Destroying Effects of Twin Earthquakes on the Economy and Agriculture in Turkey: Lessons of Japan

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This article has two transitive topics and aims. Here, first of all, the devastating effects of the fallout of the K. Maraş-centered regional earthquakes in February 2023, which is considered the natural and human disaster of the century in Turkey, on socio-economic life and the agricultural sector, and all kinds of economic aid and measures that are taken into action immediately are examined. Secondly, after giving examples of countries from the world's earthquake geography from the Japan and USA to China and New Zealand, the economic, political and technological policies and measures implemented by Japan, which is famous for making earthquake resistant constructions and protecting the agricultural sector against earthquake risks, are listed. It is desired to emphasize that these effective and beneficial practices, which are successful against earthquakes, should be taken as a model by Turkey absolutely and uncompromisingly.

Keywords: Twin Earthquakes in Turkey, Economic and Agricultural Impacts, Financial Measures and Aids, Lessons from Japan

1. Introduction

On February 6, 2023, two great devastating earthquakes with a magnitude of 7.7 and 7.6 and a violence of 11 centered in K. Maraş occurred in Turkey. According to the determinations of geophysicists, such a devastating twin earthquake has never been seen on the same day in the history of earthquakes. Therefore, these earthquakes are considered as the *"disaster of the century"* as they are the first in the world. As a matter of fact, as a result of the rupture of the East Anatolian fault line, which spans 500 kilometers, according to official data, hundreds of thousands of houses and workplaces, especially on agricultural lands and poorly built, were destroyed, more than 55 thousand people died, the agricultural and industrial sectors shrank, and the regional economy regressed. Property damage is estimated at more than $ 100 billion. There were delays in the humanitarian and technical aid process, and weaknesses in economic and political governance, but the wounds began to heal quickly thanks to the country's solidarist socioeconomy. In this process, Japan, which is known in the world for its effective measures against the bad and destructive results of the earthquake, came to the agenda of the domestic public again as a good country that can be taken as a model by Turkey.

Every major earthquake causes serious material and moral damage in the cities and rural areas where it occurs. It disrupts the psychology of households and employees and changes their socio-economic behavior. For all these reasons, the earthquake, which appears to be a natural disaster, is also a socioeconomic problem that closely concerns large populations due to its negative effects and / or devastating consequences, and even a political problem considering the objective grievances caused by the central and local governments, which could not take sufficient rational (scientific / technical) measures since before the earthquake. These recent regional destructive earthquakes in Turkey have proven the existence of these problems once again.

When the risks were examined within the scope of *the Local Disaster Risk Reduction Plan* (LDRRP) studies of 11 provinces (in alphabetical order; Adana, Adıyaman, Diyarbakır, Elazığ, G.Antep, Hatay, K.Maraş, Kilis, Malatya, Osmaniye and Ş.Urfa) affected by the earthquake fallout of February 2023 and located on or near the fault lines, the following findings were obtained: The main problem is that sufficient information about the building stock and its qualities is not available in any province. In addition, the most important common problem is that the construction is dense on weak soils with alluvial content and liquefaction risk, and the urban transformation is carried out on the basis of buildings and without taking into account the ground properties (Citizens Assembly, 2023; HYD, 2023).

While one of the two transitional subjects of this study is to present the devastating effects of the recent regional earthquakes in Turkey on the economy in general and the agriculture sector in particular, and the aid and measures to mitigate these devastating effects, in the background of the world, the other is to present various vital lessons that Turkey can take from Japan, which comes to mind first when it comes to earthquake geography and a country that makes earthquake-resistant constructions and shows special sensitivity to the agricultural sector.

2. Literature Review and Theoretical Framework

Earthquakes are primarily related to soil changes and behaviors and have the potential to trigger geotechnical problems (Konagani, 2011). Therefore, the earthquake does not only happen in Turkey and does not only negatively affect Turkey's agriculture. In the globalizing or glocalizing world, earthquakes and their effects go beyond the borders of the country where the earthquake occurred and are closely related to all countries connected to each other by commercial, economic and cultural relations. Because, depending on the changing conjuncture, labor, service, goods and capital circulate all over the world partly unlimited and partly limited. For example, the interruption of the food supply chain in one country due to an earthquake may hinder the fulfillment of needs and the flow of foreign exchange in other countries.

Indeed, as Johnson (2011) noted, the very severe earthquake and tsunami in Japan in March 2011, followed by the radioactive spill of food produced near the Fukushima Daiichi Nuclear Power Plant, has raised fears about the safety of Japan's food production systems and future food exports, except that it has adversely affected many of the country's agricultural and fishing areas. The whole world agreed that this bad situation may limit food exports and increase the need for food imports in the future, despite Japan's industrial giant. It has not been clarified

cyclically what effect Japan's current food supply and demand imbalance caused by the earthquake will have on world farm commodity markets and food prices.

According to research by Whitman et al. (2013), the Darfield earthquake and aftershocks recorded in September 2010 affected the central Canterbury plains of New Zealand's South Island, a high-density agricultural production area supported by rural service towns. Direct impacts on farming have been in the form of interruptions to water and electricity services and various structural damage. In terms of mitigating the effects of the event, agricultural organizations noted that well-constructed buildings and insurers were generally helpful. Despite many differences, reliance on electricity utilities has been observed to be a critical vulnerability for agriculture and rural non-farm utilities, and backups such as onsite generators have mitigated the effects of the disaster.

As Sun et al. (2010) stated on the occasion of frequent earthquakes in China, the degree of damage to the houses of rural households after the disaster has a significant negative effect: This picture reveals that rural households whose houses were severely damaged in the earthquake are prone to poverty, that after the disaster, the households were unable to do business outside because they had to maintain and renovate the destroyed houses, resulting in reduced income and increased vulnerability to poverty.

Some determinations and observations of Heng et al. (2008) are complementary to the economic and agricultural loss table highlighted above: Even if the direct economic loss rate caused by the demolition of houses in cities is not large, the indirect economic losses of the earthquake that caused the collapse of the function of the economic system reach more serious dimensions. Some of the funds used in productive investments are transferred for the repair or reconstruction of houses after the earthquake, leading to a decrease in investment of agricultural production and in productivity.

Brandenberg et al. (2014) draw attention to California, one of the most fertile soils in the world and the USA, and state that the agriculture of this region is vulnerable to damage from earthquakes for three main reasons: First, a significant portion of farm production and related marketing and processing activities are located in regions that are particularly susceptible to seismic activity. Secondly, it is dependent on public infrastructure that rural and agricultural sectors face possible disruptions, especially in electricity and transportation, after earthquakes. Third, much of California's agriculture is devoted to perishable agriculture. There are farm and marketing activities that need to be done without delay, such as milking cows and processing milk or harvesting and shipping fresh vegetables.

Chapagain and Raizada (2017) propose an *"emergency sustainable farming kit"* (eSAK) framework that includes a comprehensive list of products that can be combined into packages to meet the needs of post-disaster labor shortages, seeds, preservation of local crop varieties, along with first aid and shelter during earthquakes in rural areas: easy-access and inexpensive agricultural-grade plastic rolls to assist farm needs, low-oxygen shovel-purpose gardening bags, low-oxygen gardening tools, early-water cropping tools, temporary food support and first aid kits should be provided. Besides, as stated by Sun, et al. (2010), who approached the issue more systematically, natural disasters such as earthquakes and floods cause

farmers to become impoverished or re-impoverished in the following five aspects: massive loss of *physical capital* (destruction of infrastructure, housing collapse, etc.), loss of *human capital* (personnel losses, workforce reduction), loss of *financial capital* (disruption of migrant workers, planting and breeding industry losses), loss of *natural capital* (destruction of farmland and environment), and loss of *social capital* (disruption of the educational process, decrease in the quality of education). Farmers suffer these five types of significant losses, and this negative situation widely increases their vulnerability (see Figure 1).

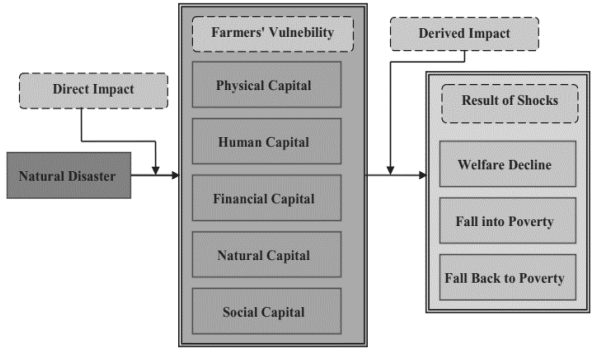

Figure 1 *Relationship Framework for Natural Disaster and Rural Poverty*
(Source: Sun, vd. 2010)

Finally, many studies pointed out by Lian, et al. (2021) believe that those *five factors* can help improve earthquake preparedness behaviors of residents in general and farmers in particular

- **Risk Perception:** The stronger the risk perception ability of the public, the higher the degree of earthquake preparedness.
- **Disaster experience:** Those living in areas with frequent disasters are more conscious of pre-disaster preparedness than those living in other regions, and even non-destructive earthquake experiences encourage the public to prepare for earthquake disasters.
- **Trust in Government:** People who have more trust in their government have a lower perception of risk against potential earthquakes and, accordingly, lower disaster preparedness.
- **Obtaining knowledge/information:** Residents judge the probability and severity of an earthquake based on the knowledge / information received and can therefore change their behavioral decisions.
- **Media Exposure:** This can influence emergency preparedness behavior by increasing social pressure and self-efficacy or by increasing the perception of risk.

As shown in Figure 2, reasonable physical disaster preparedness can reduce physical vulnerability, while risk perception and earthquake experience can reduce social vulnerability to effectively improve resilience of residents and farmers. In addition, formal education and training are the basic mechanisms that facilitate the acquisition of knowledge, skills and abilities of the society and farmers and affect their adaptation.

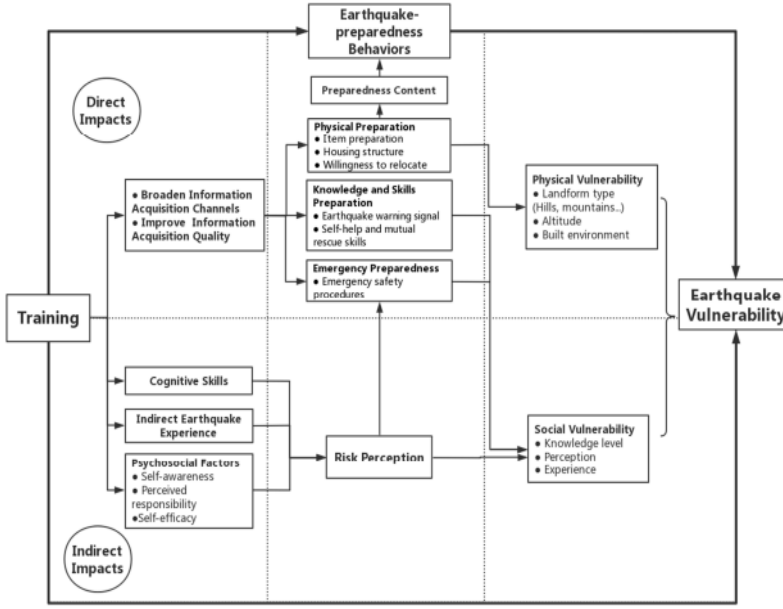

Figure 2 *Theoretic Framework of the Impact of Training on Earthquake Preparedness Behavior of Farmers*
(Source: Lian, et al., 2021)

3. Basic Macro-Economic and Agricultural Indicators in the Seismic Zone

The 11 provinces affected by the recent regional earthquakes are called *"key provinces"* and *"fertile crescent"* due to Turkey's relative superiority in agriculture. According to the 2021-2022 data below, this major earthquake zone has an important place in the Turkish economy and in terms of agricultural indicators. (Compiled from FAO: Alkır, 2023; Daily Memo, 2023; Yavuz, 2023; Nieuwsbericht, 2023):

- The earthquake zone provides approximately 9 % of Turkey's gross domestic product (GDP).
- The share of the agricultural sector in the region's GDP is 14.3 %.
- 13.3 million people live in the region, corresponding to 15.7 % of Turkey's population. While the population density in the country is 110, it is 151 in the disaster area.
- The region's exports correspond to 8.7 % of the total country's exports (regional export revenue reached approximately $ 20 billion).
- The number of registered agricultural enterprises and farmers in the region is approximately 270 thousand.
- Vegetable production area in the region is 110 thousand hectares (15.2 % of the country's total vegetable area). The area where spice and beverage plants are grown is 930 million hectares, which constitutes one fourth of the total relevant land of the country.

4. The Unbearable Destructive Weight of the Earthquake on Agriculture

The Food and Agriculture Organization of the United Nations (FAO, 2015) presents some important findings on the impact of earthquakes and other natural disasters on the agricultural sector and its sub-sectors in developing countries or emerging markets (EMs), including Turkey:

- The Agricultural Sector – including crops, livestock, fisheries and forestry – absorbs about 22 % of the economic impact caused by medium and large-scale natural disasters and disasters in the EMs.
- The high impact of natural disasters and disasters on agriculture requires the expansion of disaster risk reduction and resilience in agricultural sub-sectors.
- There are large data gaps regarding the impact of natural disasters and their impact on agriculture sectors in EMs. This sector-specific data should be collected regularly and included in national and international disaster loss databases to better plan appropriate risk reduction policies and investments.
- Humanitarian and official development assistance to the agricultural sector is small compared to the economic impact and needs in the sector. More investment in disaster risk reduction is needed to build resilient livelihoods and food production systems.
- Agricultural sectors need to be mobilized as proactive implementation partners after 2015, both to foster local action and to ensure the resilience of the poor (wage farmers and breeders), who are often the most precarious and most vulnerable, to disaster risks.

These twin regional earthquakes, called the *"disaster of the century"* in Turkey, have had devastating effects on agriculture. When these devastating effects are added together, a frightening picture emerges.

According to observations from the outside world, Turkey is facing an epic recovery. However, in a recent report, the World Bank estimated that direct physical damage from regional earthquakes in February 2023 was $ 34.2 billion, accounting for about 4 % of Turkey's 2021 GDP. Rebuild costs can be 2 times this amount or more. UNDP Turkey Representative Louisa Vinton stated that the damage exceeded $ 100 billion (Cramer, 2023).

It is known that earthquakes -theoretically- threaten agricultural areas and the labor market. Most of these threats stand out in the form of various agricultural losses and damages in the earthquake devastated region (especially in Adıyaman, Hatay, K. Maraş and Malatya provinces) (see Powsell, 2023; Politics Today, 2023; EPA-US Environmental Protection Agency, 2023):

- As a result of the unofficial death of hundreds of thousands of people in these twin earthquakes, there has been a great decrease in the amount of labor and thus the loss of farmers and breeders whose number is not clear.
- Due to these severe earthquakes, with the Anatolian peninsula shifting 3 meters to the west, huge crevices and collapses occurred in the fields and gardens.
- According to FAO, $ 5.1 billion in damage and an estimated $ 25 billion in earthquake-related production losses occurred in Turkey's food industry. When food prices and consumer inflation rose uncontrollably and real incomes fell, it was reflected to the public as higher cost of living and impoverishment.

- Due to the negative impact of earthquakes on agriculture, there was a quantitative and qualitative decrease in plant and animal production; this situation lowered welfare while raising prices.
- Disruptions in the stages of the food supply chain, such as transportation, storage, processing, wholesale and retail trade, caused loss of agricultural products and increased food prices.
- Caused $ 1.3 billion in damage to agricultural infrastructure and storage facilities and excessive animal deaths and injuries as a result of earthquakes.
- Due to labor shortage, tons of citrus fruits could not be picked on the trees; tons of them waiting for their distribution were stuck in warehouses.
- Animal Losses were Seen in Rural Areas with the Collapse of Houses and Barns – which was not taken into account in the shadow of excessive human deaths. Temporary problems arose in the use of tractors, machinery and equipment, fertilizer, feed and seed adequacy, as the damage to machinery, equipment and tools reduced inputs such as seeds and feed and caused losses in seed and feed quality.
- Water bodies are heavily polluted. There was a loss of harvest or livestock and trees. Infectious diseases and susceptibility and passivity to disease increased. Irrigation systems and other agricultural infrastructure were severely damaged.

It is clear that earthquakes have strong negative impacts on the development of the global economic community, and fortunately, these negative impacts can be mitigated by earthquake preparedness behaviors. It is vital that the government accelerates disaster prevention and mitigation education policies and makes farmer education policies sustainable in rural areas at high risk in Turkey.

5. Economic Assistance and Measures for the Earthquake Zone

Since these terrible twin earthquakes that occurred on the same day in Turkey coincided with the winter months, bad weather conditions put a lot of pressure on both the earthquake victims and the citizens who rushed to help, as well as the search and rescue teams and public governance units. The Turkish goverment immediately issued a *"level 4"* international aid alert. Thereupon, dozens of countries from every continent of the world, together with the United Nations, started the emergency aid process. Apart from search and rescue personnel, many countries, integrations and organizations have stepped in to send humanitarian, medical, economic and other aid materials and/or provide financial support. For example USA, European Union, Arab League, World Bank, Balkans, Caucasus, Turkic Republics, India, China, Japan, Israel, Argentina, Venezuela, Australia and many more. These heavy twin earthquakes experienced by Turkey may be national, but aid has been realized rapidly within the framework of international cooperation and division of labor and on a global scale. (For detailed information and data, see Euronews, 2023.)

In addition to the central and local governments in the earthquake region in Turkey, foreign economic aids have increased in proportion to the devastating effects. Economic assistance and measures for agricultural production, food supply chain and food access, which are the most vital among sectors, are constantly updated.

The losses of some farmers have been corrected. Turkey's Agricultural Insurance Pool has paid 11 million Turkish liras (TLs) insurance compensation since the disaster. However, only about 20 % of farmers in Turkey are insured. Many vegetable growers are not insured, causing a large proportion of the country's food producers to depend on small government incentives for production. Wheat, rice, soybean and sunflower should be planted on the fields in the earthquake zone as soon as possible. To meet this seasonal calendar and help the country avoid food shortages, farmers need support in providing seeds, fertilizers and diesel. The Ministry of Agriculture and Forestry announced that it will pay TLs 2.8 billion in cash to registered earthquake victims (Cramer, 2023).

After the recent earthquakes in Turkey, institutional funds provided from abroad, as well as in-kind and cash aid from the central government, municipalities, private sector and non-governmental organizations, are used to meet humanitarian needs, compensate for damaged agricultural and industrial losses, and help rebuild destroyed cities. It has been estimated that the overall or total preliminary damage cost, including agricultural losses, in Turkey is not less than $ 100 billion. There are a number of important aids and measures for the agricultural sector (see Table 1).

Table 1 *Agricultural Aids and Measures for Earthquake Zone in Turkey*

Agricultural Aids	Agricultural Measures
• The government has committed and made the payments to each earthquake survivor family in emergency cash assistance (TL 15.000) and to support agricultural production. • FAO is seeking $ 112 million to provide immediate and long-term support to earthquake survivors in Turkey. It has met only $ 1.5 million of these needs through its Special Fund for Emergency and Rehabilitation Activities (SFERA) and internal resources. • UNDP allocated $ 5 million to public projects for 100,000 farmers to repair rural infrastructure (roads, energy, water) and sustain food and feed. • World Credit Unions Foundation (WFCU) evaluated the biggest needs of Turkish Agricultural Credit Cooperatives. • The total commitment of the International Donors Conference is €7 billion, of which €6.05 billion is given to Turkey as grants and loans. • T.C. Ziraat Bank makes cash payments to the heirs of the farmers who lost their lives in the disaster. The Turkish Grain Board insured all stored products.	• Assistance and incentives are provided to stop migration movements from earthquake-affected cities and rural areas to earthquake-free areas or to encourage return. • Mass Housing Administration (Toplu Konut İdaresi-TOKİ into Turkish) will distribute long-term interest-free housing to farmers. • The government provides in-kind and cash aid to the farmers engaged in animal husbandry in 11 earthquake-affected provinces and many other districts. • The Ministry of Agriculture and Forestry pays the producers for loss of cattle, sheep and goats, beehives and poultry. • The Presidency has issued a decree to distribute one-time feed per animal until the end of 2023. • In addition, the Ministry of Agriculture and Livestock announced that it will immediately deliver enough sugar for 1 billion 483 million hives to approximately 12 thousand beekeepers.

Source: *CUNA 2023; EC Directorate-General for Neighbourhood and Enlargement Negotiations, 2023; Yavuz 2023; Alkır, 2023; EFA News, 2023; UNDP, 2023.*

6. Economic, Political and Technological Lessons Turkey Can Take from Japan Against Earthquakes

Recent regional disasters have shown once again that the earthquakes that destroyed the bridges at home have also been instrumental in the establishment of humanitarian bridges abroad through international humanitarian solidarity, financial assistance and technology transfer. It is known that Japan and Turkey are two Eastern friendly countries, one from the Far East and the other from the Middle East, who love each other from afar.

Turkey, just like Japan, has bound contemporary construction standards to laws and regulations. However, unlike Japan, in practice, it cannot prevent the unfair rent wheel at many stages from the selection of the construction ground to the construction and inspection, from the zoning plan to the zoning amnesty process. As a result, multi-storey, rotten and uncontrolled buildings built on agricultural lands as a very wrong and dangerous policy are destroyed by a severe earthquake and the loss of life and property increases frighteningly. As a matter of fact, in 11 provinces where the Eastern Anatolian fault line was broken, a large number of people – more than 55 thousand according to official data, hundreds of thousands according to unofficial estimates – died, countless people were injured and became incapacitated, and also trillions of liras (billions of dollars) of economic loss occurred. Therefore, from now on, Turkey, where new earthquakes are expected, especially in Istanbul (by one of its ancient names, Constantinople), should take as a model Japan, which has almost no loss of life and property since it takes very effective measures against earthquakes in order not to experience a similar human tragedy.

First of all, Japan is considered quite successful in providing infrastructure security. In terms of the *Infrastructure Safety Index* prepared by The Economist (2023), Osaka and Tokyo are two of the top five cities in the world, according to 2019 data. Istanbul, on the other hand, ranks 31st among 60 metropolitan cities. It is a fact that infrastructure security is provided with the right construction and efficient budgets.

Secondly, in accordance with the proverb *"a sound mind resides in a sound body"*, since a *sound building will be on solid ground*, as it is clearly seen in Japan, the State contributes to the formation of a zoning culture in a rational, not fatalistic way in the housing production and inspection process, and imposes the necessary sanctions on unqualified decision-makers who make the correct zoning laws passive and take part in the production of rotten construction.

A final source of inspiration for Turkey is Japan's assertiveness and insistence on building resistant to earthquakes thanks to advanced technologies. The fact that he did not compromise on the strict rules he followed played a major role in this success.

In the light of this preliminary information and expectations, it is thought that Turkey can take the following economic, political and technological lessons from Japan (see Table 2).

Table 2 *Lessons Against Earthquake from Japan to Turkey*

Economic Lessons	• **Cessation of Builder Growth on Agricultural Land:** As in Japan, builder growth and construction on agricultural land should be stopped in Turkey. The opportunity cost of construction (that is, forgone) should not be agricultural production when converting lands into plot. Otherwise, the country's agricultural and food sovereignty will be damaged due to imports and the society will be impoverished. • **Abandoning high-cost public-private partnership (PPP) projects:** Discipline should be brought to PPP projects (so that costs are not nationalized and profits are not privatized). • **High research and development (R&D) expenditures share in central and local government budgets in combating earthquakes:** The high budget allocated by the government and municipalities for R&D from public resources in Japan has ensured that earthquakes cause less loss of life and property, almost symbolically. Thanks to the cooperation of the public authority and the builders, expensive rail-isolator systems were used in earthquake-resistant buildings to prevent residences and workplaces from becoming graves for people.
Political Lessons	• **Enhanced Zoning Culture Supported by Law:** The non-partisan construction culture developed by the past Japanese governments creates more role models for Turkey, one of the world's biggest earthquake countries. • **Politicians can not Approach the Earthquake Fatalistically:** Local and national politicians in Turkey are also expected to use a clean and secular political language that is free from demagogy, polarizing partisanship and religious exploitation against citizens during the earthquake, as the constitution dictates. Accordingly, it is important to abandon politicized religious discourses such as *"destiny plan, halalness, there is mercy in the earthquake, be grateful, be patient"* regarding the earthquake event and its consequences. In any case, geophysical facts cannot be covered with metaphysical discourses. • **Sustainable Earthquake Preparedness in Government Institutions:** In Turkey, as in Japan, the state-led earthquake preparedness mobilization should be socialized. Here, family and school education are decisive.
Technological lessons	• **Seismic Isolation:** The earthquake-resistant rail foundation system houses used in Japan create a base insulation that allows the building to disconnect from the earth. In the installed system, rubber-made bumpers are used on the foundation of the building. These bumpers make it possible for buildings to sway horizontally instead of shaking and tilting during earthquake hazards. The demolition of the building is prevented by using hydraulic wires inside the building frame so that the shaking at the foundation spreads throughout the building (Trends in Japan, 2011). • **Early Warning System:** This system automatically sends the warning message to everyone in the regions where the seismometers receive the tremor warning, in all tremors of 5 magnitude and greater according to the Japan earthquake severity scale (Shindo). While the warning is sent to the telephone subscribers as an audio and video screen message, the television broadcasts are also cut off, even if the television is not completely turned off, the earthquake warning message appears on the screen in voice and text even if it is not watched (America Newsletter, 2017). • **Robust and Responsible Civil Engineering:** There are basically two conditions that the Japanese government expects from newly built buildings: The contractor and engineer who built the building should guarantee that this building will not collapse in any earthquake for 100 years, and the second is that no damage will occur for 10 years from the construction of the building. In addition, quality materials to be used in building construction for license are determined by the state authority with strict rules (Korkutata, 2020).

7. Conclusion: A Few Important Notes and Recommendations

It should be emphasized that Turkey's agricultural lands and sectoral structure were damaged due to the last devastating regional earthquakes in February 2023, and its geoeconomy was also damaged naturally and necessarily. The economic aids and the economic measures taken are aimed at partially mitigating this loss. There are losses that are irreparable due to large human losses.

After the disaster in Turkey, construction should never be done on agricultural lands, as evidenced by bitter experience. The collapse of buildings on soft ground is faster and the loss of life and property is greater. In addition, agricultural production and income are given up. These very serious and difficult to compensate *"opportunity (alternative) costs"*, that is, abandoned goals are counted. According to this, apart from delaying the regional development that could not be completed, the recent earthquakes also opened the inter-regional development gap to the detriment of the region. It has been observed that the public expenditures made after the earthquake far exceed the expenditures that should be made before the earthquake. If the dozens of earthquake research proposals submitted to the parliament before the earthquake were accepted and the populist zoning peace (amnesty) laws indexed to the voter vote base were not enacted, first of all, the earthquake area would not turn into a war zone, moreover, the economic aid packages put into effect after the earthquake would have been used for new resistant construction and employment budgets, and the regional development momentum would have resumed.

If it is necessary to put what needs to be done on a rational basis and to apply the lessons to be learned from Japan correctly and decisively… It is known that one of the prerequisites of rural development is agricultural activities that will increase agricultural production and national income, not housing construction that will accelerate migration and urbanization in agricultural lands. Governments should abandon the builder growth policy that paves the way for rentier enrichment. If new cemeteries are not to be built, mountainous lands should be made more attractive for durable, safe and prosperous housing.

Geography may be destiny, but just like Japan, Turkey, which is located in an earthquake zone, can be protected and saved from the devastating effects of the earthquake, thanks to reason and science. In this sense, it is clear that lessons should be learned from Japan, which did not collapse even though its skyscrapers sway like a cradle. The fact that Japan is one of the leading economies in scientific-technological patents and innovations was also reflected in *the effective political economy measures* it took against earthquakes. Many subjects such as responsible politicians-bureaucrats, qualified contractors-engineers, construction selection outside of agricultural lands, construction of buildings with rail-insulators in Japan, which suffered very little human loss and least economic damage in earthquakes, are a human and technical laboratory.

Finally, if Turkey is to implement non-partisan, uncompromising and sustainable measures against earthquakes and rent economy, it should start by establishing *the Ministry of Earthquake and Disaster* with a high and effective budget. It is undeniable that the labor-capital conflict and class conflicts have become sharper due to macro problems such as hyperinflation, high unemployment, high cost of living,

income distribution injustice, etc. The immediate solution of the real life problems of the majority of the earthquake victims in Turkey should not be postponed in the shadow of the excessive profit appetite of the minority and artificial *"earthquake opportunists class"*, which is observed to grow by turning even the earthquake disaster conjuncture into all kinds of opportunities and rents.

In addition, the rule of law rules should be enforced and necessary sanctions should be applied for the public interest and benefit, against wrong and faulty operations and neglect of supervision, which will lead to high potential wrecks while making political and administrative decisions in the zoning and construction processes in Turkey. After these twin regional earthquakes with thousands of deaths, no Turkish responsible is expected to do *"harakiri"* like the Japanese, but in order to ease the public conscience - in the West and of course in Japan, which is a part of it - the institution of resignation and accountability as the simplest modern democratic and fair sanction should be put to work immediately.

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