



# **POLICY PULSE**

**A MONTHLY NEWSLETTER**

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# IN THIS ISSUE

## ECONOMY SNAPSHOT

Global Economy 3

Indian Economy 6

**WORLD TRADE ORGANISATION** 7

**FREE TRADE AGREEMENTS/ BILATERAL DISCUSSIONS** 10

## POLICY/ REGULATORY UPDATES

### India

Tamil Nadu to establish itself as a space destination 12

### World

EU initiated dispute settlement against Algerian's Restrictions on Trade and Investment 12

Japan revised Energy policy favouring nuclear power 13

## OPINION COLUMN

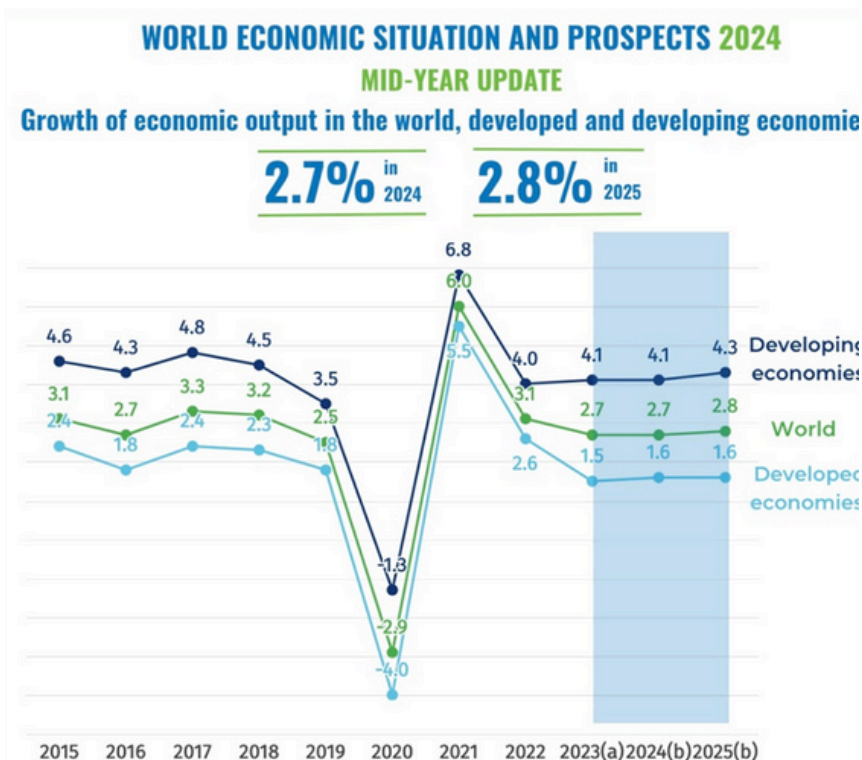
Understanding Economic Forecasting and Modelling: A Critical Tool for Decision-Making 14

Azerbaijan's COP29 Presidency and Its Crucial Role in Advancing the Paris Climate Agreement 17

The Future of Food: Technological Advancements in Food Processing and Packaging 19

### Stabilization Amidst Challenges: An Overview of the Global Economy in 2024

The global economy, as of mid-2024, is experiencing a period of stabilization, a welcome change after years of geopolitical conflicts, and significant monetary policy shifts. Despite stabilization, growth remains below historical standards, presenting a mixed future outlook.



#### Stabilization Amidst Weaker Growth

According to the latest Global Economic Prospects report from the World Bank, the global economy is expected to stabilize in 2024, marking the first stability prediction in last three years. This stability is coming at a level weaker than in the decade preceding the pandemic. Global growth is projected to be 2.6% in 2024, slightly increasing to an average of 2.7% for 2025–2026. This is notably lower than the pre-pandemic average growth rate of 3.1%. Indermit Gill, the World Bank Group's Chief Economist and Senior Vice President, attributes this lower growth rate to the lingering effects of the pandemic, ongoing conflicts, persistent inflation, and monetary tightening. Despite these challenges, the steady growth is a positive indication that the global economy is gradually finding its footing again.

#### US Monetary Policy and Inflation Dynamics

In the United States, the Federal Reserve has opted to keep interest rates steady at 5.25%–5.50%. Federal Reserve Chair Jerome Powell emphasized that policymakers are content with the current rate until a clear economic signal necessitates change. This approach underscores the importance of balance between fostering a strong labour market and achieving price stability.

Powell noted that despite modest progress in curbing inflation, the central bank remains cautious about making premature adjustments to interest rates, reflecting a broader trend of central banks around the world.

### **Regional Economic Conditions**

Economic conditions vary significantly across different regions and countries, owing to diverse challenges and dynamics. In Pakistan, the government has set a budget deficit target of 6.9% of GDP for the fiscal year starting July 1, aiming to address the country's fiscal challenges while stimulating economic growth. Meanwhile, India has seen a slight easing of retail inflation, which stood at 4.75% year-on-year in May, compared to 4.83% in April. This suggests progress in managing inflationary pressures in one of the world's fastest-growing major economies.

In the United Kingdom, GDP remained flat in April after a 0.4% rise in March, with wet weather affecting the construction and retail sectors. Germany experienced an increase in inflation in May, driven by higher service prices, with consumer prices harmonized with other EU countries rising by 2.8%. In Myanmar, the World Bank has highlighted a dire economic situation, with poverty more widespread than the past six years and growth unlikely to exceed 1% this fiscal year.

### **Global Inflation and Interest Rate Trends**

Inflation trends and interest rate policies also highlight varied economic landscapes. In the United States, the core consumer price index, excluding food and energy, rose 3.4% year-on-year in May, marking its slowest pace in over three years. Thailand's central bank has maintained its key interest rate at 2.5%, reflecting a steady approach amid stable economic conditions. Conversely, Argentina saw a significant cooling of inflation to 4.2% month-on-month in May, down from 8.8% in April. Japan experienced a 2.4% year-on-year increase in wholesale inflation in May, its fastest pace in nine months. Serbia, meanwhile, made its first interest rate cut since 2020, reducing its key rate by 25 basis points to 6.25%.

### **Challenges and Future Prospects**

Looking ahead, the global economy faces challenges: substantial investment is needed for net-zero emissions by 2050, hindered by high interest rates. The Asia-Pacific, set to be the fastest-growing region, must balance growth with sustainability.

In conclusion, while the global economy stabilizes, growth rates lag historical standards, reflecting ongoing challenges. Regional disparities in economic conditions, inflation, and monetary policies further complicate the global economic landscape. Addressing these requires coordinated, strategic policymaking for sustainable, and inclusive growth.



### **India's Economic Outlook: A Bright Future with Continued Momentum**

With the conclusion of the world's largest democratic elections establishing a new government, India's economic outlook remains promising. The country is poised to be the fastest-growing economy in the G20 this year and is expected to become the third-largest economy in the world by 2030, according to an S&P Global report. Despite the changes in political leadership, India's economic growth has remained consistent, foreshadowing continued prosperity.

### **Economic Growth and Structural Reforms**

India's economic momentum is forecasted to continue throughout the fiscal year 2024-25 with a projected GDP growth of 6.6%, following a robust 8.2% growth in the fiscal year 2023-24 as reported by India's finance ministry. At the 'Confederation of Indian Industry Annual Business Summit 2024', Amitabh Kant, the G20 emissary for India, highlighted the country's impressive growth rate of 8.4% over the last three fiscal quarters. He attributed this success to structural reforms, digitization, infrastructure development, and climate action. Kant expressed optimism that India could contribute 30% of global GDP growth between 2035 and 2040.

### **Capital Markets Performance**

India's capital markets have seen significant growth, especially in equities. From January to May 2024, 31 Indian companies launched Mainboard IPOs, up from six in the same period last year, boosting India's stock market capitalization to approximately \$5 trillion. This places India as one of the most active, and the world's fourth-largest market, surpassing Hong Kong and France.

The debt capital markets have also performed well, attracting global investors to its sovereign bonds. As of June 2024, the 10-year government bond yield was trading at 6.9%. India's imminent inclusion in JP Morgan's emerging market bond indices is expected to attract between US\$20 billion and US\$22 billion of additional inflows into the bond markets, further bolstering investor confidence.

### **Borrowing Options and Reverse Flipping**

India's debt markets, both offshore dollar and local rupee-denominated, have been vibrant. High capital inflows from international and domestic investors keep the domestic currency debt markets active. The international currency debt markets have also seen increased activity, with higher registrations, disbursements, and net inflows compared to the previous fiscal year.

A notable trend is the 'reverse flipping' phenomenon, where Indian start-ups that previously moved abroad for capital access are now returning to India. Companies like Groww, Pine Labs, and Razorpay have made the return, and there are rumours that Flipkart, India's largest e-commerce company and part of Walmart, may follow suit ahead of an IPO. This trend signifies growing confidence in India's capital markets and its supportive ecosystem for businesses.

**Future Prospects and Economic Stability**

India's economic indicators suggest a path towards becoming an economic superpower. The Reserve Bank of India forecasts a GDP growth rate of 7.2% for FY25, driven by significant investment and domestic demand. A normal monsoon is expected to further support growth and mitigate food inflation.

In summary, India's economy is set for sustained growth, backed by structural reforms, robust capital markets, and strong investor confidence. This trajectory presents lucrative opportunities for businesses, both domestically and internationally, positioning India as a dynamic market to watch in the coming years.

## South Africa Calls for Panel Review of EU Measures Affecting Citrus Imports

South Africa has initiated WTO dispute settlement panels against the EU regarding citrus import restrictions from South Africa into the EU. The specific measures in question pertain to import restrictions imposed by the EU to control the spread of the insect 'Thaumatotibia leucoderma', commonly known as the False Codling Moth, and the fungus 'P. citricarpa', also known as "citrus black spot." South Africa contends that these EU measures lack sufficient scientific evidence and are more trade-restrictive than necessary for achieving the EU's appropriate level of protection.



Despite failed consultations, South Africa contends that regional differences in pest risk were not adequately considered by the EU when applying these measures. In response, Spain's Citrus Management Committee defends the regulations, citing rising interceptions of South African citrus due to black spot concerns, amounting to 51 in 2023.

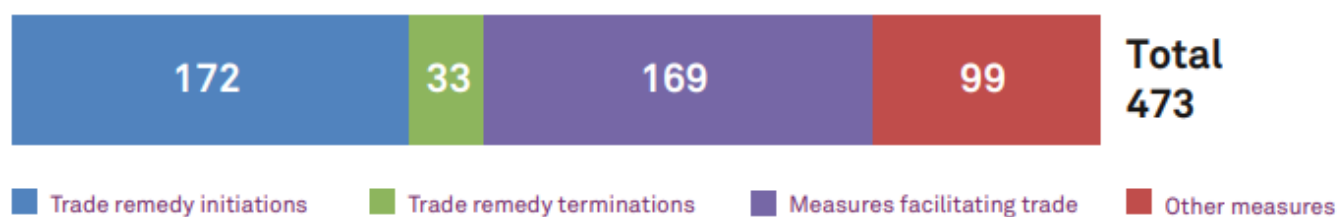
This dispute holds significant economic implications for South Africa, impacting a sector employing over 140,000 people. In summary, South Africa seeks a thorough review of EU citrus import rules, while Spain defends the existing regulations based on scientific evidence.

## Trade Monitoring Update emphasizes the resilience of World Trade

The Trade Monitoring Reports aim to shed light on the latest trends in the policy measures implementation that impact the flow of trade and to provide an update on the global trading environment.

The recent report, released in July 2024, provides an overview of selected trade and trade-related policy developments in the area of goods from mid-October 2023 to mid-May 2024. During the review period, WTO members implemented more measures aimed at facilitating trade (169) than restricting it (99) for goods, predominantly focusing on import-related measures. The introduction of new export restrictions notably decreased during this time, marking a reversal from trends observed between 2021 and 2023.

# WORLD TRADE ORGANISATIONS



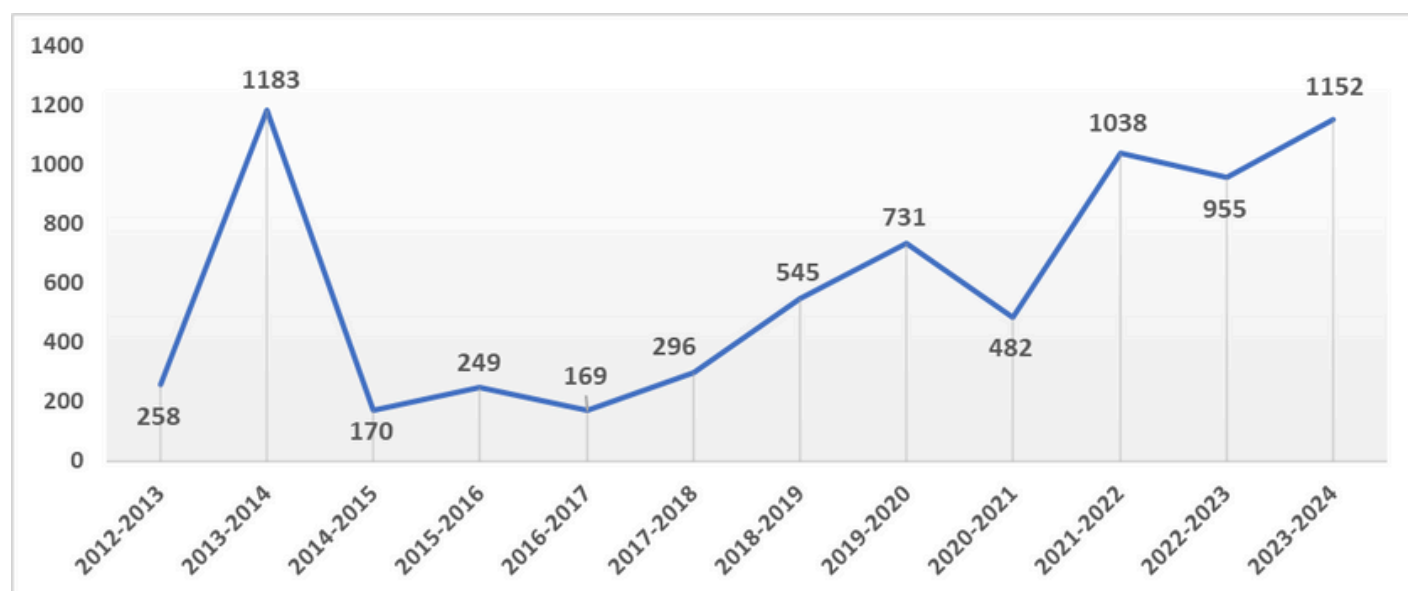
Source: WTO Secretariat

## Trade Volume and Outlook

According to the WTO's most recent forecast of 10 April 2024, the volume of world merchandise trade is expected to increase by 2.6% in 2024 and 3.3% in 2025, following a 1.2% contraction in 2023. The outlook for commercial services trade is also positive, especially for digitally delivered services trade, the value of which rose 51% between 2019 and 2023.

The global economy continued to recover gradually during the review period. In the first quarter (Q1), output expanded at a moderate pace in the world's leading economies. Annualized quarterly GDP growth in the United States slowed to 1.3% in Q1 of 2024 from 3.4% in Q4 of 2023 but remained positive. GDP growth in the euro area picked up to 1.3% in Q1 of 2024 from 0.0% in Q4 of 2023, while growth in China accelerated to 6.6% from 4.9%.

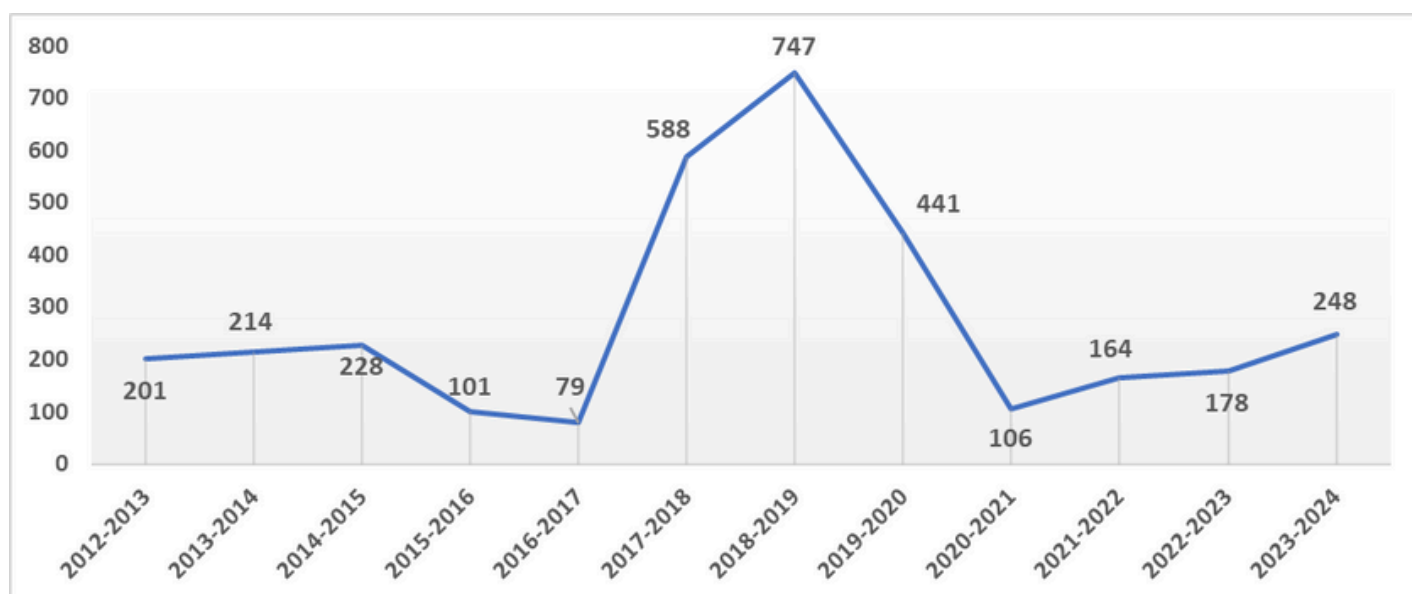
## Import Facilitating Measures Time Period: Mid-October to Mid October



Source: WTO Secretariat



## Import Restricting Measures Time Period: Mid-October to Mid October



Source: WTO Secretariat

The total trade coverage of trade-facilitating measures, encompassing both imports and exports, rose to USD 1,219.0 billion from USD 977.2 billion in the previous report. Meanwhile, other trade and trade-related measures, excluding those facilitating trade or acting as remedies, reached USD 433.6 billion, up from USD 337.1 billion.

The average number of trade remedy initiations increased to 24.6 during the review period, reversing a previous decline trend. Nearly 90% of these investigations were initiated by G20 economies, with anti-dumping actions accounting for 70.3% of initiations and 93.9% of terminations.

The trade coverage of all trade remedy investigations initiated during the review period was USD 56.1 billion (up from USD 24.6 billion), with terminations valued at USD 2.5 billion (down from USD 15.5 billion).

In the services sector, WTO members predominantly introduced trade-facilitating measures aimed at liberalization or improving regulatory frameworks. Adjustments to intellectual property regimes also continued. The implementation of new COVID-19-related trade measures and government support declined during this period.

The stockpile of active import restrictions has steadily increased since 2009, now totalling USD 2,272 billion or 9.7% of total world imports in 2024.

The review period also witnessed significant economic support measures, particularly subsidies, as part of industrial policies, notably in renewable and non-renewable energy, climate change, and national security sectors.

# FREE TRADE AGREEMENT/ BILATERAL DISCUSSIONS

## India-ASEAN FTA review target to be completed by end of 2024



India and the Association of Southeast Asian Nations (ASEAN) are reviewing their trade agreement to finalize changes by year-end. The next round of Review talks will focus on revising India's zero-tariff concessions on mobile phone imports. India's goal is to protect and encourage its domestic industries while modernizing the ASEAN Trade in Goods Agreement (ATIGA), signed in 2009.

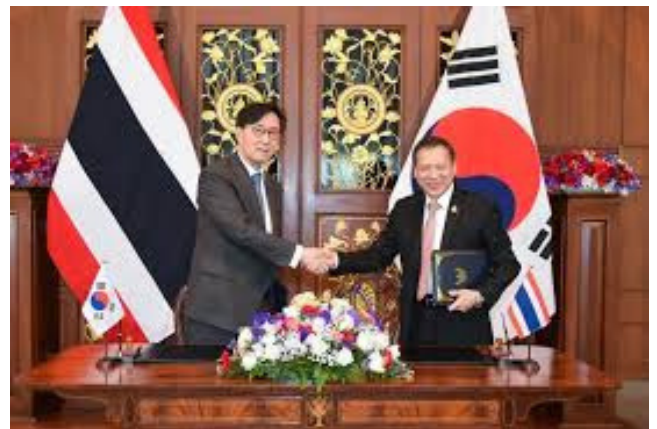
Since the agreement's implementation, India's trade with ASEAN has grown significantly, albeit with a trade imbalance favouring ASEAN. Since 2011, India's trade deficit with ASEAN has grown from USD 7.5 billion annually to about USD 44 billion in FY23. Over 50% of India's imports from ASEAN consist of coal, palm oil, and other raw materials, while India exports refined petroleum products, commercial vehicles, telecommunication equipment, and more.

Experts suggest that India's single tariff schedule for all ASEAN members limits the effectiveness of India's exclusion list.

According to GTRI, India will focus on reducing imports from ASEAN during the review. India is looking to adjust tariff concessions and potentially tighten rules of origin to ensure value addition in electronics products and other areas.

## South Korea and Thailand launched the first round of negotiations

On 9th July 2024, Korea and Thailand initiated the first round of negotiations for an Economic Partnership Agreement (EPA) to enhance bilateral trade and investment. The talks, led by Deputy Minister Roh Keon-ki from Korea and Chotima Iemsawasdikul from Thailand, are taking place in Bangkok.



Source: *The Korea Times*

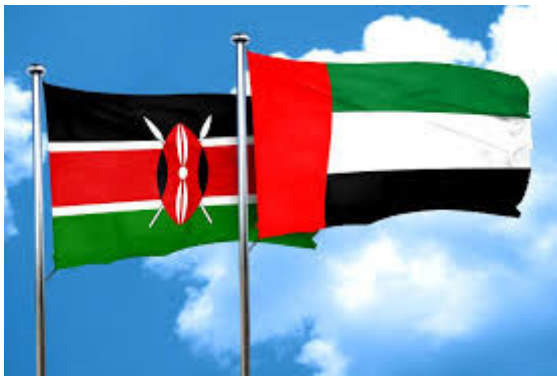
Despite existing trade agreements between Korea and Thailand under the Korea-ASEAN FTA and RCEP, there is potential for further economic cooperation. The EPA aims to strengthen bilateral economic ties, covering various sectors such as goods, services, investment, digital economy, and government procurement. Thailand, the second-largest economy in Southeast Asia and a manufacturing hub, presents

# FREE TRADE AGREEMENT/ BILATERAL DISCUSSIONS

Korea an opportunity to bolster its competitiveness against other rivals like Japan and China.

## **Kenya is awaiting parliamentary approval for an agreement with the UAE**

The Kenyan Cabinet has approved a trade agreement with the United Arab Emirates (UAE), to boost Kenya's global economic presence. The Kenya-UAE Economic Partnership Agreement, signed by Trade Cabinet Secretary Rebecca Miano and her UAE counterpart Thani bin Ahmed Al Zeyoudi, is part of Kenya's efforts to enhance access to foreign markets. While the agreement's initial phase was concluded earlier this year, it is now awaiting parliamentary debate and approval.

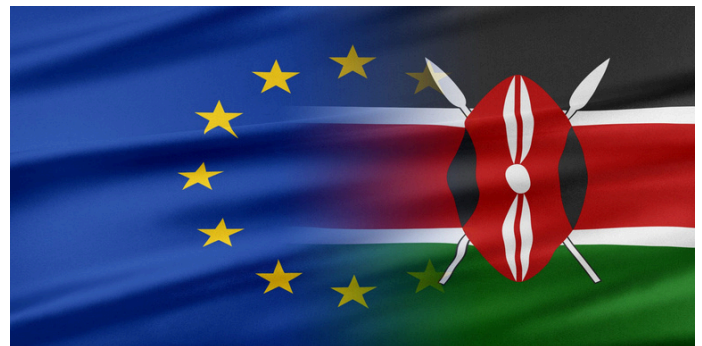


*Source: Kenyan Wall Street*

If ratified, the treaty will grant the UAE preferential market access for various Kenyan products, including tea, meat, fruits, vegetables, and cut flowers. It aims to deepen trade relations, enhance investment flows, remove unnecessary trade barriers, and open new economic and technical cooperation opportunities between the two countries. The agreement also involves collaboration with the East African Community (EAC) to expand regional market access.

## **Kenya ratifies EPA with European Union**

Kenya began importing duty-free goods from the EU on July 1 under the EU-Kenya Economic Partnership Agreement (EPA), ensuring unrestricted access for Kenyan exports to the EU, except for arms. The EPA covers trade, economic cooperation, and sustainable development, addressing issues like labour rights, gender equality, forestry, environment, and climate change.



Under the agreement, Kenya's agricultural produce, including vegetables, cut flowers, fruits, tea, and coffee, will continue to enter the EU duty-free and without quotas. In return, Kenya has committed to gradually lowering duties on imports from the EU over 25 years, after which trade will be fully liberalized. This will apply to goods such as machinery, mineral, and chemical products and will also incentivize investments from the EU.

The agreement includes a safeguard clause preventing the EU from subsidizing agricultural exports to Kenya without dialogue, safeguarding Kenya's agriculture and food security. Despite trade between the two parties favoring the EU, the agreement's enforcement follows approval from the European Parliament and Kenyan lawmakers.



### **Tamil Nadu to establish itself as a space destination**

The Tamil Nadu government has unveiled the draft Tamil Nadu Space Industrial Policy 2024, aiming to establish the state as a global hub for the space industry and generate economic opportunities. Key goals include attracting investment, promoting innovation, ensuring sustainability and establishing the state as a preferred destination for space-related research, development, and manufacturing activities. To achieve this, the policy outlines measures to develop state-of-the-art infrastructure, provide financial incentives, and facilitate collaboration between industry, academia, and research institutions.



Under the proposed policy, the government plans to establish specialized industrial parks and clusters to nurture and support space technology start-ups and companies. These dedicated spaces will provide essential infrastructure, resources, and a conducive environment for businesses to thrive in the space sector. Additionally, the policy emphasizes the importance of skill development and aims to create a robust talent pool equipped with the necessary expertise to drive innovation in the space industry.

In line with the national space policy framework, the draft policy aims to foster collaboration with the Indian Space Research Organisation (ISRO) and other national space agencies. By leveraging ISRO's expertise and resources, the policy seeks to facilitate technology transfer, joint research initiatives, and the establishment of testing and validation facilities to support the state's burgeoning space industry. The draft policy also prioritizes promoting public-private partnerships to drive innovation and investment in the space sector to leverage the strengths of both sectors to propel the growth of the space industry in Tamil Nadu.

## **WORLD**

### **EU initiated dispute settlement against Algerian's Restrictions on Trade and Investment**

On June 14, 2024, the European Union (EU) initiated dispute settlement proceedings against Algeria to address trade-restrictive measures imposed since 2021, which the EU believes violate Algeria's trade liberalization commitments under the EU-Algeria Association Agreement. These measures include an import licensing system that functions as an import ban, subsidies for car manufacturers contingent on using local inputs, and a cap on foreign ownership for companies importing goods into Algeria.

These restrictions affect various market sectors, from agricultural products to motor vehicles, and have negatively impacted EU exporters and companies operating in Algeria, as well as Algerian consumers, by limiting product choice. The EU's goal is to remove these restrictions and find a mutually

satisfactory solution else it may request the establishment of an arbitration panel as per the EU-Algeria Association Agreement.



The EU-Algeria Association Agreement (2002), effective since 2005, aims to liberalize trade and enhance cooperation. The EU is Algeria's largest trade partner, accounting for about 50.6% of Algeria's international trade in 2023. However, EU exports to Algeria have decreased from €22.3 billion in 2015 to €14.9 billion in 2023. Despite concerns, EU exports to Algeria declined from €22.3 billion in 2015 to €14.9 billion in 2023, prompting the dispute action under standard EU trade dispute mechanisms.

### **Japan revised Energy policy favouring nuclear power**

Japan is revising its energy policy to prioritize nuclear power amid concerns over energy security, aiming to reduce reliance on fossil fuels and ensure stable electricity supply. This shift follows the Fukushima disaster in 2011, which reduced nuclear power usage and increased fossil fuel dependency. Despite commitments to achieve net-zero carbon emissions by 2050, Japan is now emphasizing nuclear energy alongside renewables like wind and solar, driven by geopolitical tensions and

supply disruptions from the Russia-Ukraine conflict.

The Japanese government's decision to boost nuclear power is expected to impact LNG and thermal coal exporters, such as Australia, Qatar, the U.S., and Indonesia. Japan plans to include provisions for new nuclear reactors in its upcoming energy policy update, reflecting a pro-nuclear stance adopted by Prime Minister Fumio Kishida in 2022.



However, achieving the target of 20-22% nuclear power in the energy mix by 2030 is a challenge due to regulatory obstacles, public opposition, high costs, frequent earthquakes, and the lengthy development time required for nuclear plants. Experts predict that Japan may only reach 15% nuclear power by 2030, necessitating continued reliance on thermal power to meet demand.

Japan's energy policy revision also includes setting new greenhouse gas emissions reduction targets for 2035 and beyond, as well as a decarbonization strategy for 2040. The country aims to accelerate the growth of renewable energy and reduce fossil fuel generation to lower prices and improve the competitiveness of Japanese companies in a decarbonizing global economy.



## Getting Inside Economics

Aditya Sinha

### Understanding Economic Forecasting and Modelling: A Critical Tool for Decision-Making

Economic forecasting and modeling are vital tools in the arsenal of policymakers, businesses, and financial institutions. These methodologies provide a scientific approach to predicting future economic conditions, allowing stakeholders to make informed decisions. Yet, despite their importance, the concepts of economic forecasting and modeling are often misunderstood or oversimplified.



#### What is Economic Forecasting?

Economic forecasting involves the prediction of future economic conditions based on current data and trends. It encompasses a range of economic indicators, including GDP growth, unemployment rates, inflation, and more. Forecasts are used to anticipate economic performance and help in planning and decision-making processes at various levels.

Forecasters rely on historical data and statistical methods to project future outcomes. For instance, if data shows a consistent pattern of consumer spending rising during certain periods, forecasters might predict similar increases in the future, adjusting for new variables or potential disruptions.

#### The Role of Economic Modelling

Economic modeling, on the other hand, is the creation of abstract representations of economic processes. These models simplify complex economic systems to understand the relationships between different variables. By inputting various assumptions and parameters, economists can simulate different scenarios and observe potential outcomes.

There are several types of economic models:

- **Macroeconomic Models:** These models look at the economy as a whole and are used to forecast national economic activity. They can help predict GDP growth, inflation, and unemployment rates.
- **Microeconomic Models:** These focus on individual sectors or markets within the economy, helping to understand supply and demand dynamics, pricing strategies, and consumer behaviour.
- **Econometric Models:** These use statistical techniques to quantify relationships between economic variables, often employing regression analysis to test hypotheses and predict future trends.
- **Computable General Equilibrium (CGE) Models:** These are sophisticated models that simulate how changes in one part of the economy affect the rest, considering the interdependencies within the economic system.

## The Importance of Economic Forecasting and Modelling

Accurate economic forecasts and models are crucial for several reasons:

- **Policy Formulation:** Governments rely on economic forecasts to design fiscal and monetary policies. Accurate predictions help in setting interest rates, taxation policies, and government spending.
- **Business Planning:** Companies use economic forecasts to make strategic decisions, such as investment planning, inventory management, and expansion strategies. Understanding future economic conditions helps businesses mitigate risks and seize opportunities.
- **Financial Markets:** Investors and financial analysts use economic models to predict market trends and make investment decisions. These forecasts can influence stock prices, bond yields, and currency values.
- **Public Awareness:** Forecasts help the general public understand potential economic changes, aiding in personal financial planning and decision-making.

## Challenges and Limitations

Despite their importance, economic forecasting and modeling face significant challenges:

- **Data Quality:** Accurate forecasts depend on high-quality, timely data. Inaccurate or outdated data can lead to faulty predictions.
- **Complexity of Economies:** Economies are inherently complex and influenced by countless factors, including political events, technological changes, and natural disasters. Capturing all these variables in a model is challenging.
- **Uncertainty:** The future is inherently uncertain. Unexpected events, such as the COVID-19 pandemic, can dramatically alter economic trajectories, rendering forecasts obsolete.

- **Model Assumptions:** Economic models rely on assumptions that may not always hold true. Simplifications necessary for modeling can sometimes overlook critical real-world complexities.

Economic forecasting and modeling are indispensable tools that provide valuable insights into future economic conditions. While they are not without limitations, their role in shaping policy, guiding business decisions, and informing financial markets cannot be overstated. As data quality and modeling techniques continue to improve, the accuracy and reliability of economic forecasts are likely to enhance, offering even more robust support for decision-making in an increasingly complex global economy.

*(The writer is an Senior Research Analyst at VeKommunicate)*

## Environment Equity

Saloni Goyal

### Azerbaijan's COP29 Presidency and Its Crucial Role in Advancing the Paris Climate Agreement

As the world confronts the urgent challenges of climate change, Azerbaijan's COP29 Presidency is poised to play a pivotal role in advancing the crucial objectives set by the Paris Climate Agreement of 2015. With COP29 just a few months away, it is essential to understand the significance of Azerbaijan's presidency and the necessary actions to achieve the ambitious targets outlined.



Azerbaijan's primary goal for its COP29 Presidency is to act as a critical enabler in three fundamental aspects of the Paris Climate Agreement. Firstly, it aims to achieve deep, rapid, and sustained emission reductions to keep global temperatures under control, ensuring they remain below 1.5°C. This target is vital for mitigating the most severe impacts of climate change. Secondly, the presidency is committed to an inclusive implementation process that leaves no one behind, addressing the needs of vulnerable communities and ensuring equitable participation in the transition to a sustainable future.

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The COP29 Presidency's plan is built on two mutually reinforcing pillars. The first pillar, "enhance ambition," focuses on ensuring all parties commit to ambitious national plans and transparency. The second pillar, "enable action," emphasizes the critical role of finance in turning ambition into action, reducing emissions, adapting to climate change, and addressing loss and damage.

This is the engagement with a broad range of international stakeholders to ensure that all voices are heard and perspectives are included, aiming for inclusive outcomes based on shared solutions.

The cooperation among the Troika—the UAE, Azerbaijan, and Brazil, Presidencies of COP28, COP29, and COP30 respectively—aims to build continuity and coherence between Presidencies. This partnership is designed to maintain momentum from the Dubai Conference into the Baku COP in 2024 and beyond into the Belem COP in 2025,

moving from negotiated texts to action and implementation.

In the first letter to Parties, COP29 President-Designate Mukhtar Babayev outlined Azerbaijan's priorities, including food, health, finance, nature, gender, trade and investment, energy, and education. Alongside the negotiated outcomes, COP29 priorities include establishing a new climate finance goal, carbon markets, and addressing loss and damage.

Azerbaijan's leadership in COP29 presents an opportunity to drive meaningful change and accelerate progress towards a more sustainable and resilient future. The presidency's approach recognizes that urgent and ambitious action is necessary to address the ongoing climate crisis. By fostering global cooperation and mobilizing resources, Azerbaijan aims to propel the international community towards achieving the Paris Agreement's objectives.

By facilitating multilateral dialogue and collaboration, Azerbaijan has the potential to inspire increased ambition and drive the implementation of robust climate policies. Given the interconnected nature of climate change impacts, such collaborative efforts are essential for effectively addressing the global challenge. Through its presidency, Azerbaijan seeks to create an environment conducive to innovation, investment in renewable energy, and the adoption of sustainable practices to curb emissions.

For Azerbaijan's COP29 Presidency to succeed, stakeholders across government, industry, civil society, and academia must work together to build consensus and drive action. The presidency offers a crucial opportunity for all stakeholders to contribute their expertise and resources toward realizing the goals of the Paris Agreement.

Key to this effort is the need for transparent communication, shared responsibility, and a commitment to accountability.

Looking ahead to COP29, it is vital to recognize that Azerbaijan's presidency underscores the collective responsibility of nations to address the climate crisis. By championing ambitious climate action and fostering inclusive processes, Azerbaijan is poised to make a significant contribution to the global response to climate change. The success of COP29 hinges on the commitment of all parties to work collaboratively and prioritize the urgent and collective action needed to safeguard the planet for future generations.

*(The writer is an Senior Research Analyst at VeKommunicate)*



## Science Space

Pragya Prakash

### The Future of Food: Technological Advancements in Food Processing and Packaging

As we look ahead to a world where the population is expected to surpass 9 billion by 2050, the challenge of providing sufficient, safe, and sustainable food becomes increasingly urgent. The recent advancements in food processing and packaging technologies are not just innovations; they are essential steps towards ensuring global food security.

One of the most exciting areas of development is antimicrobial packaging. This technology, which actively combats the growth of harmful microorganisms, has the potential to significantly extend the shelf life of various food products.



By incorporating specific agents that inhibit microbial growth, antimicrobial packaging can enhance food safety during storage. This is particularly crucial for fresh and minimally processed foods, which are often more susceptible to spoilage. The focus on natural antimicrobial agents, which are both effective and sustainable, aligns perfectly with the global push towards environmentally friendly solutions.

Another ground-breaking advancement is the use of nano-silica and chitosan coatings for fruits like mangoes. These coatings have

shown remarkable results in preserving fruit quality during storage. For instance, studies have demonstrated that mangoes coated with these films experience reduced weight loss, delayed skin degreening, and maintained firmness compared to untreated ones. This not only extends the fruit's shelf life but also ensures that consumers receive high-quality produce. The potential of nano-silica/chitosan film coatings to preserve the quality of fruits during storage and marketing represents a significant leap forward in food packaging.

In addition to these innovations, biodegradable packaging solutions are gaining traction. The use of gum Arabic and starch-based films for coating fruits like pomegranates, combined with various polyliners, has shown promising results in reducing weight loss and maintaining fruit quality during storage. This approach offers a biodegradable alternative to traditional plastic packaging, addressing both food preservation and environmental sustainability.

Enhancing food safety and quality during processing is another critical area of focus. Innovative drying techniques and gamma irradiation have been explored to boost the antioxidant properties of milk-based products. For example, freeze-drying has been found to preserve higher levels of total phenolic content and antioxidant activity in milk fractions compared to spray drying. These advancements not only improve the nutritional value of food but also extend its shelf life, contributing to better food security.

The battle against frost formation in frozen foods is also seeing new developments. Studies comparing different plastic films, such as Polyvinyl Chloride (PVC) and low-density polyethylene (LDPE), have provided insights into how packaging materials can influence frost dynamics and meat preservation. Such research is crucial for developing improved packaging materials that maintain product quality during freezing and storage.

Mechanical innovations in food processing, like the geometric analysis of four-bar mechanisms used in oscillating screens, are revolutionizing the efficiency of separation systems in food processing equipment. By enhancing the precision of these systems, we can ensure better handling and manipulation of food products, ultimately improving their quality and safety.

In conclusion, the technological advancements in food processing and packaging are paving the way for a future where food security is achievable. These innovations not only enhance the efficiency and effectiveness of food preservation but also align with sustainability efforts, reducing food waste and optimizing resource utilization. As we continue to push the boundaries of technology and explore novel techniques, that we can meet the challenges of feeding a growing population while safeguarding the environment and ensuring the long-term availability of safe and nutritious food.

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