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Aviation Technology

I. History and Background

Commercial development of the aviation industry in Iran started with creation of the first airline office in Tehran in cooperation with Junkers in 1923. It provided air travel services between Tehran, Mashhad, Shiraz, Bandar Anzali, and Bushehr. A non-civilian body was also established in 1922 as the first official aviation organization in Iran.

Although initiatives for development of the aviation industry in Iran were primarily commercial at the outset, in 1930s the authorities decided to develop the two major categories of this important new industry; that is both civil and military aviation. Providing civil aviation services required establishment of technical and civil supporting organizations alongside the military services and logistics. This way, Iranian airlines started their services in 1923, in parallel with the military development. The rapid pace development resulted in a partnership between the private sector and Iran Airways in 1944 through private sector investment. The next in this group was the Persian Air Service (PAS) which began operating in 1952. Iran Airways and the Persian Air Service merged as Iran Airline in 1961. In 1962 state nationalization of the air transportation industry led to establishment of the Iranian National Airline (called Homa in the Persian language) which operates under the regulations of the International Air Transport Association (IATA).

After the Islamic revolution, the country witnessed huge developments in the industry. In general, the history of Iranian commercial aviation from the beginning to present day can be divided into 8 periods:

- 1923-1927: Creation of Army Air Forces;
- 1927-1932: Inauguration of Junkers Airline in Iran;
- 1932-1938: Lack of commercial air transportation;
- 1938-1946: Creation of Ministry of Post, Telegraph and Telephone Airline;
- 1946-1961: Creation of Iran Airways and Persian Air Service;
- 1961-1962: Creation of Iran United Airline;
- 1962-1979: Iran National Airlines (Iran Air), the flourishing years;
- 1979 up to now: Post-revolution, the era of multiple airlines.

II. Strategies and Objectives

Based on development programs in the country and in line with realization of Iran's aerospace and aviation Vision 2025, the comprehensive document for development of aerospace has been



prepared through 3 consecutive years of collaborative work of four main committees of aviation, aeronautics, space, and air defense.

These committees consisting of 27 specialized working groups have been supported by contributions of more than 450 experts including representatives of all related institutions. Development strategies and objectives of this industry inspired by the comprehensive aerospace development document are as follows:

A. Macro Level Strategies

- Integrating, organizing, and regulating institutions to prevent overlapping, boosting productivity and synergy of the institutions, and tailoring authorities to missions while separating and securing independence of the agents in charge of policymaking, implementation, and monitoring;
- Creating supportive business environment, assigning the necessary incentives in an attempt to maximize private sector contribution, and providing the infrastructures required to build knowledge-based industries and enterprises in the aerospace domain;
- Providing targeted support for education and research activities and scientific hubs needed by aerospace and aviation programs;
- Developing and improving supply chain, maintenance measures, and upgrading the required technologies with the contribution of the private sector;
- Utilizing projects based on common platform of subsystem development;
- Creating constructive competition to improve quality in active aviation companies;
- Building R&D networks with national and international universities, research centers, and manufacturing sectors, with an emphasis on value chain creation;
- Revising flight routes, especially transit routes so as to make economic and effective use of country's airspace;
- Running targeted development of scientific, technological, and innovative collaborations at regional and international levels in addition to strong presence in the global arena and the related effective international institutions;
- Developing general aviation services through maximizing contribution of the private sector.

B. Macro Level Objectives

- To become regional hub and achieve global recognition by the use of science and technology universities and scientific and industrial centers in terms of the following items:
- To design and manufacture 100-150-seat regional aircrafts and general aviation airplanes in accordance with national and global market demands;
- To design and manufacture medium and semi-heavy helicopters;
- To maintain, repair and overhaul;
- To design and manufacture mini turbojet engines, light and heavy turbofan engines and gas turbine engine compressors with capacity of 1-10 MW;
- To design, develop and manufacture avionic systems;
- To create advanced science and technology process and train human resources;
- Effective presence in the global aviation industries by promoting Imam Khomeini Airport as the second aviation hub in the region;
- To develop hardware and software for capacity building with the aim of using all air traffic potential at the national and international level;
- To achieve flight safety and quality standards above the global average;
- To create and implement comprehensive safety management systems;
- To implement new air traffic management systems.

III. Capacities and Capabilities

A. Human Resources and Aviation Centers

Table 1

Human Resources in Aerospace Industry

Title	Number	Period
Admitted Students	26197	1989-2014
Graduates	13552	1988-2013
Faculty Members	147	2014

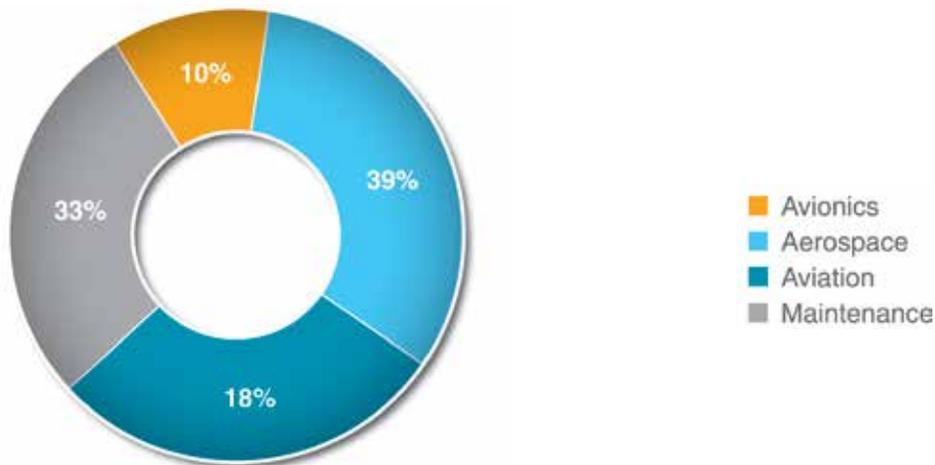


Figure 1: Percentage of Aerospace Graduates by Field of Study (2013)

Table 2*Aviation and Aerospace Centers*

Education/Research Institutions	Number
Universities	45
Research Units	7
Incubators	1
Research Institutes	3
Research Centers	1
Science and Technology Parks	1
Knowledge-based Companies	114

B. Some Achievements

• Fuel Pump

An important system in aircrafts is their fuel system in which the fuel pump as one of its main subsystems is directly connected to engine and any malfunction or fault with this part may affect the performance of the engine. The manufacturing processes of fuel pumps have been accomplished through this project.

• Smart UAVs

Altitude and position of the UAVs (unmanned aerial vehicles) are estimated precisely through comparing single sensed images with stored images of the reference database using salient features and descriptors. The suggested strategy is implemented in 2 phases: creating reference geographical database and automatically geo-referencing images resulting in estimation of aircraft's position.

• 72-Seat Aircraft

With regard to the country's need for regional jet aircrafts up to 100-seat capacity and in accordance with capabilities of design engineers and industrial infrastructures, the project for design and manufacturing of 72-seat aircraft has been operated since 2014. At the moment, the design process is in progress.

• 2-Seat Helicopter

This project has been defined in order to meet the needs of training and transportation services. Design and manufacture of this light helicopter is in progress based on joint cooperation with technology owners of this product in Europe and Latin America.

• 8-Seat Helicopter

This project has been defined based on the need for cargo and passenger transportation, search and rescue and offshore operations. This project is in progress on the basis of a co-production with European components.

• Duct Fan VTOL UAV

This UAV with the weight of 26 kg and payload of 3 kg is designed and manufactured with the aims of patrol missions, search and rescue, firefighting and forests and environment protection.



- **2.5 MW Turbine Engine Core**

This project has been defined in order to be used in aviation industry and other industries such as oil, gas and energy with the power capacity up to 2.5 Megawatts. Modular structure for ease of maintenance and repair is considered to be the most important characteristics of this engine.

- **Firefighting Aircrafts**

Extensive fire as a natural disaster annually threatens environmental health. One way to deal with these large fires is using firefighting aircraft for fire suppression.

Given lack of firefighting aircraft on a large scale in the country, a project for converting Tupolev Tu-154 aircraft into firefighting aircraft with capability of carrying 18,000-20,000 liters of water has been defined in five phases as follows:

- 1) Studies and research, conceptual design and calculations;
- 2) Laboratory investigation and simulation of the project;
- 3) Analysis and verification of the software;
- 4) Selection and purchase of equipment;
- 5) Manufacturing, optimizing and assembling.

- **FAJR 6-Seat Aircraft**

The two piston engine aircraft with the capacity of 6 persons has been designed in the form of low-wing configuration with retracting landing gear. The mission of this aircraft with endurance of up to 6 hours is air taxi.

IV. Authorities

A. Iran Aviation Technology Development Headquarters

The Iran Aviation Technology Development Headquarters (IATDH) affiliated to the Vice-Presidency for Science and Technology has the responsibility to implement the plan and achieve the goals mentioned in the comprehensive document for aerospace development.

IATDH is the most influential body in Iran aviation industry established in 2013, with the task of policy-making, leadership, coordinating and supervising organizations and entities working in the field. IATDH focuses on determining practical solutions to problems and challenges of high-tech aviation firms and facilitating the business environment and trade regarding the legal and judicial considerations. It also provides necessary requirements for international companies interested in



cooperation with Iranian companies.

Accordingly, policymaking and evaluating goals, strategies and programs, commercialization, and development of aviation products and services, setting up Iran aviation value chain network, development of infrastructures, setting up Iran Aviation Technomart, development of international communications and strategic alliances among aviation scientific, industrial and technical centers inside and outside the country, culture making, and educational development are among the main programs and measures of IATDH.

B. Other Authorities

• Civil Aviation Organization

The Directorate General of Civil Aviation was established in 1946 and was renamed as the Civil Aviation Organization in 1974.

Responsibilities of the Civil Aviation Organization as government's representative to exercise sovereignty over air transportation sector include planning, determining the major strategies and priorities of air transportation, and planning for training expert human resources and accrediting directors' technical qualifications in all airline companies, compiling flight standards and authorizing aircrafts which can be used for air transportation, setting the regulations and operating procedures of national airspace control, issuing flight permits and monitoring air traffic control units, preparing security guidelines and monitoring their enforcement and examining air accidents and collisions, issuing or revocating licenses of air travel agencies and continuous monitoring of their operations, and membership and communication with the International Civil Aviation Organization (ICAO) and the other related global organizations.

• Iran Airports Company

The Iran Airports Company was established with the aim of constructing, maintaining, and managing all airports affiliated to the Civil Aviation Organization.

Responsibilities and authorities of the company include providing airport services such as operation and maintenance of (freight and passenger) transport terminals and airport security; providing transportation and support services for aircrafts like fuel and ground handling; presenting aviation services such as facilitating flight routes; providing operation and maintenance services for aviation equipment; navigation of aircrafts including landing and take-off; constructing research labs considering company's targets; providing air traffic control services; and designing, constructing, and providing



maintenance services for terminals, ancillary facilities, flight equipment, navigation instruments, and communications tools.

V. International Cooperation

Priorities for international cooperation and collaboration are among the most important programs of IATDH in order to develop Iran aviation industry. In this line, a development strategy is planned for joining Iranian companies to the international supply chain and technology catch-up.

By integrating technical, financial and market demands of different sectors, IATDH can define long-term partnership plans and consequently recognize the potential partners from all around the world. Therefore, remarkable amounts of the demands and inquiries which fall under the same market section would be discussed with an optimized number of qualified international partners.

Furthermore, establishment of joint ventures and formation of international consortiums; general aviation development; collaboration in design and manufacture of medium helicopters and co-production of semi heavy helicopters; network formation for commercial applications of commercial UAVs; regional market coverage in the field of maintenance, repair and overhaul; upgrading and modernizing the technological level of avionic systems; and participation in production of regional aircraft and manufacture of its parts, subsystems and systems are among other international programs.

It is worth mentioning that China, Russia, Germany, France, Italy, and Austria are among the target countries for international cooperation in aviation and aerospace area.

