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Thoughts from the Gundam Pavilion at the Osaka Expo: Who would be the judge if a murder were to occur in an orbital elevator?

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I. A thought experiment from Gundam

"If a child is born in space, what nationality does the child take on? If a murder were to occur in an orbital elevator, who is responsible? If there is a labor dispute on a space colony, which labor laws would be applied?"

At first glance, it may seem like a science fiction story, but it may be a "future reality" that is right around the corner from us. Last time, inspired by Professor Hiroshi, I wrote a blog post titled "Is the Android 'Me' the Same Person?" (https://innovationlaw.jp/en/android-law/)

This time, I visited the Gundam Pavilion (https://www.expo2025.or.jp/domestic-pv/bandai-namco/). Gundam is a monumental science fiction anime franchise that depicts warfare using mobile suits and humanity's expansion into space. In this fictional world, characters fight battles in their own high-tech original suits.

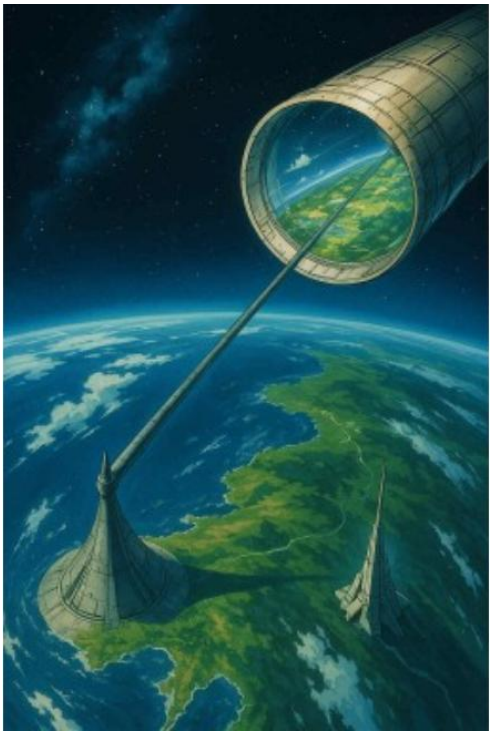
The Expo Pavilion depicts a peaceful future where mobile suits are used for construction, agriculture, and space debris collection. Visitors of the Pavilion have a virtual experience of riding an orbital elevator from Yumeshima in Area 7 (Gundam terminology for Earth) to a space colony.

While experiencing this, I was thinking about the following: "In the exhibit, it takes only a short time to reach space, but in reality, it would take days. If something were to happen during that time, which laws would apply?
And to begin with, is an orbital elevator a vehicle? Or a building?
In the world of Gundam, space colonies are independent of Earth, but if they were connected to the ground, whose territory would it be?"

In my previous blog, I questioned what the law should be like in a future where the

boundaries of humanity become blurred. In this article, I would like to attempt a thought experiment from a legal perspective on a future where the boundaries of space become blurred, namely, in space, regarding which country can reach whom and how.

Figure 1 Orbital Elevator and space colony (AI-generated)



II. In what country will you give birth? - Orbital elevators and "nationality of space"

(1) The entrance to space is limited to "directly under the Equator."

Imagine a birth taking place in a space elevator. Labor begins 10,000 kilometers above Earth. The baby is born 20,000 kilometers away.
Before deciding on the child's nationality, the first thing we need to consider is, "Where is the elevator built?" In fact, space elevators have some surprising physical constraints. Due to the geostationary orbit, they can only be built directly on the equator. In other words, they are physically impossible to build in a place like Japan. They can only be built in countries directly on the equator, such as Ecuador, Kenya, Indonesia, Brazil, and the Congo (this point is explained in the pavilion).

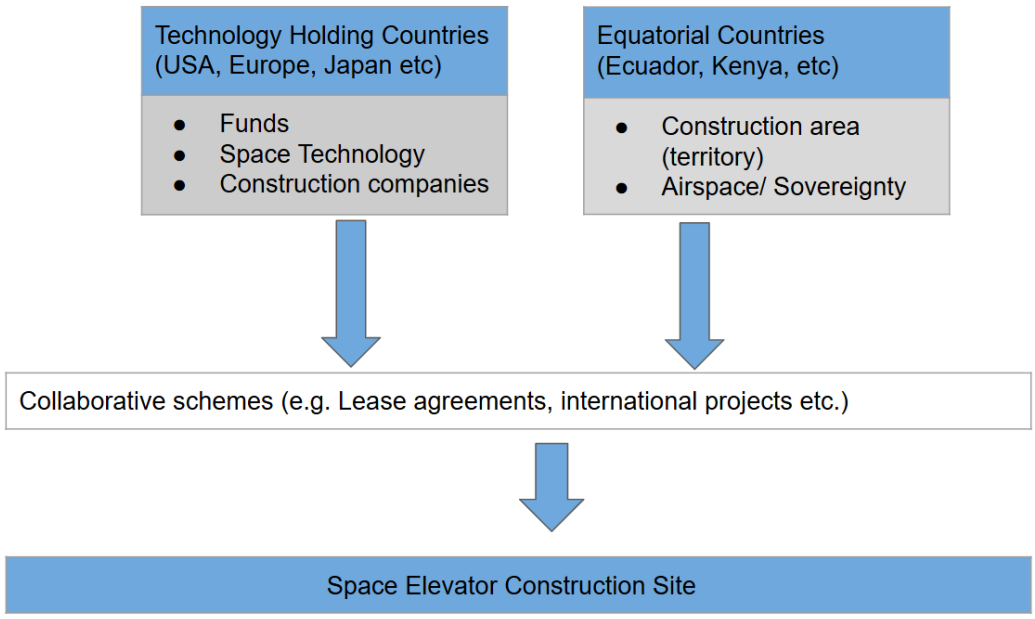
(2) Technology vs. Land

This is where an interesting (and complicated) structure arises.
It seems likely that the countries with the technology and funds to build a space elevator are primarily the United States, European countries, China, and Japan. However, it is the countries along the equator that have the physical space to build one. This means that there is inevitably a separation between "countries with the technology" and "countries that provide the land."

Going back to the birth example from the beginning, if the United States had built a space elevator in Ecuador:

- Elevator Owner: America?
- Land provider: Ecuador
- Jurisdiction of place of birth: Which country would this be? This is a complex issue that cannot be resolved simply by saying "one of the nationalities."

Table 1: Structure of space elevators and jurisdiction boundaries



(3) Who will control the “gateway” to space?

A space elevator is more than just a transportation facility. As the only "gateway"

connecting Earth and space, it will be an extremely important strategic infrastructure in terms of politics, economy, and security.
Because logistics and communications between Earth and space will be concentrated at this single point, the country that controls the elevator will have an overwhelming advantage in the space economy. It will also be in a position to effectively control activities in outer space.
This situation could potentially give rise to a serious international issue known as "orbital superiority" in real-world space development.

(4) A return of the Panama Canal-style “lease model”?

So how should equatorial countries, geographically capable of building a canal, and countries with the technology cooperate? The Panama Canal, built by the United States in Panama in the early 20th century, is often cited as an example.
At the time, the United States leased the Canal Zone from Panama for 99 years, effectively granting it sovereignty and military control. A similar model for space elevators is envisioned: they would be built and operated under a long-term lease of land and space.
However, space elevators are not simply terrestrial facilities. They would extend from the Earth's surface to 35,000 km into outer space. This would require more than a simple terrestrial lease; a contract would also need to include access to territorial airspace, undefined airspace, and outer space. This would likely result in the most lengthy legal agreement in history.

(5) Seek practical solutions

Currently, several alternatives are being considered in legal research on space elevators. The Japan Space Elevator Association and others have proposed building it above the sea directly under the equator, avoiding territorial disputes. However, maritime law does not anticipate use in the airspace, creating new legal challenges. Organizations such as the Japanese Society of Aeronautics and Astronautics have also proposed building and operating it through an international consortium of multiple countries. This model would operate space infrastructure through a multinational institutional design, similar to the International Space Station, while avoiding the monopoly of any single nation.
In any case, the physical constraints of where a space elevator can be built dictate who and how it can be legally operated. The technological constraints themselves are driving the design of new international institutions. In the next section, we will delve into the legal

issues that arise in the "space" itself, through which this elevator will travel—that is, in airspace, outer space, and the undefined areas in between.

III. How many kilometers above the ground did the murder occur? - The gray area "high above the ground"

(1) Which country is the 10,000 km point in?

A murder occurred on a space elevator. The suspect was arrested, but the crime occurred 10,000 kilometers above Earth. The question that arises here is, "Whose laws apply to this space?"
In fact, there is no clear answer to this question. This is because the space elevator is designed to travel through 35,000 kilometers of space, where it is unclear whose sovereignty extends and whose territory it is.

(2) Jurisdictions change like the transcontinental railroad

The uniqueness of a space elevator is similar to that of a transcontinental railroad. Just as the applicable laws change whenever a railroad crosses a border, the legal jurisdiction of a space elevator also changes as it ascends.
However, there is a crucial difference. With a railroad, the laws change at the "line" of a national border, but with a space elevator, the boundaries themselves are unclear, as to which country's laws begin and end.
With an airplane, the laws of one country apply. In contrast, while a space elevator is a single structure, its legal world changes gradually as it moves vertically, from the ground to airspace to outer space - making it an extremely unique entity never before seen.

(3) The sky is the limit of sovereignty

First, a surprising fact: the extent of a nation's "airspace" is not actually clearly defined under international law.
Sovereignty extends to the altitude at which passenger aircraft fly - roughly 10 to 12 km. As for the stratosphere and mesosphere (12 to 100 km) above that, the situation is vague, with some saying it is "probably territorial airspace."

(4) The Outer Space Treaty and the Definition of "Outer Space"

The 1967 Outer Space Treaty stipulates that "outer space has no sovereignty." However, there are problems here as well.

To begin with, it has not been decided where outer space begins.

- America: Space is defined as anything above an altitude of 80 km.
- International Aeronautical Federation: The boundary is at an altitude of 100 km (called the Kármán line)
- Outer Space Treaty: No specific provisions

This ambiguity is a fatal problem for structures that continuously connect the ground and space, such as a space elevator.

(5) Structures that penetrate legal vacuums

The space elevator is a single continuous structure, but the space it travels through is:

Table 2: Scope of Laws Applicable in Outer Space (Conceptual Diagram)

Altitude range	Legal nature	Current laws that may apply
Ground- 12km	Certain airspace	Criminal and civil laws of the country where the facility is located
12km-50km	Actual airspace	Laws of the country where the facility is located (approximate)
50km-100km	Undefined airspace	Unknown
More than100km	Outer space	Outer space treaty + laws of the country where the facility is located

In the murder example mentioned above, the 10,000 km point is clearly outer space, so the laws of the country that "registered" the elevator would likely apply. But what if it were 100 km away? This would be a crime in a "legal vacuum."

(6) Multiple legal systems in one cable?

In reality, it would be impossible to manage a space elevator by dividing it into different altitudes, such as "from here to here it is subject to Country A's law, and from here to Country B's law."
One of the biggest legal challenges in building a space elevator is determining which legal framework to use to treat the entire structure under. Whether it be managed by a single country, operated by a multinational corporation, or governed by an international

organization -- the choice will determine the nature of this "legal gateway" to space.

In the next section, we will look at the more complex legal issues that will arise in the space colonies that lie beyond this space elevator.

IV. Are Strikes Legal? - Labor Laws in Space Colonies

(1) Who protects the rights of mobile suit pilots?

Mobile suit pilots working on the construction of the outer walls of a space colony have gone on strike, demanding special allowances for dangerous work in space.
Their demands are legitimate. Construction work in space is many times more dangerous than on Earth. However, the question that arises is, "Under whose labor laws should this labor dispute be resolved?"
In fact, to answer this question, it is necessary to know "the nationality of the space colony." However, the current system for determining the nationality of space facilities is too complex to accommodate the space colonies of the future.

(2) The current "registered country principle" and its limitations

Current space law has a rule known as the "country of registration principle." The country that launched or commissioned the launch of an artificial object (satellite, spacecraft, or space station) into space becomes its "country of registration," and that country has jurisdiction and responsibility.
This principle works relatively well for the International Space Station (ISS). Japanese law applies to the Japanese laboratory module "Kibo," while Russian law applies to the Russian module.
However, future space colonies will not be research facilities where various countries bring their own modules. They will be one large "space city" with integrated social infrastructure, including housing, commercial facilities, hospitals, schools, and factories. The traditional simple rule of "launching country = country of registration" is no longer applicable.

(3) Complex construction system involving multiple countries

The construction and operation of a space colony is expected to require an extremely complex international system.

For example, funding will come from a joint venture between the European Space Agency,

NASA, JAXA, and a private investment fund, construction will be a joint venture between SpaceX (USA), Mitsubishi Heavy Industries (Japan), and Airbus (Europe), components will be launched using rockets from different countries, and final assembly will be carried out unmanned and automatically in orbit.

In this case, how will the strike by the mobile suit pilots at the beginning be handled?

- Pilot for US corporate employment → US labor law?
- Construction work ordered by Japanese companies → Japanese labor law?
- European funded project → EU labour law?

Not knowing which answer is correct is a real problem.

(4) Space elevator connection makes it even more complicated

The problem becomes even more complicated when a space colony is physically connected to Earth by a space elevator.
Conventional space facilities "float" in space. However, a colony connected to Earth can also be considered an "extension of ground facilities." If a labor dispute occurs in a colony connected to an orbital elevator extending from Ecuador, multiple options arise: the laws of the country of registration, the laws of the country of connection, or special international agreements.

(5) The new concept of space citizenship

What if tens of thousands of people were to live in a space colony, have children, receive an education, work, marry, and grow old there?
What would their "nationality" be?
Gundam depicts a division between "spacenoids," born in space, and "earthnoids," born on Earth. While it is fiction, how to handle citizenship, voting rights, and social security for people who were actually born and raised in a colony will be a realistic challenge in designing a system.
Who will protect the rights of space workers? This question will eventually develop into the more fundamental question of "who will protect the rights of space citizens?"

Column: Who will defend the colony if it is attacked?

When considering the legal status of space colonies, military and security issues are unavoidable.
If a space colony were to be attacked by cyberattack or physical attack, which country would bear responsibility for its defense?

Under the current system:
Outer Space Treaty: The principle is peaceful use of outer space and claims of sovereignty are prohibited.
Outer Space Liability Convention: The registered state bears international responsibility.
In other words, the registered state bears primary responsibility. However, if the colony is connected to the ground by a space elevator, countries with ground bases may also defend it as "national infrastructure."
Furthermore, while the Outer Space Treaty prohibits the deployment of weapons of mass destruction, it does not prohibit conventional security or interception systems. This gray area could potentially spark the militarization of space in the future.

Institutional Design Needed
Orbital elevators and space colonies are attempts to incorporate space into reality as a "living space." However, current international law views them merely as "mere artificial structures."
The traditional system of registered states cannot accommodate colonies where people actually live, work, and function. New institutional concepts such as "space citizenship," "multinational autonomous regions," and "orbital special administrative regions" will be necessary.

Column: Do AI pilots have human rights? (Thought column)

At the Gundam Pavilion at the Expo, an AI replicating the thoughts and personality of a famous pilot will be featured. A mobile suit appears in a desperate scene, and the AI pilot rescues the audience. Here, I'd like to ask a question: does this AI have personality or human rights?
AI learns from past words and actions and imitates "typical" behavior. However, this is not the person themselves; it is merely software replicating their "personality."
Under the current legal system, AI is not recognized as having personality or human rights. It is not held responsible and is treated merely as property.

However, in the future, when AI with self-awareness and the ability to make decisions appears, and it is able to, for example, save lives in outer space and choose to "sacrifice itself," can we still call it "merely a tool"?
AI pilots can operate in harsh environments such as radiation and vacuums, and have the potential to become even more important partners than humans.
What if such an AI were to save someone, choose someone, and sacrifice itself?
Would it be just a machine, or "someone"? It may be that law and ethics in the future will no longer be able to turn a blind eye to this question.

V. Can Space Law Keep Up with the Future? —Recommendations for System Design

The future space infrastructure we saw at the Gundam Pavilion at the Expo is by no means science fiction. Orbital elevators are expected to become a reality in the 2050s, and space colonies may become a reality within this century.
However, neither orbital elevators nor space colonies were within the imagination of the 1967 Outer Space Treaty's framers. Geopolitical inequalities due to physical constraints, ambiguity in the scope of sovereignty, and complex relationships of responsibility—all of these are the result of technological progress outpacing existing legal systems.
For Japan to take the lead in creating legal rules for space development, it is time to make legal preparations before the future we saw at the Expo becomes a reality.

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