besides the rights of laying cables, these cables and the information within

these cables is subject to the jurisdiction of the country. Furthermore, environmental issues arising from the laying and the operations of the cables are subject to local jurisdictions in case they pass through or next to these islands. Additional implications may arise from e-commerce transactions that are subject to potential taxation based on the traffic that is transported via these cables.

3. Research Questions and Framework

Overcoming the taxation challenges arising from the provisioning of digital services and goods represents a major challenge for any government. Most recent digital services taxes exhibit rather broad and vague criteria on the amount that is taxed by an individual company and focuses primarily on larger enterprises that have a relatively market dominating position. The vagueness of the measurement criteria, being primarily related to the overall revenue of the corporation instead of a targeted approach to determine the value created by these services based on the user interaction.

We will address in this article the subsequent research questions:

- What shall be the legal framework for AI assisted taxation of digital services ?
- How can bilateral treaties and agreements be structured between the countries connected to the South China in order to accurately tax digital services ?
- How can environmental related cost caused by subsea communication cables be taken into account for the taxation of digital services ?
- What is an adequate integration of cybersecurity regulations in order to ensure accurate enforcement of the taxation regulations?

With the advent of the implementation of digital services taxes in a variety of forms in several developed countries, the main challenge is the development of a robust legal framework for the taxation of digital services that accurately captures the value creation in the countries connected to the South China Sea. Furthermore, ensuring that the legal framework is established in such a way as to accurately determine the revenues resulting from the services that are provided. Given the extensive amount of data that has to be processed in order to accurately determine the value that is generated from the user data and the transaction and services that are provided.

Taxes on digital services shall serve several functions, which are the fiscal, redistributory, regulating, controlling and promoting functions. The fiscal function allows the government to finance its budgets and realize national programs, which incorporate the provision of

defense, environmental protection and other social services. Many governments in the last decades have encountered shortcomings of the existing taxation framework, feeling that many companies in the digital space, such as Facebook and Google, bypass historical taxation regulations via their ability to provide services to anyone across the globe without having a physical presence in the country. This important function of fiscality has to be addressed by a robust legal framework related to digital services [Wei 2016].

The redistributory function is connected to the fiscal function in that it shall ensure that the income generated by these companies, and the subsequent shareholder, shall be redistributed to those that are deprived or shall enable the poorer ones to advance in their lives. This factor is especially observed in the digital space, where almost every individual consumes content and services, while leading to a monopoly effect [Avi-Yonah, Fishbien 2020].

The regulating function of the taxation of digital services serves a crucial purpose to support the economy and steer the digital economy into the desired direction of the government. In the instance of digital services, this shall avoid that digital companies may derive revenues from a country without paying any taxes on the income they have generated in the nation. This shall inhibit this attempt at shifting profits to low-tax jurisdictions and avoid that these companies can easily succeed against other more traditional companies that need a physical presence.

The controlling function of a digital services tax represents a crucial role as it allows the government to control the activities of digital service providers in the country via ensuring that they are accounted for as a provider when they are providing services in the country.

A final function of the digital service tax is the promotion of new business models and technologies via ensuring that these smaller and innovative enterprises receive incentives in order to be able to grow their business model.

4. Analysis and Discussion

When discussing the implementation of digital services taxes, the main legal question arises in terms of whether the services are covered already by existing sales or usage taxes, and how a digital services tax distinguishes itself from existing sales taxes that are covering digital products and digital services.

In order to properly integrate the taxation of digital services in existing taxation frameworks of the countries bordering the South China Sea, a more focused approach analyzing the data, and the value that is generated from these data is needed. Given this

situation, an artificial intelligence benchmark model that serves as the benchmark for the determination of the taxation amounts, is the most beneficial approach. A major question arises on how to formulate the legal framework to reference to this model as the guideline for taxation, and how to ensure that the model is properly utilized to obtain a fair taxation amount. The most promising and solid approach is to stipulate the model in the taxation text, referring to the model version and input factors, as well as the documentation requirements, which incorporate IP address information as well as length and duration of access to a specific website. The model further requires the company to outline the revenues derived from the user interactions, which is based on the pricing regiment the company employs for the calculation of the advertising fees. As pricing may differ, the model has to be trained on the data to establish a correlation between the user data and the revenues. Furthermore, environmental costs associated with the extensive degree of data utilization may be taken into account. This may be equally integrated into the taxation legal framework as a cost associated with each user access that is transferred via these subsea cables. The cost associated with environmental damage and remediating its impact can be determined via modern big data algorithms in order to provide a specific and easily to monitor allocation of cost for the revenue obtained from each user interaction with a company.

A major question that arises is how digital services taxes and its effect on the income of corporations can be better incorporated into bilateral and multilateral investment agreements in order to avoid double taxation. The first initial step is to avoid dual taxation of incomes, ensuring that any digital services taxes are deductible from local income taxation between the nations. While the digital services taxes may differ between the nations, the tax deduction shall be claimed where the service tax is charged. The issue with cross-country invoicing in order to minimize the overall digital service tax to be paid is less applicable in the instance of digital services taxes, as an IP address-based charging of taxes cannot be overcome with cross-country invoicing or profit shifting.

As outlined above, environmental related cost due to subsea communication cables can be determined via advanced artificial intelligence techniques. The instances of user access and its revenue generation can be connected to the extent to which the information passed through any of these subsea cables. This allows to determine the overall revenue generated for the utilization of the subsea cables, and average cost associated with environmental damages caused by subsea cables can be incorporated into the taxation of the overall digital services tax.

A further challenge arising from the taxation is the aspect of cybersecurity and individuals or groups trying to either circumvent the regulations to minimize taxation liabilities, as well as trying to access the data recording infrastructure in order to exploit user and traffic data. Cybersecurity has become of major importance for many governments, given the significant impact it may have on the economy and the potential conduct of illegal activities. The first question that arises from the international transfer of communication data is the place of data residency. In order to ensure that the access to the collected data, which incorporates both user and revenue data, data legal provisions should require that these data are stored on domestic server networks, and that there sufficient best practice safeguards for the protection of the data. This also applies to the artificial intelligence model that is utilized for determining the taxation amounts.

While these data residency requirements are important, sufficient penalties for data breaches have to be enacted as well. This also relates to the subsea cables in order to ensure that individuals cannot penetrate the subsea communication, and illegally access data. The minimum security requirements for subsea cables requires that a data penetration can be detected within a limited period of time, which should be within minutes. This requires the subsea cable providers to install respective security sensors and detection of physical intrusions.

With respect to data breaches, companies need to ensure that an average individual with conventional penetration tools will not be able to obtain illegally access to the data and model. Furthermore, data access has to be monitored, as well as it has to be ensured that only selected individuals with authority are able to access the data.

Ensuring that adherence to the regulations outweighs the cost and maintenance of a security system, penalties need to be sufficiently high for individuals and enterprises violating these requirements. This shall ensure that there is sufficient incentive for the adherence to the regulations and safeguard against data breaches.

5. Conclusion

Digital services have had a significant impact on the economy, with a vast array of conventional services being supplied almost entirely online. With the rising income levels and digitalization in the countries connected to the South China sea, digital services represent a significant share of today's economy, with internet companies creating significant revenues from the provisioning of services, as well as utilization of user data. Existing digital services taxes represent a rather unprecise approach to the taxation of

digital services, utilizing broad measures instead of quantifying the exact revenues generated by these companies. Artificial intelligence has played a crucial role for dealing with the large amount of data related to digital services, and quantify the financial revenues obtained from it. The article outlined a new legal framework for the utilization of artificial intelligence models for accurately determining cross-border digital services revenues, focusing on the analysis of subsea communication cables as well as incorporating the environmental impact these cables and the operations have on the environment.

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