



JAPAN AND INNOVATION:

A HISTORICAL AND SOCIAL OVERVIEW

INTRODUCTION

When we think of the State of Japan we undoubtedly imagine one at the forefront of innovation, modern society, and the systematic implementation of technologies of the highest level. All this has been achieved with hard work and a particular focus on developing a country that understood that wealth is not in the ground but in the talent of individuals who make up society and who, in turn, are capable of generating it.

Japan's results and indicators is an excellent example of how to do things well, even if there are significant challenges ahead. However, to describe this exciting country a little, we can say that it is the second most important economy in Asia with 24 Nobel Prize winners, making it the most awarded nation globally with these recognitions. It is currently ranked 23rd in the economic freedom index developed by the Heritage Foundation. The international property rights index developed by the Property Rights Alliance Japan is ranked 12th.

Among the things that have achieved such a level of development are the collaboration between the State, the private sector, and universities, which has led it to be the third country with the highest number of patents in the world and, in addition, with an investment by the private sector for research and development that represents about 80% of the total, as highlighted by the Spanish Institute for Strategic Studies.

Likewise, from the perspective of the country itself, as stated by Máximo Taylhardat we interviewed, who belongs to the culture area of the Embassy of Japan in Caracas, one of the most striking elements is that all this technological development has always been done with a great sense of belonging to the culture itself, respected by practically all the members of its society, which contributes to consider the importance of traditions in a country without this impeding its development, or as Ambassador Kenji Okada has expressed it: "The reconstruction and development of Japan were not achieved overnight, but was due to the continuous efforts of the Japanese people, including our ancestors."

Japan is a poor country that, by focusing on the education of its people, shows us that it is possible to be the best and advance beyond our imagination with determination, education, research, focus on economic freedom and protection of private property without neglecting respect for one's own culture and traditions.

JAPAN, HISTORY, AND DEVELOPMENT: IN THE WORDS OF AMBASSADOR KENJI OKADA ¹

Japan is an island nation located in eastern Asia and has an area of three hundred and seventy thousand (370,000) square kilometers. Its population is one hundred and twenty (120) million inhabitants, and it has a temperate climate with four seasons. It is poor in natural resources. For example, it imports ninety-nine percent (99%) of its oil from other countries. Touching a little on the history of Japan, the ancestors of the current emperor were the creators of the Yamato Court, who unified the country in the fourth century (IV). Until the end of the twelfth century (XII), the Yamato Court, centered on the emperor with real political power, ruled the country. However, from the end of the same twelfth century (XII), the shogunate led by the samurai maintained the real power of politics, establishing the Edo Shogunate in the seventeenth century (XVII), activating the policy of isolation.

In the nineteenth century (XIX), while the great powers (Western countries) were pushing hard for the colonization of Asian countries, Japan was carrying out the Meiji Restoration and the opening up of the country, from which the policy of modernization was launched. Before the Meiji Restoration, Chinese culture had been introduced, after which the culture, institutions, science, and technology of the Western world began to be aggressively introduced. The slogans of that time were "Japanese spirit with Western learning" and "wealth and military strength." The latter motto referred to strengthening military power on the one hand and promoting the industry to enhance economic strength. The "military strength" was reflected in the battle of Japan in the Sino-Japanese War in eighteen hundred and ninety-four (1894), in the Russo-Japanese War in nineteen hundred and four (1904), and also as an allied country in the First World War, which resulted in Japan becoming a permanent member of the Council of the League of Nations established after the First World War. However, Japan, by provoking the Second Sino-Japanese War in nineteen thirty-seven (1937) and in nineteen forty-one (1941) the Pacific War and the refusal to accept the Potsdam Declaration, suffered defeat in nineteen forty-five (1945). It was the first defeat in Japan's history by foreign forces, which resulted in a material loss and had a negative psychological impact on the Japanese themselves. As an aside, it should be noted that Japan, being an island country with few resources, achieved its victory against a great country like Russia in 1905 in the Russo-Japanese War, which gave surprise and hopes to many peoples oppressed by the colonial powers in the world and consolidated Japan as an important country on the world stage.

After the Meiji era, when economic power was supposed to be strengthened to enrich the country, the result of the defeat of the war was the death of more than three million Japanese. The country was destroyed by bombing and two atomic bombs, and a quarter of the national wealth was lost. In

¹ Document provided by the Embassy of Japan for this research of Ambassador Kenji Okada's remarks on Japan's post-war development. (大使講演).

particular, ships, industrial machinery, and equipment wear and tear on large structures. The production base of factories was in ruins. Most production facilities were forced to be converted to military production lines, so it was not easy to convert them to peacetime industrial purposes. Initially, Japan was a country with very few resources. Still, it was war-torn, lacking in material and human resources, and lacking in raw materials. In addition, the movement of people such as military personnel and Japanese living abroad returning to the country, coupled with the rising birth rate, caused the population to increase rapidly, further exacerbating the shortages, especially the lack of food and clothing. Although a rationing system was implemented to distribute goods equally, the imbalance of supply and demand for goods was too great.

For this reason, the black market for goods and the rampant parallel prices in this market were highlighted. In addition to this scenario, significant amounts were paid for compensation caused during the war, which led to a rapid rise in inflation, reflected in the trend of high price increases in a short period, collapsing the economy.

After the defeat in 1945, Japan was occupied by foreign forces for six (6) years and eight (8) months, regaining its independence in April 1952. The Japanese economy was severely devastated by the war. Still, by its independence, the main economic indicators such as agricultural and industrial production and Gross Domestic Product had recovered to the level of nineteen hundred and thirty-four (1934) and nineteen hundred and thirty-six (1936), i.e., to the pre-war level. This recovery was due to a series of reforms carried out and to the economic policy implemented during the occupation of the external forces. Subsequently, from nineteen hundred and fifty-five (1955) onwards, Japan enjoyed economic growth for fifteen (15) years, with an average annual increase of more than ten percent (10%). In other words, the Gross Domestic Product quadrupled during the economic boom. Thus, in nineteen sixty-eight (1968), Japan became the world's second-largest economic power. No other example of such rapid economic growth had been seen globally. New industries such as petrochemicals, household appliances, and the automobile industry proliferated.

In the mid-nineteen sixties (1960), the foreign trade balance began to produce a surplus. Due to economic growth, the structure of employment changed dramatically. In nineteen fifty-five (1955), more than forty percent (40%) of the population was engaged in agriculture, fishing, and forestry. Still, by nineteen seventy (1970), it had dropped to less than twenty percent (20%). In nineteen fifty-five (1955), twenty-four percent (24%) of the Japanese worked in the industrial sector. By nineteen seventy (1970), it had risen to thirty-four percent (34%). In nineteen fifty-five (1955), thirty-six percent (36%) of the population worked in the service sector. By nineteen seventy (1970), it had risen to forty-seven percent (47%). A meaningful change took place in the daily life of the Japanese with the widespread use of household appliances such as electric washing machines, refrigerators, vacuum cleaners, televisions, and automobiles. This drastic change in consumption and lifestyle became known as the consumer revolution.

In nineteen forty-five (1945), Japan was defeated. More than three (3) million Japanese died, Japan lost forty-four percent (44%) of its territory, and cities were devastated by air raids and two atomic

bombs. Despite having no natural resources, after the war, Japan achieved economic growth to become a country with great economic power for many reasons such as:

1. the high level of education of the Japanese people, they possessed abundant human resources of high quality, for being a firmly united people who attach great importance to discipline and work,
2. they complied with the renunciation of war, which was decreed in the new peace constitution after the war, and did not increase the nation's defense expenditures,
3. participated in the international economic systems known as the IMF GATT, the Japanese maintained a high savings rate, which made them become investments,
4. the legal system necessary to mobilize the economic system was already in place,
5. democratization was carried out in the postwar period, highlighting land reform, the dissolution of business conglomerates, and the emergence of trade unions,
6. the fixing of the exchange rate of three hundred and sixty yen (¥ 360) to one (1) dollar until the "Nixon Shock" of nineteen seventy-one (1971), which strengthened exports, among other reasons.

I want to explain three specific points among the reasons stated above. The first is that they are a strong united people who attach great importance to discipline and hard work.

The second point is the high level of education of the Japanese people, i.e., they possessed abundant high-quality human resources, and the third point is that they complied with the renunciation of war, which was decreed in the new constitution of peace after the war, and thus did not increase the expenditures for the defense of the nation.

Japan was in isolation until the middle of the nineteenth century (XIX). It was in eighteen hundred and sixty-eight (1868) with the Meiji Restoration when it began to open up. From then on, modernization began. The idea of that time is represented by the compound word "Wakonyosai," which means "Japanese spirit with Western learning ." "Wakon" represents the soul of the Japanese, i.e., their spirit, precisely the traditional Japanese spirit, which is based on respecting discipline, valuing courtesy, industriousness, and harmony. After the opening of Japan, the Japanese maintained the same essence of the spirit, so much so that for foreigners, respect for discipline is a characteristic of the Japanese. Likewise, it is notorious that in martial arts, namely judo, kendo, iaido, and karate, the teaching of techniques goes hand in hand with the appreciation of courtesy. Many people were surprised to note that in the year two thousand eleven (2011), when the great earthquake and tsunami occurred in eastern Japan, there was no rioting or looting in the face of the situation.

On the contrary, it was a manifestation of the spirit of respect for discipline that was observed. "Yosai" refers to the aggressive introduction of Europe's outstanding technology and academic knowledge. Under the philosophy of "Yosai," after the Meiji Restoration, Japan strengthened education, setting up universities, high schools, and elementary schools, striving for compulsory education in society. By the year nineteen hundred (1900), the percentage of enrollment increased to ninety percent (90%), resulting in the existence of a large number of high-quality human resources in Japan. In fact, in the

case of education, even before the country's opening in the nineteenth century (XIX), in the Edo era, Japan was already focused on strengthening education. Not only the children of samurai went to their schools, but there were also spaces where the children of ordinary people went to learn to read and write. It is worth noting that in the eighteenth century (XVIII), the literacy rate in the main cities was twenty percent (20%) in London, ten percent (10%) in Paris, and seventy percent (70%) in Edo (Tokyo). In addition, as part of the "Yosai," since the Meiji era, Japan took as a reference the legal system of Germany and France and established the constitution, criminal law, civil law, and a legal system of commercial code, all of which were necessary for the functioning of the economic system.

The third point, our country is a new constitution of Peace. As stated in Article Nine (9) of the Constitution of Japan, Japan renounces the right to war and, therefore military force. First of all, after the Meiji Restoration, Japan, under the slogan "wealth and military strength," as a national policy, aims to improve the strength of military power and develop the industry. Under this context, "military strength" resulted in a high price and many sacrifices in Japan's defeat in World War II. Based on this reflection, Japan decided to abandon "military strength" and focused on "wealth," seeking economic growth in the post-war period. Thus, under the coordination of the international community, the country's prosperity was realized. Indeed, after the war, Japan has been a peaceful nation and has not been involved in wars. The suppression of expenditures for the nation's defense contributed significantly to the economic development of postwar Japan.

In conclusion, he stressed that it should not be forgotten that the reconstruction of Japan was not achieved overnight but was due to the continuous efforts of the Japanese people, including our ancestors.

INNOVATION AND CULTURE IN JAPAN: INTERVIEW WITH MÁXIMO TAYLHARDAT FROM THE CULTURAL AREA OF THE EMBASSY OF JAPAN.

How would you describe Japan's relationship with innovation?

Japan spends more than all the developed countries on research and education. Here, the teamwork between the State, private companies, and universities is decisive because this is a country without natural resources. Even to the young people in Japan, this point is emphasized when they are growing and in the process of formation since the only capital that the country has is the development of its citizens.

Japan currently has many challenges to overcome as a country. For this, a series of measures have been arranged as a new stimulus package to the economy, looking for more competitiveness, credit, and giving everyone more viability.

Japan, until the '90s, grew remarkably. Nowadays, the competition with China, Taiwan, and South Korea implies more interest, creativity, and movement to be at the forefront.

How do Japan's tradition and culture coexist with its technological development?

In 1868, having been surpassed by the Western powers, being practically isolated and with a technology that could barely beat the barbarians, Japan realized that it had to work on the systematic modernization of the country. Similarly, in 1945, after the Second World War, Japan knew that it needed to reformulate itself to advance, so a philosophy was created that focused on how to be Japanese on the inside and modern on the outside. The model is designed so that the Japanese tradition is not affected and there is a significant development.

The Japanese learned from others and surpassed those others, competed for many years with the best in the world, and earned its prominent place in innovation in the world, standing out as a reference to cities like Tokyo and Kyoto.

What is the characteristic of the Japanese that has brought it to this level of development?

Japanese people know that the right thing should always be done. There should be no surprises in doing the right thing because a prosperous society acts and does what should be done.

An example of this is the tsunami that affected the country a few years ago. There was no looting, primarily because there is also a broad content of values in the education system. We must not do evil, and misfortunes challenge us to put our best face.

Undoubtedly I consider that everything has to do with the educational system. There is no useless information, and the performance is not only left to the school. It is a union between the school, the community, and the parents.

Many people talk about the Japanese miracle, but what it means is to base everything on education. For that reason, not only did the country succeed, but it managed to overcome the atomic bombs.

How does Japan's leadership serve your development and innovation?

Beyond its leadership, we can highlight its political system based on the British one. It is deeply institutional, accountable, and has checks and balances, but with a limited bureaucracy that allows it to continue to function.

Our success is the success of solid institutions and representatives who do the right thing. There is no populism but law.

How do you see the country in 20 years?

It is a complex question, but in every challenge that has been presented to the country, it has overcome it with gallantry. The foundations of Japanese society, its culture, education, and research give it the

tools to affirm that despite everything, it will continue to be at the forefront of technological development, placing the Japanese individual in the first place.

JAPAN'S MOST IMPORTANT PROJECTS TODAY

Among the technological advances that have been most invested in Japan in recent times, we can name the three most relevant ones:

Biometrics: This is a crucial area of technology and is the biological measure that seeks to identify physical characteristics for the recognition and authentication of people.

Among the characteristics above, we have fingerprints, facial and voice recognition, based on the fact that these characteristics are unique, recordable, and measurable.

Biometric characteristics can be of three types: biological, morphological, and behavioral. The biological ones have directly to do with DNA, such as saliva, nails and hair. It should be noted that these types of characteristics are much more accurate but require greater resources and time for evaluation. On the other hand, we find the morphological characteristics, which are the most developed in recent years, including facial recognition, voice and fingerprint. We see this most in smartphones and for behavioral traits, which include the walking of individuals and the study of the coordination and movement of human locomotion.

For more than four years, Japan has been using one of the most advanced biometric systems in places such as airports, including Narita International Airport, which serves Tokyo. This year's first fully biometric boarding process worldwide, implies a breakthrough mainly for security issues. Still, the progress is that this biometric facial recognition was already used in the recent Olympic Games.

The country's goal is that millions of people will visit the country in the coming years, so it will continue to research and implement biometric security until it is adapted to more areas of daily life.

Hydroponic agriculture: Japan is a world leader in hydroponics, which involves adapting technologies such as artificial intelligence, robotics, and the internet of things to crops, developed more intelligently. Knowing that the environmental conditions are not the most conducive to cultivation, there is immense development in soilless cultivation in Japan.

This type of cultivation requires 90% less water than traditional crops and dispensing with pesticides. These crops are real technology centers where private sector companies, the government, and universities invest in research.

The Japanese state is currently subsidizing the development of 20 types of robots. Hokkaido University, together with the heavy machinery and agricultural machinery and engines company Yanmar, is already testing one of these robots in the field.

Being a leader in this area makes the mood even more intense, to the point that Japan's responsibility is very significant to the countries of Africa, where Japan is contributing technology for the development of these efficient crops to combat hunger.

Fight against Covid 19: Innovation in Japan has found in the Covid 19 pandemic an outstanding possibility to be put to the test. This problematic situation led the country's innovators to develop many responses to the circumstances experienced. This can be seen in Euronews' magnificent report, where they highlight the most critical innovations against the Covid 19 pandemic in Japan.

Among these innovations, the most outstanding are two:

The supercomputer: To recreate models, the supercomputer is an initiative of the Institute of Physical and Chemical Research of Japan and the company Fujitsu. This is the most powerful computer in the world and came into operation in 2020 to help in the fight against covid.

Ultraviolet Light: While exposure to ultraviolet light can cause harm to humans, the reality is that the lighting company Ushio Inc. has developed a special ultraviolet light lamp that precisely filters to remove covid 19 on surfaces. This is possible because the technology uses a combination of an excimer lamp that emits ultraviolet light concentrated around the wavelength of 222 nanometers and a unique filter that blocks the emission of photons above 230 nm that are potentially harmful.

All these advances demonstrate the constant work and development of research in the country and where the cooperation mentioned above between the State, universities, and private companies can be observed. With these sectors working in coordination and promoting education and social values, the country advances.

CONCLUSION

Understanding a nation as nuanced as Japan is no easy task. Behind all its development and innovation, there are great lessons and ways of both doing things and seeing the world. Throughout most of its history, this way of seeing the world has led it to be one of the most modern countries in the world.

From a historical perspective, after remaining isolated for hundreds of years, the leap to modernity did not take away all their cultural richness. On the contrary, they have achieved the formula to keep the sense of traditional Japanese practically intact, along with the advancement of the fourth industrial

revolution and technologies such as artificial intelligence, biometrics, and robotics that are revolutionizing the world.

The values transmitted in the Japanese family are the perfect complement to a comprehensive education at all levels. The main focus is to act correctly, without hesitation or seeing this as extraordinary. The country has an education where society's limitations are accepted and where the greatest strength is in the formation of each of the Japanese that leads the country to be better and better.

As we have seen, Japan is at the top in terms of economic freedom, human freedom, and safeguarding property rights. This is a reflection of the culture of development that the country has built up over so many years.

The Japanese system's success and institutions are not due to any miracle. Still, to the efforts of all the individuals who, in cooperation, have managed to overcome every challenge that the circumstances of history have placed upon them, so they will undoubtedly continue to have the highest standards of development.

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