A CROSS-GENERATIONAL EXPEDITION TO THE FUTURE: THE NATIONAL TECHNOLOGY INITIATIVE

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Abstract

A closer look at historical developments reveals that our organic ties to science and technology disappeared despite our being the grandchildren of a civilization that founded the positive sciences. The National Technology Initiative, which emerged within that context, aims to promote Türkiye's social transformation in science and technological development and to train individuals, whose work is guided by ethics and moral principles, that strive to serve humanity and their society. The vision, which the National Technology Initiative embodies, is not limited to developing high technology. At the same time, it aims to serve the benefit of humanity as a whole. This study sheds light on the historical processes and objectives, which influenced the National Technology Initiative's emergence, and the methods, which must be employed to ensure the success of that vision, with an emphasis on the phenomena of man and society. Stressing that striving to be the best in any given area alone is not enough to become a pioneer in science and technology, this article posits that scientific research must be conducted in line with ethics and morality, and serve humanity. In this regard, it draws certain conclusions about technology and working for the benefit of humanity from Türkiye's experience of developing a ventilator amid the COVID-19 pandemic and its decision to donate that equipment to the countries in need. This study, which also discusses the paradigm shift that unmanned aerial vehicles (UAVs), which experts view as the new players in the battlefield, have triggered, also tells the story of Baykar, one of the key players in that transformation. In this regard, it discusses the secrets of the success of Baykar, which developed the UAVs that led to an overhaul of military doctrine worldwide, and the secret to Baykar's success – in other words, its genetic code. It also analyzes Teknofest and the Deneyap Technology Workshops, which the Türkiye Technology Team Foundation (the T3 Foundation) hosts, with the National Technology Initiative at the center, for the purpose of transforming society's mindset and raising future generations with a commitment to developing science and technology.

Keywords
National Technology Initiative, Teknofest, Ethics, Morality, Unmanned Aerial Vehicles

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Introduction

The National Technology Initiative is a leap forward that aims to transform all parts of society to ensure Türkiye's complete independence in science and technology. It aims to raise future generations that appreciate the importance of science and technology, work in those fields, and engage in all relevant activities without straying from ethics and moral values. In this regard, the National Technology Initiative represents a long-term movement that seeks to build a society that trains for the races of the future rather than the present. Türkiye's pursuit of developing high technology, which gains momentum today especially thanks to the defense industry and creates a domino effect across different sectors, influences all parts of society, regardless of their age, as a sort of groundswell. The National Technology Initiative, which reflects a series of steps taken based on the premise that "one swallow does not make a summer," did not emerge for the sole purpose of developing high-tech products or services nor to specialize in a single sector. Instead, it is an ideal that emerged with an eye on the benefit of our neighborhood, our planet, and all of humanity in science and engineering to reach the highest level in all fields.

It is absolutely necessary for the rise of a fully independent and strong Türkiye that we spread that ideal across our neighborhood, thinking: "Let a child come and touch a plane. Perhaps they will work for our country's space program in the future." It is through such an ideal that we may re-establish our organic ties with science and technology, which we had maintained for centuries before losing at some point. Our main goal must be to refuse to bow to any kind of obstacle, which we may face along the road, and to reach the point where Türkiye develops technology.

1. The Role and Importance of Our Civilization in the History of Science and Technology

1.1. The Development of the Positive Sciences

Whereas our civilization does not immediately come to mind in any conversation about science and technology today, one would see that we are the children of that civilization, which founded science and even the methodology of science, if one were to go slightly back in history. Indeed, we represent the continuation of an ancient civilization that shaped the methodology for scientific research as well as gaining, accumulating and passing on knowledge.

Some examples of the scientists that this ancient civilization raised, include the following: Al-Jazari, who lived in modern-day Cizre and is considered the founder of robotics, was also the first scientist to have developed autonomous machines. Taking into consideration simulated environments and the control laws that govern them, we rely on thousands of differential equations, advanced mathematics and calculus to fly our unmanned aerial vehicles today. It was al-Khwarizmi that presented us with those equations, together with the number zero, and made it possible for us to build the decimal system. It is possible to note that Ibn Khaldun, widely considered the founding father of sociology, was among our scientists that shaped many generations.

Zooming in the field of aviation, it would not be wrong to argue that our civilization was among those civilizations that set its eye on the sky early on. Indeed, Ulugh Beg and Taqi ad-Din were among the first scientists to build the first space observatory. Moreover, Ali Qushji conducted significant research at Ulugh Beg's observatory and individually.

1.2. Reflections on the Present

It is possible to observe that our civilization, which played a founding role in science, lost its organic ties to science and technology by the sixteenth or seventeenth century. Whereas we trained a series of extremely esteemed scientists since then, it goes without saying that we do not have the kind of glorious history of science as we once did. As we analyze the reasons behind that situation, building on the experience that we accumulated during the struggle for the unmanned aerial vehicles, we reach the conclusion that one ought to ask what could be done about it and to take necessary steps. The question, which we must ask ourselves, is how we can create a climate that generates high technology anew. After all, the strongest wind of change in this day and age blows through high technology and penetrates our lives with its positive, negative, and social impacts. All of those details are subject to debate, yet we witness that there is an extremely rapid motion, fueled by high technology, to the extent that we live in what some call the geometric times. At this point, the question of developing technology is no less important than literacy for any given society. If a society wants to be independent and prosperous and pursues an honorable status, it absolutely must have that ability and brush aside more than three hundred years of learned helplessness. To become successful –or, at the very least, take the initial step— it is crucial for individuals and, later, society as a whole to believe in their success. In this regard, we must first remember that our civilization produced such great minds in the past.

2. The History of National Aviation: From Achievements to Roadblocks

2.1. The First Works on Aviation in the Pre-Republican Period

Our civilization's work on aviation predates the Republic's foundation. Initial experiments with flight, which featured gliders, and our attempts to soar into the sky with rockets clearly attest to long-standing efforts to progress in that field. Unfortunately, some of those experiments faced roadblocks throughout our history, causing a delay of three hundred years. Notwithstanding the lack of complete certainty, the destruction of Taqi ad-Din's observatory, which, some historical sources state, was bombed by the Ottoman Navy under Grand Admiral Kılıç Ali Pasha's command in 1580, attests to that fact (Kandilli Observatory and Earthquake Research Institute, n.d.). Taqi ad-Din, several of whose works was unprecedented in the field of astronomy, reportedly conducted his research with certain types of equipment, which he had personally built to observe the sky. Sultan Murad III allegedly made the decision to destroy Taqi ad-Din's observatory due to the popular belief that various plagues, earthquakes, and domestic political strife were caused by the scientist's experiments (Unat, n.d., p. 1-4).

Whereas Evliya Çelebi claimed in his Book of Travel (Seyahatname) that Hezarfen Ahmed Çelebi, who reportedly lived in the seventeenth century, experimented with human flight by using wings that imitated birds, it seems unlikely, based on an analysis with today's technology, that a gliding experiment from Galata to Üsküdar could have been successful at the time. Nonetheless, it is noteworthy that such research became the subject of popular debate – rather than the outcome of such experiments. The existence of such studies boosts society's self-confidence and persuades future generations that some experiments, which seem impossible, could indeed succeed. At the same time, that scientists conducted research on aviation in the seventeenth century deserves attention, as it attests to our civilization's interest in flight back then. Notwithstanding those points, it is possible to observe that our civilization, which experts count among the founding elements of science, began to lose its organic ties with science and technology in the seventeenth century (Kaçar, 1998).

2.2. National Aviation Projects in the Republican Period

Following the Republic's foundation, those organic ties were rebuilt after three hundred years despite the destruction that war had caused in the country. During that period, our civilization launched new efforts in aviation through pioneers like Vecihi Hürkuş and Nuri Demirağ. Vecihi Hürkuş, our nation's chief plane builder, began to design planes at the end of World War I and built the Vecihi K-VI, our first plane, in 1924 with parts seized from the Greek forces. Whereas a group of experts was formed to establish that aircraft's ability to fly, the lack of a controller within that delegation delayed its maiden flight. In the end, Hürkuş completed his first flight in early 1925, having been informed that the authorities would not grant him the necessary certification. He was subsequently punished for conducting a flight without proper authorization. Refusing to give up on designing aircraft in later years, Vecihi Hürkuş rented a lumber shop, where he built the Vecihi K-XIV within three months. That plane completed its first flight in 1930. Moreover, he was the first and only pilot among the founders of the Turkish Aeroplane League (THK). Hürkuş proceeded to open the Vecihi Civilian Aeroplane School, which closed down due to the refusal of the relevant authorities to offer accreditation to its first graduates (THK, n.d.).

The notable contributions of Nuri Demirağ, in turn, include the production of the first parachute and the establishment of Türkiye's first airplane factory with the possibility of serial production. He took initial steps to open a plane factory in 1936, believing that "we can do our best to prevent the army's foreign dependency." A wealthy businessman, Nuri Demirağ used most of his holdings for that purpose. He broke ground for a factory in Beşiktaş in 1936 and completed its construction within a short amount of time. Demirağ also paid for the construction of hangars, maintenance workshops and runways for the planes, which would be manufactured at his factory. Moreover, he founded the Sky School, which ended up training 290 pilots by 1943. Yet an accident occurred during the test flight of aircraft, which the factory had manufactured for a domestic customer, leading the institution in question to cancel their order. That incident, which turned into a legal battle, resulted in the cancellation of all of Demirağ's outstanding domestic orders. At the same time, the authorities banned the export of aircraft, which were ready to be delivered to overseas customers, and the production of additional planes. Dragged into bankruptcy due to a lack of orders, Türkiye's first national aircraft factory closed in 1944, as the plot of land, where Demirağ's factory once stood, was nationalized (Yılmaz, 2016, p. 325-326).

2.3. Roadblocks and Lessons to be Learned

It is necessary to draw lessons from Hezarfen Ahmed Çelebi's exile to Algeria following his flight experiment (which Evliya Çelebi reported), the fate of Taqi ad-Din's observatory, Vecihi Hürkuş's experiences, the hurdles that Nuri Demirağ faced and the problems that our civilization encountered in its efforts in this field, and to grasp the root causes of those issues to find solutions.

It is probable for any individual that wants their country, nation and community to prosper to face certain roadblocks depending on the circumstances at the time. One must refuse to give up in the fact of those obstacles and to keep working with the same level of determination and commitment. In addition to hard work, it is crucial to transform the mindset of the entire society. That individuals get behind such efforts and contribute to the expansion of their scope, older citizens encourage the youth, young people learn from their predecessors in an attempt to outperform them will enable that transformation to impact

all parts of society. It is necessary to realize that "one swallow does not make a summer" and to ensure that any promising project, regardless of the field, receive due support from all social groups. That is the only way to establish a sustainable, organic bond with technology once again. Only then can we turn our being a civilization that develops technology into our very culture and safeguard that quality.

3. The Impact of Unmanned Aerial Vehicles and the Paradigm Shift

3.1. The New Players on the Battlefield

It is a well known fact that the production of manned aircraft represents the first wave of the transformation in aviation. One could draw parallels between technological developments with surfing waves. Specifically, surfers that catch the wave on time stay ahead of it – whereas those that cannot have no choice but to follow from behind. Based on that metaphor, it is possibly to argue that the first wave consisted of manned aircraft and unmanned aerial vehicles represent the second wave. Whereas Türkiye caught the first wave thanks to the studies on manned aircraft in the Republic's early years, it ended up lagging behind.

When it comes to the unmanned aerial vehicles, which experts describe as the second wave in aviation, however, the country caught the wave on time to become one of few nations around the world that develop that technology. UAVs, which were initially seen as auxiliary elements in the battlefield, proved themselves as a main combat element as the Turkish forces won the first-ever victory with armed drones during the military operation, which Azerbaijan launched to liberate Karabakh from occupation. In this regard, Türkiye became one of the pioneers in developing as well as using the UAV technology.

3.2. The First Victory of Armed Drones and its Repercussions

The emergence of unmanned aerial vehicles marked a major transformation across the world. The Bayraktar TB2 armed drone, in turn, triggered a paradigm shift and opened the existing military doctrine to discussion. Its ability to destroy conventional warfare tools like main battle tanks, advanced air defense systems, artillery rockets and other types of military equipment established the importance of armed drones in the battlefield.

The Turkish armies were first in the world to achieve victory with armed drones. During Operation One Homeland, which Azerbaijan launched to liberate Karabakh from occupation, the use of Bayraktar TB2 armed drones, which flew as fleets, as a main element showed the world that the course of war had changed. Over time, some nations in different parts of the world even composed anthems to celebrate the Bayraktar TB2. Bayraktar thus evolved into a general phrase that refers to unmanned aerial vehicles.

4. The Process of Developing the National Unmanned Aerial Vehicles: The Story of Baykar

4.1. The Beginning

Baykar was established in 1986 by Özdemir Bayraktar, a senior mechanical engineer, to manufacture sensitive engine parts that were subject to localization in the auto industry. In the early 2000s, the company began to engage in R&D activities on unmanned aerial vehicles. The public knew little about UAVs at the time and the idea of flying an aircraft without a pilot was not completely embraced by the population. It seemed impossible to imagine an aircraft flying from Point A to Point B at the push of a button. Moreover, robotic

and miniature UAVs were still at the level of lab experiments. I, too, was studying formation flight for UAVs and landing helicopters on a vertical wall.

The unmanned aerial vehicles, which gained momentum as a result of those experiments, must essentially be viewed as the precursor to a paradigm shift. That the idea of developing unmanned warplanes is expressed increasingly frequently today, too, shows that the above-mentioned transformation is already underway.

4.2. Türkiye's First Flight Control System

At Baykar, where we began to study unmanned aerial vehicles in 2004, a small group developed Türkiye's first autopilot and flight control system. The following year, the Undersecretariat for Defense Industries (SSM) launched the Mini UAV Development Project. That competition, which welcomed open competition, took place exclusively among domestic companies, who were required to produce the autopilot or the fuselage (or both) in Türkiye.

Baykar joined that project with an aerial vehicle whose fuselage and flight control system's autopilot were built domestically. It performed a flight demo. At the time, Baykar was the only company to participate in the demonstration flight with a native flight control system and fuselage and the only institution to successfully complete that flight in the presence of official delegations. None of the remaining private or public institutions - which participated in the demo flight, an essentially technical competition - were successful despite having imported flight control systems. The delays in placing orders with various excuses, however, encouraged Baykar - the only company to have successfully completed the project, which included the purchasing of mini unmanned aerial vehicles - to focus on developing different kinds of aerial vehicles.

In 2006, the company started the R&D process for a new system that one could describe as a robot helicopter. That system was developed for the specific purpose of facilitating vertical landing and takeoff in places with no runways, such as base areas and outposts, within the framework of counter-terror and border safety operations. Throughout the development of a rotating-wing aircraft, all trials were conducted by a group of engineers, whom I led personally, and the security forces at the sites of counter-terror operations directly. Indeed, the Malazgirt Rotating-Wing UAV was used by the security forces in actual operations during that period. In this sense, it was the first robot helicopter to be used in real-life operations. Despite those efforts, the above-mentioned project became the target of various bureaucratic obstacles and was effectively doomed to failure.

In 2009, the Bayraktar TB1, an unmanned aerial vehicle that weighed 450 kilograms, completed its first flight. Whereas the world's most renowned UAVs lacked the auto-landing and takeoff ability at the time, the Bayraktar TB1 could perform that task successfully. The Bayraktar TB1, too, was a target of bureaucratic attempts to block it, which must have taken place thousands of times in our history of technology development and the process of building unmanned aerial vehicles. As a matter of fact, some officials, who insisted that the Bayraktar TB1 - which completed a nighttime auto-landing during the demo flight in the presence of official delegations - had not actually landed automatically and refused to confirm it on the official record, attempted to arrest Haluk Bayraktar, the company's general manager, for speaking up against their unfair approach.

Finally, in 2014, the Bayraktar TB2, which has since made headlines worldwide and caused the military doctrines to be questioned, entered the inventory of the Turkish Armed Forces.

Having been equipped with Roketsan's smart micro munitions the following year, the Bayraktar TB2 began to serve as an armed drone in 2016.

4.3. From Six Kilos to Six Tonnes

The process for the development of unmanned aerial vehicles, which started in the early 2000s with a small team engaging in R&D, resulted in the production of UAVs of various dimensions and for different mission concepts – from the Mini UAV, which weighed six kilograms, to the Bayraktar AKINCI Combat Aerial Vehicle that weighs six tonnes. Whereas the former was equipped with a single computer, the AKINCI UCAV features 100 computers.

The Bayraktar AKINCI UCAV, which completed its first flight test on 6 December 2019, has a payload capacity of 1500 kilograms and is a strategic unmanned aerial vehicles that can use any type of domestically-produced munition. Some two years after its first flight, on 29 August 2021, its initial delivery to the Turkish security forces was completed.

4.4. A New Revolution in Combat: Bayraktar Kızılelma and Bayraktar TB3

Gazing into Baykar's future, one ought to mention the Bayraktar TB3, which is expected to be the only vehicle in its class to land on- and take off from short-runway ships, and the Bayraktar Kızılelma, a combatant unmanned aircraft system capable of aggressive maneuvers to accomplish its mission.

The Bayraktar TB3, which is larger and heavier than the Bayraktar TB2, has a takeoff weight of 1400 kilograms. Compared to helicopter platforms, its cost efficiency, easy maintenance and range makes the TB3 more advantageous for military elements at sea.

The Bayraktar Kızılelma, which will be Türkiye's first unmanned warplane, will conduct operations by making aggressive maneuvers – which distinguishes it from unmanned aerial vehicles. The idea of the Red Apple in Turkish mythology represents a goal that one seeks to reach but gets further away with every step. It is possible to describe the combatant unmanned aircraft system as Baykar's 20-year-old dream or 'red apple', if one were to make a reference to Turkish mythology. Like the Bayraktar TB3, the Bayraktar Kızılelma, too, will be able to land on- and take off from ships with short runways.

Just as the Bayraktar TB2 armed drones revolutionized the history of warfare by achieving a victory for the first time with armed drones, it is an indisputable fact that the Bayraktar TB3 and the Bayraktar Kızılelma, too, will represent a revolution in the global history of combat as soon as they become operational.

4.5. Baykar's Genetic Code

There are three distinct questions that one must ask to understand Baykar's genetic code and the meaning that lies beneath that genetic code: What, how and why?

The human body consists of trillions of cells and each cell has a nucleus. Each nucleus contains DNA, which, in turn, contains the same code. That same genetic code exists within cells in the eye, fingernails and cartilage. In this sense, to grasp Baykar's genetic code, one could ask the most fundamental question that the positive scientists pose. Indeed, positive scientists approach the universe by asking "what" and attempt to express the answer in the language of mathematics.

Some of Baykar's employees design aerial vehicles. Others participate in their assembly. Yet others play support roles within the company. In other words, individuals with different

areas of specialization, who perform different tasks, work together in harmony. I must add that my role as technology leader is no different from the positions that my colleagues hold. After all, all of us amount to a big *nothing*. It would be useful to prove why we amount to nothing with an example.

The laws of optics stipulate that one must use a large lens in order to gaze into the distance. There is a space telescope called "Hubble" in the Earth's orbit. The Hubble space telescope's lenses, in turn, need to be outside the atmosphere in order to capture clear images. That telescope has looked at the universe through a pinhole and the distance, into which it gazed, was the past as opposed to the present. For example, when we look at Mars, whose distance from Earth changes based on the solar orbits of those two planets, we see four to fourteen minutes into the past. If Mars were to suddenly explode, that explosion could be observed from our planet after approximately eight minutes. Here, we understand that the distance significantly increases in quantitative terms. As the quantity increases, it becomes harder and harder for the human brain to process it. As such, the telescope observed through a pinhole what happened thirteen billion years ago and saw billions of galaxies. Within each galaxy, it has seen billions of stars surrounded by planets. If we can observe that 13-billion-year-old image of the universe through a pinhole, then we can comfortably say that we are *nothing*. Any model, which utilizes mathematics, uses the calculus of negligence. Yet it would seem that there is not even enough here to neglect. That is why any of our efforts ultimately amounts to absolutely nothing in the universe.

By asking another question - how? - it becomes possible to identify some things as very important tasks. In light of that process, one needs not to attach too much importance to the answer of *what*. After all, that question entails a description of the current state of affairs without adding any more meaning to it. By contrast, the questions of *how* and *on which moral ground* bear greater importance. The answers to those questions focus on quality over quantity and even give our job a much deeper meaning. In a way, that is ultimately what distinguishes Baykar from others. One must refuse to go with the flow if the establishment is shaped by what is wrong or immoral as opposed to right. Based on that point, the story of what happened to the Bayraktar TB1 in 2009 would be a good example.

At the time, Türkiye suffered from complete foreign dependency in the area of unmanned aerial vehicles. Indeed, the Turkish people used the word "Heron" to describe UAVs. In 2009, when we attempted to fly the Bayraktar TB1, that flight had to take place over a runway and all runways belonged to the state. To begin with, it was difficult to find a suitable runway. Whenever a suitable runway was located and we attempted to fly there, the authorities promptly banned us from accessing those facilities. It took us many months to find another suitable runway. Obviously, it is mandatory to obtain necessary permits to use runways. Yet the clock was running and many activities, which were rooted in technological development, were still underway. The evolution never stopped. Finally, upon finding a suitable runway, the Bayraktar TB1 taxied from the hangar to the runway and completed its flight automatically, thanks to its ability to take off and land automatically – which was an ability that the best-known unmanned aerial vehicles lacked at the time. That was the first time that this technology was used in a large part of the world. Such a level of technological development was unprecedented in Europe and other regions. In the end, the authorities attempted to arrest Baykar's executives instead of congratulating them on successfully completing that flight. It is possible to be excluded for failing to go with the flow and to become the target of various excuses and policies designed to make you give up. One must not, however, stray from righteousness and morality or your principles for

short-term gains – no matter why. If one were to draw parallels between social conventions and the Tower of Pisa, it is impossible to expand or elevate a mistakenly-constructed structure. To build anything atop that flawed structure would be a violation of the laws of statics and eventually lead to the structure's collapse. Man-made systems, too, are like mathematical systems. They cannot progress and move forward unless they lack the fundament of justice and morality and sits on uneven ground. That is why *how* one does something is much more important than *what* one does.

The most important among those three questions, in turn, is *why*. In the recent past, a pandemic broke out, sending shockwaves across the world and turning people into metaphorical prisoners in their own homes. In the early days of that pandemic, mankind witnessed highly unusual developments globally. Some of those incidents occurred in the advanced, modern and wealthy West. We have seen human beings losing their lives because they lacked access to ventilators, as intense care units ran out of space. At the time, there was a worldwide mobilization to manufacture ventilators and technologists publicly pledged to build ventilators. Those individuals ended up placing orders for readily available ventilators instead of developing and manufacturing those devices due to the high opportunity cost. Technically speaking, a ventilator is a rather basic device. It is undoubtedly a technological product, yet the West somehow failed to build that machine, which had been produced for a long time and could be manufactured quite quickly. That is because some ventilator parts were manufactured in Germany, whereas others were made in the United States. In the end, all governments banned the export of the relevant components, reasoning that "everyone should die if we are going to die," and no country could produce ventilators. Ironically, they would have been able to manufacture that device, which was desperately needed, by supporting each other and through mutual cooperation. Accordingly, we witnessed that the way out of that crisis, which was caused by vulture capitalism, was solidarity augmented by compassion.

During that period, Baykar was busy creating a model of the illness in addition to conducting its work on unmanned aerial vehicles. We began to contemplate how we could assist our country in the face of the pandemic. Our initial thought was to support medical workers or purchase and donate ventilators. Shortly thereafter, however, one of our colleagues reminded us what needed to be done: "We have the means, the ability and the technological depth that we accumulated from the defense industry. Those steps would be beneath us. Let us build those machines instead of buying and donating them. Turkish engineers can do it and they would set a great example to the entire world."

In cooperation with Biosys, Aselsan and Arçelik, Baykar worked hard in the spirit of mobilization throughout that month of Ramadan. Whereas Aselsan and Baykar focused on designing the machine and developing the necessary software, Arçelik began forming on the assembly line. A startup called Biosys, in turn, was working on a prototype that was under development. Those companies worked together to build ventilators for people in need, which would be given to Türkiye and, if needed, offered as gifts to other countries. Within 14 days, the device was made ready for serial production. Those devices, which were made in Türkiye, were not used exclusively in our country. Türkiye exported them to many nations and donated them to friendly nations in need free of charge. Somalia was among those countries. The country, whose population is approximately 16 million, was known not to have any ventilators whatsoever. That is why the first ventilators were intended to be delivered to Somalia. We worked hard through many nights, striving to get the ventilators to the airport on time, and ultimately succeeded. The shipment was

completed without problems and on time. One might wonder why anyone would work day and night to build a soulless machine that did not know what it was doing and operated in line with the laws of physics. The answer is about one's commitment to taking that device to a poor human being at the other end of the world, who lacks all the means and needs a machine to keep breathing, to breathe new life into humanity. It is that struggle that gives meaning to that meaningless and soulless machine and all the hard work that goes into it. That is why one must try to answer all those questions whatever they do. That is the only way to reach beyond the ages and to honor our work with meaning and depth. Otherwise, none of the material efforts have any value.

5. The Key to the National Technology Initiative's Success: Social Mobilization

5.1. The Goal of Future Generations Developing Science and Technology: The T3 Foundation

5.1.1. The Purpose of T3's Establishment

It goes without saying that human beings put themselves first by virtue of their nature. Yet the Türkiye Technology Team (T3) Foundation, in whose foundation and activities we have participated, aims to instill into the young people, whom it trains, the spirit of looking out for their family over themselves, their community over their family, their nation over their community and humanity over their nation – all to take society to new heights.

We live in an age where developing technology is no less important for nations than literacy. Societies that do not develop technology fail to make their voices be heard on the global stage and are destined to lag behind from a human and economic perspective. Insisting that "one swallow does not make a summer," the T3 Foundation was established to perpetuate Türkiye's place among technology-developing civilizations through social transformation and to bring about and execute the National Technology Initiative. The Foundation subscribes to a vision of spurring young people's interest in technology and creating an atmosphere where they can turn their ideas and projects into concrete steps.

5.1.2. Areas of Activity

The Türkiye Technology Team Foundation has organized training programs designed to teach young people about entrepreneurship, creative thinking, critical thinking, solving complex problems, effective communication and teamwork, to ensure that they can trigger a cultural transformation through social mobilization, and established science centers. In 2022, 3000 students received scholarships as part of the Özdemir Bayraktar National Technology Scholarship Program. In addition to those activities, the T3 Foundation organizes and hosts Teknofest, the world's largest aviation, space and technology festival.

5.2. TEKNOFEST: The Aviation, Space and Technology Festival

Teknofest, which intends to share the joy of developing technology with the general population, is an aviation, space and technology that, according to the 2022 data, brought together a record number of visitors and received applications from more than 600,000 young people as part of 149,000 teams to participate in 40 main contests and 99 sub-categories. Those young people, who reached the highest ranks in various tech competitions - from flying cars to microchips and model satellites to artificial intelligence - have been receiving their awards from the country's top officials in a public setting. That shows them that society appreciates their hard work and further strengthens their commitment. In 2022,

Teknofest offered a total of 12 million Turkish Lira in material support and an additional 6 million Turkish Lira to high-ranking students. Those competitions encourage young people to prepare themselves for the technology of the future and transform them into the technology developers of tomorrow.

Teknofest is a festival that amounts to a mental transformation or a silent revolution that eliminates the sense of learned helplessness and teaches young people that "we can do better." The idea is for those children, who have the least amount of opportunity, to come and touch a plane, because they could be part of our nation's space program some day. That is why we identified bringing Teknofest to all parts of Türkiye and our 'geography of the heart'. Teknofest, which kicked off in Istanbul in 2018 and 2019, broke a record by attracting 1,720,000 visitors. In 2020, that inspiration went across Anatolia to Gaziantep. Two years later, Teknofest ventured outside Türkiye's borders for the first time and took place in Baku, Azerbaijan. The festival, which takes place in Istanbul and somewhere in Anatolia every other year, was held in Samsun in Türkiye's Black Sea region in its fifth year.

5.3. The Educational Dimension of Progress: The Deneyap Technology Workshops

The Deneyap Technology Workshops were designed to get all parts of society behind Türkiye's National Technology Initiative to create a sort of groundswell. Originally established by the T3 Foundation in Istanbul at 13 locations, the number of those workshops reached 125 in 81 cities thanks to the support of the Ministry of Industry and Technology, the Ministry of Youth and Sports and the Scientific and Technological Research Institution of Türkiye (TÜBITAK). That is how the Deneyap Technology Workshops manage to reach more than 18,000 students in many parts of our country. To date, over 2700 young people have completed their training to graduate. We continue to try and provide those same opportunities to children in all of Türkiye's 81 provinces that are deemed most elusive. More importantly, it aims to promote the development of young people from across the country, who will become leaders in their respective fields by developing skills like entrepreneurship, creative thinking, critical thinking, solving complex problems, effective communication and teamwork.

6. Visions for the Future in Light of the National Technology Initiative

As the societal groundswell begins to yield results, it is an indisputable fact that those individuals, who are trained in line with the National Technology Initiative, will develop the technology of the future and keep taking their society higher. If today's youngsters are trained with perseverance and determination, the body of knowledge and experience, which will trickle down to future generations, will lead our country into a brighter future. Today, we witness that the amount of knowledge, which used to be accumulated in a millennium, is being generated at an extraordinary rate – perhaps within a single week. Since we live in an age, where technology and progress move forward so quickly, we must keep up with those developments and pioneer such efforts. We must always be one step ahead if we truly have our community's welfare and the benefit of humanity at heart.

The National Technology Initiative aims to prepare for the competitions of tomorrow as opposed to today. Indeed, Baykar's ongoing research on flying cars is about preparing for airborne smart mobility, which is expected to emerge in the future. The purpose of all the competitions within the framework of Teknofest, too, is to train experts and inspire the future generations to develop pioneering technology in their respective fields. For example,

those youngsters, who participate in rocket competitions, could work for our nation's space program someday. The participants of Teknofest's biotechnology competition could conduct groundbreaking research in the field of medicine, just as those young people, who participate in the agricultural technology competition, could find a solution to one of the world's most pressing problems: the lack of access to food. Our sole purpose is to get future generations to prepare for the competitions of tomorrow by internalizing our ancient civilization's values of justice and compassion in order to secure our future.

7. Conclusions for a Türkiye that Designs, Develops and Pioneers

7.1. The End of the Reign of the Dinosaurs

The dinosaurs ruled the world for 200 million years. The reason why describe their time as the reign of the dinosaurs is that they were the largest and most powerful creatures at the time, which were at the top of the food chain. In the end, however, they became extinct. A meteorite hit the Earth to destroy various forms of life. The impact itself caused some of them to perish, yet did not kill all dinosaurs. Instead, the impact drilled a hole on the ground, from which lava began to flow out. Subsequently, the lava, together with the emerging clouds, covered all of the world and the sky. Once the clouds covered the entire sky, sunlight could not reach the Earth. Devoid of sunlight, the world's ecosystem changed rapidly, preventing the survival of any creature that was heavier than 26 kilograms. Suddenly, the dinosaur's greatest advantage - its massive size - became their single greatest disadvantage. Thus ended their 200-million-year-long reign.

We live in what is called the geometric times. The metaphorical meteorites capable of effecting such comprehensive change strike the Earth on a weekly basis – as opposed to once in 200 million years. What mankind used to accumulate in a century can be accumulated within a week. The changes that occurred over the course of a century fit into a single week. That change, in turn, transforms the ecosystem and the paradigms. As such, if we stop moping around (for lack of a better phrase) and position ourselves just right to bring together the right mission with the right vision and prepare for the competition of tomorrow rather than today, those seemingly invincible and almighty dinosaurs will come down all of a sudden, clearing our path to leadership. That historical story includes valuable lessons and reveals the capabilities that our times offers us.

Conclusion

It is crucial for any society today to cease its foreign dependency in science and technology to prosper and be fully independent. We observe that our civilization, which once contributed to science and technology and pioneered such efforts, broke off those organic ties, placing at risk our society's long-term welfare and independence. Whereas there were attempts to rebuild that organic bond in the Republic's early years, those efforts resulted in failure due to various roadblocks. The National Technology Initiative, which draws lessons from the historical processes to present a vision for a completely independent and prosperous Türkiye, represents an intellectual transformation that covers all parts of society for the purpose of securing our future in addition to our present. The Initiative's science- and technology-oriented vision, which is rooted in our civilization's ethical and moral values, aims to establish that organic tie anew. Those efforts, which strive to raise future generations that reclaim leadership in science and technology to shed light on the world, have received considerable support from Turkish society in recent years. One of the unmistakable manifestations of that support is Teknofest, Türkiye's aviation, space and

technology festival. Young people that participate in competitions within the framework of Teknofest to take their first steps toward scientific research and developing technology, together with the significant interest shown by the general population, ought to be viewed as a reflection of our society's transformation.

Whereas the National Technology Initiative's success will become clear in the long run, it is possible to think of ventilators, which Turkish engineers developed during the COVID-19 pandemic to breathe new life into people in need across the world's disadvantaged regions or the unmanned aerial vehicles, which forced an overhaul of combat doctrines, as some of its short-term achievements.

At the end of the day, we must work for the purpose of contributing to the society, of which we are part, and serving humanity. We must never stray from ethics and morality, and keep working with an eye on becoming pioneers in science and technology. In today's world, where technology develops at a high speed, we must focus on the competitions of tomorrow rather than today and make an effort to complete the most advanced projects in all areas. For a fully independent and prosperous Türkiye and to be able to bring to disadvantaged parts of the world our civilization's sense of justice and compassion, we must never stray from this path.

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About Author

Selçuk BAYRAKTAR | Board Chairman of BAYKAR |
CTO, T3 Board Chairman of Trustees | Board Chairman of TEKNOFEST

Selçuk Bayraktar is the CTO of Baykar, founding chairman of the T3 Foundation, and chief architect of Türkiye's first indigenous, operational UAV Systems. Selçuk was born in the Sarıyer district of Istanbul in 1979. He completed his primary education in Sarıyer Primary School and graduated from Robert College in 1997. He then pursued his undergraduate education in Istanbul Technical University's (ITU) Electronics and Communication Engineering department. While at ITU, he was offered a scholarship by the University of Pennsylvania (UPenn) where he received his Master's Degree in 2004. While at UPenn, he was awarded a second scholarship by the Massachusetts Institute of Technology (MIT) as a research assistant in the Department of Aeronautics and Astronautics, where he then completed a second Master's Degree. As a graduate student at Penn in 2003, and for the first time in world history, he successfully carried out air-ground coordination of UAVs in formation flight alongside terrestrial robot teams. He continued to set record-setting milestones at MIT with his research in the autonomous, aggressive maneuvering of Unmanned Helicopter Systems, publishing his work in leading journals of controls engineering. He returned to Türkiye in 2007 and has since been serving as the CTO of Baykar, which developed the first national UAVs to serve the Turkish Security Forces in excess of hundreds of thousands of hours. He has advanced his applied research in the fields of avionics system architecture, flight control, navigation algorithm development, system kinematics and dynamics, electronic hardware and embedded software development. Throughout his work, he has emphasized the indigenization of unmanned technology and underlined its importance as a national priority. For the contributions of Baykar's indigenous and locally developed Bayraktar TB2 UAVs during the liberation of Karabakh from the Armenian occupation, Selçuk Bayraktar was awarded with the Karabakh Order of the Republic of Azerbaijan. The Karabakh Order was presented to Bayraktar by the President of the Republic of Azerbaijan Ilham Aliyev during a ceremony held in Baku on April 1, 2021. Selçuk Bayraktar has developed Bayraktar Akıncı – Türkiye's first UAV in its class – weighing in at a sizeable 6 tons. He is currently working on the Bayraktar Kızılelma UCAS (Unmanned Combat Aircraft System), which will be Türkiye's first unmanned fighter jet. At the same time, in his capacity as a pioneer of Türkiye's "National Technology Initiative", he has built a series of technology products. They include Cezeri, Türkiye's first flying car, and a medical respirator built to address the challenge presented by the COVID pandemic. The latter was done in cooperation with Türkiye's premiere firms (Biosys, Aselsan, and Arçelik) and was exported internationally. In addition to his professional work, Selçuk is the founding Chair of the Board of Trustees of the Türkiye Technology Team Foundation (T3 Foundation). T3 aims to ensure that talented young people and adults in kind participate in the development of high technology in Türkiye. T3 also supports youth camps, entrepreneurship, and research and development activity geared towards indigenizing high technology into world class products made in Türkiye. Selçuk is married with a child and is an avid private pilot.