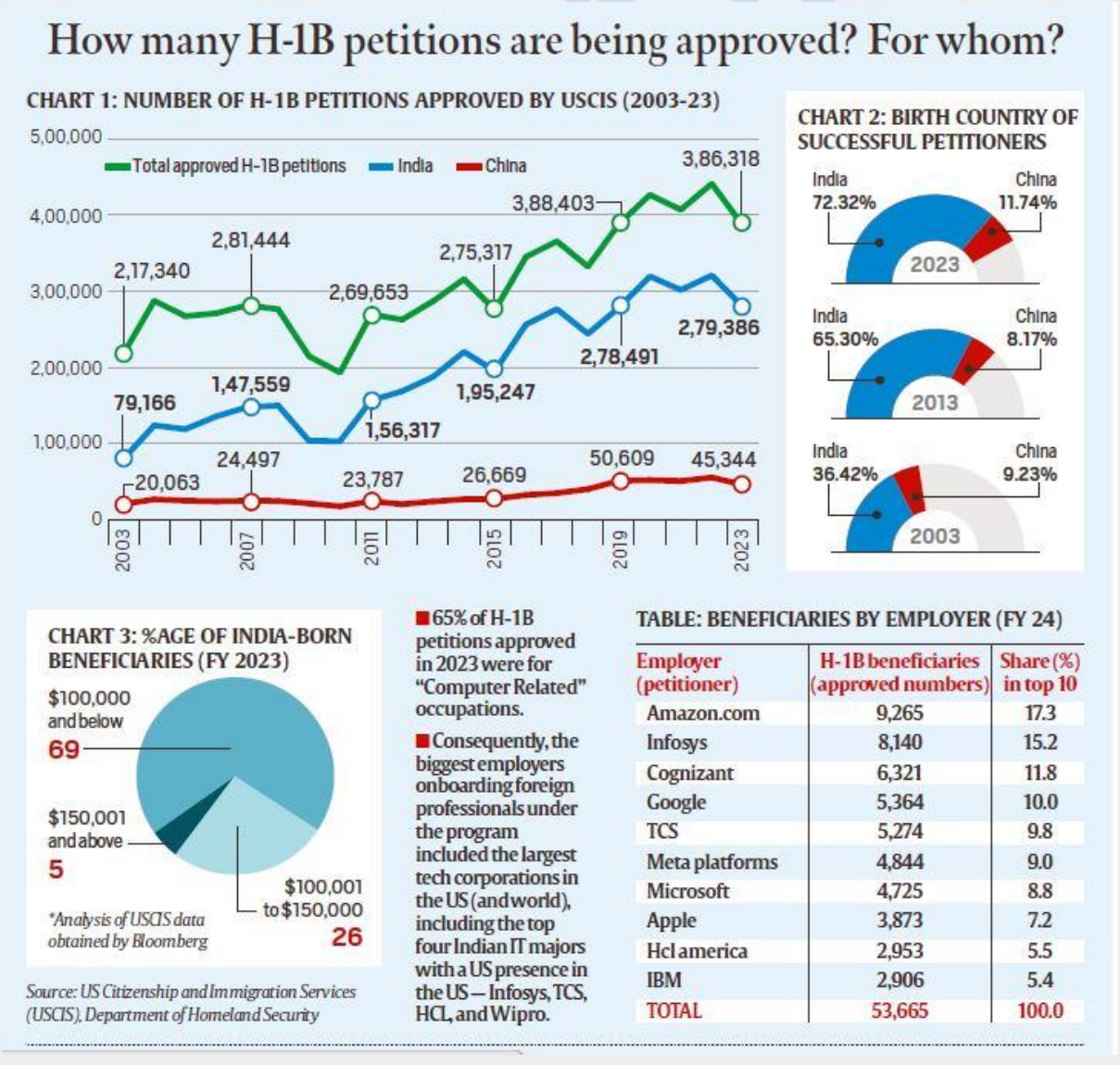
1. The H-1B Visa Debate: Key Controversies and Implications

Introduction

The H-1B visa program, designed to bring skilled foreign workers to the United States, has become a focal point of political and social contention, particularly within the conservative MAGA faction (the most vocal supporters of Trump's "Make America Great Again"). This debate reignited recently with the appointment of Sriram Krishnan as an AI adviser in Donald Trump's incoming administration and his public support for skilled immigration.



The H-1B Program at a Glance

• **Purpose:** Enables U.S. employers to hire skilled foreign nationals for roles requiring advanced expertise, typically in STEM fields.
• **Eligibility:** Requires a minimum of a bachelor's degree; capped annually at 65,000 visas, with an additional 20,000 for advanced degree holders from U.S. universities.
• **Exemptions:** Certain nonprofit and research-related petitions are excluded from the cap.

Why Indians Dominate H-1B Approvals

• Indians consistently account for over 70% of approved H-1B petitions annually, far surpassing other nationalities like Chinese applicants (12-13%).
• Their dominance is attributed to India's large pool of STEM graduates and the demand for tech talent in the U.S.

Controversy Within MAGA Circles

• **Criticism:** Some conservatives claim the H-1B program undermines U.S. workers by allowing companies to hire foreign talent at lower wages.
• **Support:** Prominent voices like Elon Musk argue for the necessity of the program to address a persistent talent shortage in engineering and tech.

Economic and Policy Implications

• **Wages and Talent:** Critics argue that H-1B salaries often fall below the U.S. median for IT professionals, suggesting corporations prioritize cost-saving over hiring domestic talent.
• **Proposed Reforms:** Musk and others advocate for raising minimum salaries and imposing higher fees for H-1B employment to level the playing field.
• **Global Competition:** With India and China producing millions of STEM graduates annually, the U.S. faces challenges in maintaining its competitive edge without skilled immigration.

Broader Immigration Debates

The H-1B debate reflects broader divisions in U.S. immigration policy. While low-skilled immigration often dominates political rhetoric, the skilled immigration issue underscores the complexities of balancing economic needs with nationalist sentiments.

Conclusion

The H-1B program remains a vital yet contentious pillar of U.S. immigration policy, reflecting deeper struggles over globalization, economic equity, and national identity.

Relevance: GS Prelims; Bilateral Relations
Source: Indian Express

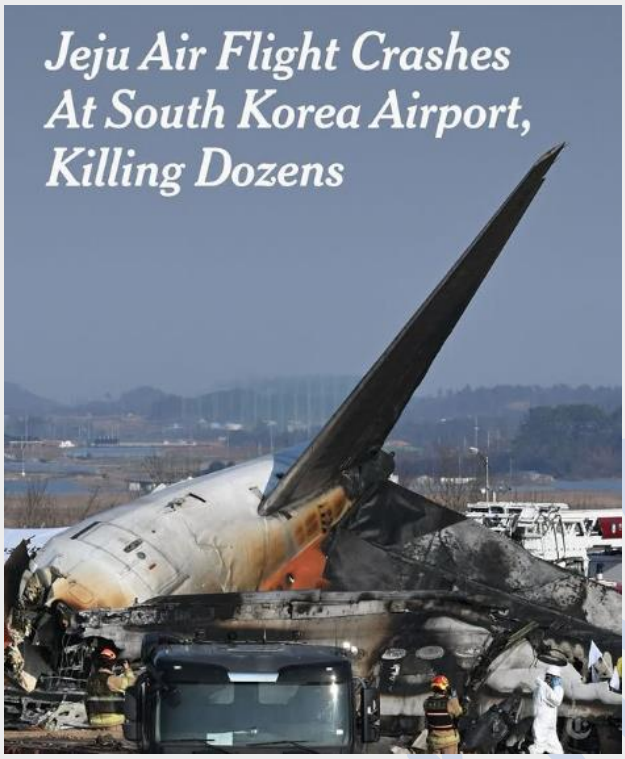
2. Jeju Aircraft Crash: How exactly a plane lands, and what could have gone wrong

Jeju Air plane crashes in South Korea

As many as 179 people were killed when Jeju Air flight 7C2216 made a belly-landing (touching down with landing gears retracted), overran the runway, smashed into the perimeter fence and burst into flames at the Muan International Airport in South Korea recently.

The twin-engine Boeing 737-800, arriving from Bangkok, had 175 passengers and six crew members onboard. Only two, both cabin crew members, survived the deadliest air crash in South Korea.

What could have gone wrong?



Belly-landing

Belly-landings are risky and carried out only in an emergency. With the landing gear up, the wings are very close to the ground when an aircraft touches down. Therefore, the wings must be held absolutely 'level' (parallel to the ground). With even a slight left or right bank either by the pilot or a strong gust of wind, a wing could hit the ground, flip the jet, send it cartwheeling or break it apart.

Even if the landing goes well and everyone walks out alive, a belly-landing results in considerable damage to the plane, its engines and wings as the aircraft skids to a stop and can leave those onboard injured. The friction generated by the aircraft skidding on the runway can also create sparks or result in a fire.

A cockpit crew decides to land an aircraft on its belly in the following situations:
1. Landing gear fails to deploy.
2. A stricken aircraft cannot make it to an airport and landing is done in a field. The pilot considers skidding the aircraft to a stop safer than touching down on wheels.
3. Ditching: when an aircraft makes an emergency landing on water.
4. Any other situation a pilot considers a belly-landing safer than landing on wheels.

That said, there have been incidents where pilots, task-saturated or distracted during the extremely busy phase of landing, simply forgot to deploy the landing gear and landed aircraft on their belly. Pilots are also humans and fallible.

Landing gear fails to deploy

Jeju Air flight 7C2216's pilots were warned by the air traffic controller (ATC) on duty at Muan of the presence of birds in the airport's vicinity and possibility of a bird strike (birds colliding with the aircraft). Minutes later, the pilots declared a Mayday and were cleared to land from the opposite direction, a BBC report said.

"Cleared to land from the opposite direction" possibly means ATC cleared flight 7C2216 to land from a direction opposite of what the crew planned.

A runway has two ends. Let's say a flight is cleared to land from a specific end of the runway but later, ATC requests the crew to land from the other end. ATC can make such a request for several reasons. In the Jeju Air crash, the crew had declared an emergency and needed to land at the earliest.

Why the pilots declared an emergency is not known yet. It has been speculated that the Boeing 737's landing gear failed to deploy. Experts have questioned the theory. Rightly so.

Bird ingestion can disable an aircraft's engines, dent the aircraft's skin, damage navigation / communication antennas fitted around the aircraft or break the windshield / window glasses in rare cases. But a bird strike damaging an aircraft's retracted landing gear — retracting into bays locked by hydraulically operated doors in flight — is unlikely.

Moreover, if a crew decides to carry out a belly-landing at an airport, there is a procedure for it. Fire trucks and emergency services must be ready to respond to a possible fire or evacuate passengers and crew after the aircraft comes to a stop. Foaming the runway with a chemical before belly-landings to suppress sparks and fire, which was in practice decades ago, is no longer required.

In the Jeju Air crash, it's unlikely the landing gear malfunctioned and failed to deploy.
A more likely possibility is Jeju Air's crew decided to carry out a belly-landing because they considered it safer than landing with the gear down. Why?

Landing long and fast
'Landing long and fast' is an aviation term that means an aircraft touches down far beyond the designated touchdown zone on the runway, leaving the crew with less runway length to stop the aircraft, and at a speed far exceeding the recommended landing speed.

From videos of the crash, the Boeing 737 appears to land 'long and fast'. Experts and officials quoted by news reports too have said so.

It is possible that at some point during the approach, the Captain realised this: That the jet was coming in 'long and fast' and that they were going to 'overshoot', that is land far beyond the touchdown zone. A go-around — calling off the approach — was perhaps not possible. The Captain must have decided that landing on the belly was safer, offering better chances to stop the aircraft within the runway than landing on wheels. It's only a conjecture but what actually went wrong will be known only from the official investigation report.

Why did the jet come in fast?
A passenger on flight 7C2216 texted a relative that a bird was stuck in the wing, according to Reuters and BBC reports, the clearest clue yet that the aircraft was hit by a bird or a flock of birds. Just how many birds and what type of bird, small or big, we don't know yet. Did a bird get stuck in the wing, or was it many birds, and in what part of the wings were they stuck?

For landing, a pilot uses slats and flaps, retractable surfaces on the front and back of wings. You can see them from a passenger window, in extended position before landing. An aircraft needs to be slowed before landing but, at slower speeds, the wings cannot generate sufficient

'lift' — the upward, aerodynamic force generated by the wings that keeps a plane aloft. At slower speeds, the wings need help to generate extra 'lift'. This extra 'lift' comes from the slats and flaps.

One of the possibilities investigators will examine is whether birds stuck in critical areas of the wings prevented the Jeju Air crew to deploy flaps before landing. If the crew was unable to extends the flaps, then landing at a slower and recommended speed was perhaps not possible. And the crew had no choice but execute a high-speed landing.

Here's why.
But first a line about 'stall'. A 'stall' is a condition when an aircraft stops flying forward and starts dropping from the sky like a stone. An aircraft can 'stall' if its nose is raised too high, which disturbs the smooth flow of air around the wings spoiling generation of 'lift'. An aircraft also 'stalls' at slow speeds, which again spoils generation of 'lift'.

Flaps & stall speed
With flaps, an aircraft's 'stall' speed is lower. Without flaps, an aircraft's 'stall' speed is higher. For example, suppose an aircraft's 'stall' speed with flaps is 80 knots. For the same aircraft, without flaps, the 'stall' speed could be 120 knots. So, with flaps extended, the plane won't 'stall' at speeds above 80 knots. But without flaps, a crew needs to fly the aircraft above 120 knots to prevent a 'stall'.

This perhaps explains why the Jeju Air Boeing came in fast.

Braking
Modern jets are slowed down in broadly three ways: Using thrust reversers, spoilers and wheel brakes.
* Thrust reversers: Once an aircraft touches down, the thrust from the engines is redirected in the reverse direction, slowing down the plane.
* Spoilers or speedbrakes: Mounted on the wing's surface and flushed during flight, the movable panels deploy after a plane lands, slowing it down with aerodynamic 'drag'.
* Wheel brakes: Conventional (operated by pilots) and auto brakes.

Modern jets are highly automated. For example, an aircraft's automation / computer might prevent auto brakes from deploying unless it 'senses' that the aircraft is in landing configuration, flaps are extended and the wheels are on the ground.

In the Jeju Air crash, investigators will look at what sort of braking was available to the crew with the landing gear retracted.

Last chance?
When they realised the Boeing 737 was not going to stop on the runway, did the crew try to swerve the plane into the huge, open space beside the runway and attempt a 180-degree turn using rudder? Perhaps, it was their last chance at survival. In the video, one can see flat, empty land on both sides of the runway.

Relevance: GS Prelims; Security Issues

3. Bezos-owned Blue Origin's New Glenn rocket, set to launch into space

Introduction

The US Federal Aviation Administration (FAA) said last week that it has issued a commercial space launch license for Blue Origin's — Jeff Bezos' rocket company — New Glenn launch.

The development came after the rocket passed its final test, called a hot fire, where engines are ignited and the performance is measured.

Although Blue Origin is yet to announce the final date of the rocket's first space mission, reports said that it could take place around January 6, 2025. Earlier, the company had said the mission would take off by the end of 2024 but it got delayed as New Glenn had not completed its development to meet the deadline.

A successful launch of the rocket would put Blue Origin in direct competition with SpaceX whose Falcon 9 rocket has dominated the launch industry.

Here is a look at the features of the New Glenn rocket, and why it is significant for Blue Origin.

What is the New Glenn rocket?

The New Glenn rocket is a heavy-lift launch vehicle which has been named after John Glenn, the NASA astronaut who was the first American to circle the Earth in 1962.

The two-stage rocket is around 320 feet tall — as tall as a 32-story building — and consists of a 7-metre payload fairing. The first stage is reusable and powered by seven BE-4 engines, which the company claims are the world's most powerful liquefied natural gas (LNG)-fueled, oxygen-rich staged combustion engines. They generate more than 3.8 million pounds of thrust.

According to Blue Origin, the first stage is designed for a minimum of 25 flights.

New Glenn's second stage is powered by two BE-3U engines, which use liquid hydrogen and liquid oxygen to provide more than 320,000 pounds of vacuum thrust.

Why is New Glenn significant for Blue Origin?

Founded by Bezoz in 2000, Blue Origin has registered only small accomplishments over the years, especially in comparison to Elon Musk's SpaceX, which was established in 2002. So far, Blue Origin's most notable success has been a small rocket called New Shepard that has taken

space tourists and experiments on short up-and-down flights, according to a report in the New York Times.

The company is hoping to change its fortunes with the help of the partially reusable New Glenn rocket. It also expects to challenge Falcon 9's — also a partially reusable launch vehicle — dominance in the market. Falcon 9 is considered one of the most successful and reliable rockets ever made. It has completed more than 400 missions successfully over the years.

However, the road to New Glenn's first space mission has been bumpy. For instance, its first mission was supposed to take place in late October 2024 when it had to carry two small Mars-bound orbiters for NASA. But the space agency pulled the spacecraft off when it realised that Blue Origin would not be ready in time.

The January mission of the New Glenn now involves launching technology related to the company's Blue Ring program, a line of business that will offer manoeuvrable spacecraft to the Pentagon, according to a report by Reuters.

Relevance: GS Prelims; Science & Technology