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TECHNOLOGY ORCHESTRATION

Artificial intelligence sits at the center of the agenda as one of the greatest transformation tools humanity has ever faced. However, the real issue under discussion should not be the anxiety over humans and technology replacing one another, but rather how they will work together.

This is exactly where orchestration comes into play: the ability to act in harmony, coordination, and alignment toward a common purpose. Just as different instruments serve the exact same piece of music, today we need to bring the capabilities of technology and humans together.

Artificial intelligence can analyze massive datasets, generate solutions to complex problems, and increase efficiency. Yet, when it comes to ethical evaluations, societal impacts, and value-based decisions, human judgment continues to be the decisive factor. Technology brings computational capacity to the table, while humans contribute the ability to give meaning and direction. True harmony is born from this partnership.

The Conscience of Technology

Therefore, the most critical question of the AI era is more conscientious than it is technical: Does the fact that we **can** do something mean that we **should** do it? The value of technology will be measured not only by what it makes possible, but by the purposes and values in line with which it is utilized.

While maintaining its focus on climate technologies, TTGV will continue to closely monitor developments in the field of artificial intelligence and evaluate the transformation dynamics of the future through a holistic lens. With its transparent, accountable, and analytical approach, it will keep pursuing the answer to the question: “What is the right thing to do in this field?”

Technology Perspective

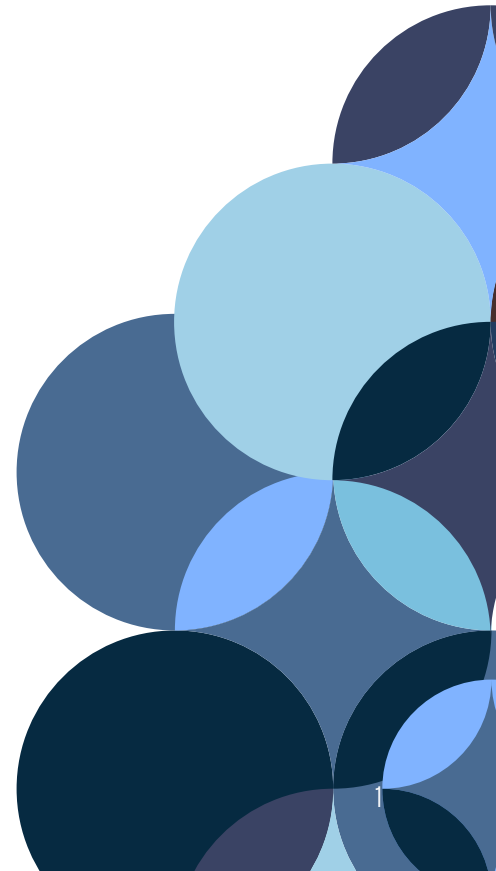
This is precisely why the issue you hold in your hands heralds a transformation. From now on, we will be meeting you with our brand-new content under the name “**Technology Perspective**”. This represents not merely a change of name, but a new identity that expresses our excitement and determination to evaluate the future from diverse viewpoints.

On that note, we hope you enjoy the read.



ESRA YAZDIÇ DEMİR

TTGV, Corporate Communications and
Media Manager





HANZADE SARIÇİÇEK
TTGV, Secretary General

CRITICAL CONSIDERATIONS IN AI TRANSFORMATION

For a long time, the AI debate was stuck between two extremes: the excitement that “it will change everything” and the anxiety that “it will leave humans unemployed.” Today, however, the point we have reached indicates a much more comprehensive and multidimensional transformation. AI is no longer merely a tool that writes text faster, generates code, or summarizes data; it is becoming a matter of systems, reshaping how organizations think, make decisions, and position human agency. While it is an indisputable fact that AI is a truly transformative technology, a realistic vision of the future cannot be built without addressing equally critical, accompanying issues with the same level of seriousness—such as the changing role of humans, socio-economic impacts, and energy and resource sustainability.

Redesign of Systems

The difference created by the AI transformation will be determined less by how far the technology has advanced and more by how boldly and robustly organizations can reshape themselves around this technology through strong governance. The question “Where can we use AI?” is no longer sufficient; the real question must be, “Now that AI exists, how should we redesign this business?”

While this question appears simple, it is highly disruptive for organizations. Injecting AI into existing processes often merely accelerates the prevailing chaos. Poorly defined data, fragmented decision-making processes, and weak governance structures do not improve with AI; on the contrary, they become more visible, riskier, and deepen institutional chaos. Therefore, it is critical to treat AI transformation as an issue of organizational design rather than a mere technology investment. The common thread among successful examples is that they do not position AI as a mere efficiency add-on; instead, they completely rethink workflows, roles, decision-making mechanisms, and where human contribution fits.

Action-Oriented Agentic Systems and the Role of Humans

The era of viewing AI purely as an individual productivity tool is drawing to a close. The agenda is now shifting toward AI agents that follow workflows, utilize tools, and interact with systems to achieve specific goals. This transition fundamentally alters the risk profile of AI. An agent that triggers an incorrect transaction or misdirects a critical process can lead to severe consequences. Consequently, the role and oversight of humans become more decisive than ever for the reliable deployment of AI.

As agents with clearly defined identities, authorizations, performance metrics, and accountabilities become widespread, routine tasks will inevitably shift toward automation. The weight of human contribution will instead concentrate in areas such as problem definition, contextualization, ethical evaluation, and reliability judgment. In the age of AI, the most critical competency will not be generating outputs, but comprehending the value and limitations of the generated outputs. Therefore, competency development is not an issue that can be resolved with a few training modules. Individuals who possess strong judgment and intuition, carry depth in their respective fields, and are capable of asking the right questions and questioning what is produced—rather than just using AI tools well—will become more valuable than ever.

Sustainability of Artificial Intelligence

The sustainability of AI-powered systems is a critical heading that requires separate focus. As adoption widens, computing power along with electricity demand, data center capacity, cooling infrastructure, and hardware supply are gaining strategic importance. Agentic systems that perform multi-step and iterative operations will further intensify this pressure.

For this reason, the future of AI must be read not only through the lens of “intelligence” but also through “resource efficiency.” Energy costs, carbon footprints, and infrastructure capacity will be the primary factors defining the boundaries of the AI economy in the coming period. If every organization, every process, and every agent creates an ever-increasing computational demand, how will the economic and ecological balance of this system be established? In the upcoming era, lasting advantages will be secured not just by those who develop better models, but by those who build reliable, sustainable, and human-compatible systems.

The New Horizon of Scientific Discovery with AI

The most exciting potential of AI manifests beyond digital productivity, appearing in fields where it interfaces with scientific discovery and the physical world. In research-intensive areas, particularly biotechnology and materials technologies, how AI transforms the scientific process is becoming an increasingly critical focal point. In this context, the concept of the “AI Scientist” stands out: with its capacity to generate hypotheses, design experiments, analyze massive datasets, and accelerate the discovery process, AI holds a transformative potential for the R&D ecosystem. Proteins becoming more programmable and the fundamental shift in the economics of drug development are just tangible reflections of this potential. The greatest societal benefit of AI will likely emerge in these domains.

TTGV AI Agenda

As TTGV, we view AI technologies, much like climate technologies, as one of the priority areas that will radically transform competitive dynamics. In line with this, we will shape our institutional focal points by deeply analyzing global industrial AI trends and Türkiye-specific opportunity areas. In our assessments, priority will be given to AI applications intersecting with climate and sustainability technologies; systems that accelerate scientific discovery in research-intensive fields like biotechnology and materials science; and industrial applications aimed at Türkiye’s production base.

Within this framework, we will both update our existing support programs with an AI dimension and design new models. We aim to support and accelerate the participation of the private sector in this transformation process through models such as guided projects to strengthen the technology absorption capacity of industrial actors, acceleration mechanisms supporting early-stage startups, and open community structures that feed the ecosystem.

INDUSTRIAL AI: TWO MAIN PARADIGMS, TWO DIFFERENT FUTURES



DR. E. SERDAR GÖKPINAR

TTGV, Innovative Technology Programmes Director

It can be said that artificial intelligence studies were born in the 1950s with Alan Turing's question, "Can machines think?" However, for this question, if we say "It has been rediscovered many times since then" and detail the history as follows: boundless promises in the 1960s, followed by long "AI winters," the rise of expert systems in the 1980s, the deep learning revolution in the 2010s... I believe we would correctly define the timeline in minds.

At the point we have reached, and in its most concise definition: artificial intelligence is the technology that enables computers to learn from examples and make predictions, recommendations, or generate content in new situations. Today's systems are based on machine learning algorithms—meaning they operate not according to predefined rules, but by extracting patterns from data.

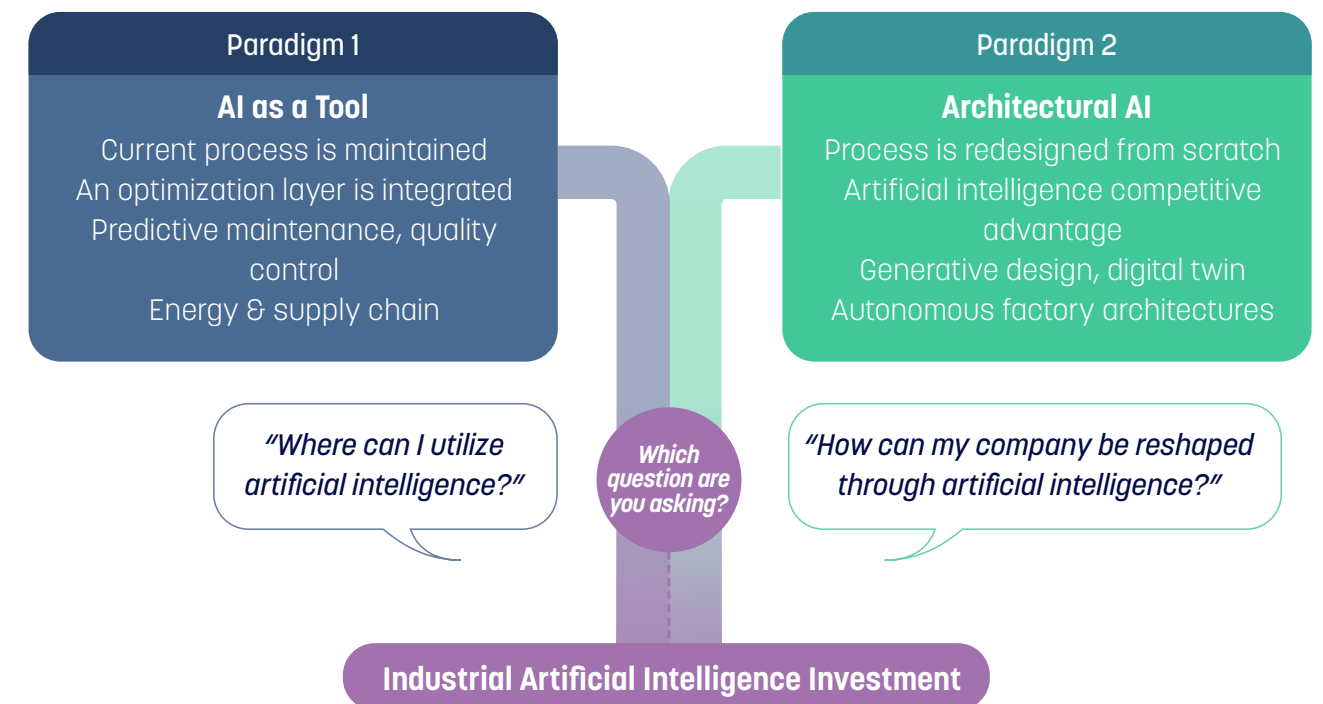
It does not think like a human; but when designed and used correctly, it is a prime candidate to significantly alleviate the human burden.

We have seen numerous waves of artificial intelligence. The wave we are currently in differs in the following aspects: while generative AI approaches human levels in language, imagery, and coding, agentic systems are becoming capable of making independent decisions and taking action. While some technology forecasters compare this to the invention of electricity, some leading scientists draw attention to existential risks. Those who call it "the greatest productivity revolution," "a power we do not yet understand," "it will take us over," "this is also a bubble," and "it will leave everyone unemployed" coexist... These are all predictions, and time will tell who will be proven right.

Two Main Paradigms

Between these extreme points, there is a segment that has to make real decisions: industry. For decision-makers, the question is no longer "is artificial intelligence real?" We passed that point long ago. The real question is this: where does my organization stand in this transformation—and is it standing in the right place? Another question

that needs to be asked before investing in artificial intelligence is surprisingly simple: "Am I adding AI to my business, or am I rebuilding my business upon AI?" These two questions represent two fundamentally different strategic paradigms.



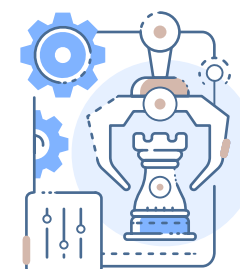
The First Paradigm: AI as a Tool

In this paradigm, the existing process, product, and business model are preserved; artificial intelligence is added to the system as an optimization tool or layer. The goal is clear: to continue doing the same business faster, cheaper, and with fewer errors without undergoing a comprehensive transformation.

The most common examples of this approach in industry include: predictive maintenance systems that forecast machine failures in advance, quality control applications operating with image processing on production lines,

algorithms optimizing energy consumption, supply chain tools improving demand forecasting, etc. There is a common logic in all of them: the existing factory, the existing product, the existing business model—but operating better or more efficiently.

In this paradigm, the ROI (return on investment) calculation is relatively clear, the investment is reversible, and overcoming organizational resistance is easier. The vast majority of industrial enterprises are still at the beginning of this path. Serious gains are also possible within this paradigm.



"For decision-makers, the question is no longer 'is artificial intelligence real?' We have moved far beyond that point. The real question is this: Where does my organization stand in this transformation—and is it standing in the right place?"

The Second Paradigm: AI as an Architecture

In this paradigm, the question is different: “Why do we do this business this way in the first place?”

The process, product, and often the business model are redesigned from scratch with AI at the center. The prominent message is: value creators do not paste AI on top of existing processes; they radically redesign processes and align human resources accordingly.

Concrete examples include: generative design systems where products are parametrically optimized and designed by AI; digital twin ecosystems that simulate the entirety of the physical facility in real time; autonomous factory architectures that minimize human intervention; new business models that offer machine performance as a service instead of selling machines. Companies entering this path position AI not as a tool, but as a core competitive advantage.

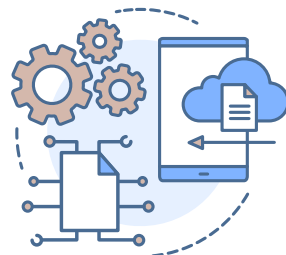
This paradigm thoroughly transforms the organization, is difficult to reverse, has a long time horizon, and carries higher risks. But the competitive difference it promises to create is permanent.

The Cost of Being in the Wrong Paradigm

The existence of two paradigms is not a problem on its own. The real problem is investing without being aware of which paradigm the organization is in.

An organization that assumes it is in the first paradigm but acts with the expectations of the second will experience constant disappointment—because AI acquired as a tool does not transform the business model. On the other hand, an organization that invests there without being ready to transition to the second paradigm will exhaust its resources and paralyze the organization.

Therefore, the critical awareness lies in knowing which question you are seeking an answer to: Is it “Where can I use AI?” or “How can my company be redesigned with AI?”



“The coexistence of two paradigms is not an inherent issue. The actual problem is for an organization to invest without being aware of which paradigm it operates within.”

Barriers to Transformation

Knowing which paradigm you are in is not enough. Any organization can easily lose its way, as the barriers to AI transformation are structural and human rather than technical. Let us now address the most fundamental barriers:

Lack of data infrastructure and culture: The raw material of AI is data—yet in most organizations, data sits scattered on paper, in disconnected systems, or in inconsistent formats. Machine logs are not electronic, production records are in office software, quality data is in the operator’s memory... Some are on paper, some in the cloud, some on computers, and a significant portion is who knows where. Furthermore, collecting data alone is not enough; a corporate culture that turns data-driven decision-making into a management reflex is also essential. Data storage infrastructure, data governance, and data security—these are the core conditions that must be established before an AI investment, and adding them later is highly costly.

Infrastructure gap: The existing digital infrastructure of most organizations is not designed for the real-time data flow that AI requires. Production equipment, sensors, and enterprise software systems are often isolated from one another, featuring an architecture that processes data in batches and with delays. Adding AI onto this foundation is like adding a floor to a building without a foundation.

Pilot hell: Small-scale trials often work and show promise, but the application may fail to scale. Various studies reveal that the vast majority of industrial enterprises repeat the same AI pilots for years but cannot carry them to an enterprise scale. The problem usually lies not in the technology, but in data governance, process ownership, and organizational capacity.

Trust and governance gap: When an AI system makes a production decision, where does the accountability lie? Who is held responsible when a flawed predictive maintenance recommendation leads to an expensive breakdown? These questions must be answered. Scaling will not be possible without clear accountability distribution and the establishment of trust.

The human and organizational dimension: This is perhaps the least discussed but most critical barrier. AI is not merely a software investment; it is a transformation that directly impacts ways of working, decision-making processes, and competency profiles. According to TurkStat data, 79% of organizations in Türkiye cite a lack of expertise as the reason for not adopting AI. AI projects that lack ownership from senior management, face resistance from middle management, or are designed in isolation from the field will fail to deliver results—regardless of which paradigm is chosen.

Cacophony and decision paralysis: In the AI ecosystem, everyone is speaking at once: solution vendors promise miracles, other experts paint dystopian scenarios, and the media dramatizes the issue by hyping it up. Yet, what will happen in the short term is genuinely uncertain. Time is needed to see the technological, social, and economic outcomes of AI. Caught in the middle of this cacophony, a significant portion of those who have to make decisions prefer to wait before investing. Uncertainty should not be a valid justification for inaction; instead, conscious and deliberate steps must be taken.



Where Does Our Industry Stand?

The AI debate in Türkiye has been vibrant for a quite long time—but unfortunately, implementation has not kept pace with the discussions. According to 2025 TurkStat data, only 7.5% of organizations in Türkiye use any form of artificial intelligence technology. This rate rises to 24% in large enterprises; however, the picture is much bleaker for SMEs. To analyze the figure from another angle: while Türkiye holds roughly a 1% share in the global economy, its share in the global digital economy remains at the 0.1% level.

Let us take this outlook as a starting point: through an honest assessment, it must be stated that “Our industry has not yet truly felt the transformative power of artificial intelligence.” Most organizations are only at the beginning of even the first paradigm, and the momentum of transformation is insufficient.

There are also structural reasons behind this outlook. There are serious issues that need to be resolved, such as data and computing infrastructure, qualified human resources, and access to finance. This part of the topic is a subject for a lengthy separate discussion...

So, what should the industry do? Three priorities stand out. First, making the choice of paradigm consciously: investing without knowing which question you are seeking an answer to exhausts resources. Second, establishing the data infrastructure, data discipline, and data culture before the AI project. Third, starting small but in a scalable manner: selecting projects that can be carried to an enterprise scale without falling into the pilot hell trap.

And let's leave a tough question here: How will the transformation of traditional SMEs take place?



“Technology is becoming more accessible, resources more limited, and time increasingly valuable. Let us remember that the benefit and pace of transformation will be determined not by technology, but by the organization’s capacity to learn.”

Conclusion: Asking the Right Questions

In general, there is significant information pollution and confusion. How reliable the predictions are is a separate topic of discussion. At the point we stand today, artificial intelligence is neither a magical solution nor an existential threat. It is an evolving, transformative family of technologies that yields powerful results when fed with the right data and approached with the right questions, but exhausts resources when fed with incorrect data and approached with the wrong questions.

The fundamental argument put forward in this article is simple: what determines what an organization should expect from artificial intelligence is not the technology it uses, but primarily the question it asks itself. The questions “Where can I use artificial intelligence in my current business?” and “How can my organization be recreated with artificial intelligence?” lead to vastly different outcomes, even with the same investment budget.

For our industry, the upcoming period will be an era where organizations that ask this question consciously will come to the fore. Technology is accessible, resources are limited, and time is becoming increasingly precious. Let us not forget that it is not technology, but the learning capacity of the organization that will determine the benefit and speed of the transformation.

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COMMUNICATION IN THE AGE OF AI: HUMANIZING TECHNOLOGY



MUSTAFA AKBAŞ

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“When everyone flirts with the same algorithms and whispers similar prompts, the narratives of brands and corporations begin to look oddly alike. In literature, this is referred to as ‘Algorithmic Homogenization.’”

Let’s admit it; as communication and marketing departments, we all have a new colleague lately: Artificial Intelligence. These digital assistants, which prepare presentation drafts in seconds, report endless data analyses, and never hesitate when requested to «rewrite this in a slightly more professional tone,» have accelerated our way of doing business to the speed of light.

However, there is another side to the coin. Do you also notice it while sipping your morning coffee and browsing through LinkedIn or digital platforms? When everyone flirts with the same algorithms and whispers similar prompts, the narratives of brands and corporations begin to look strangely alike. In literature, this is called «Algorithmic Homogenization»—that is, the flawless but «soulless» wave of uniformity that emerges as artificial intelligence optimizes the entire data pool based on the average.

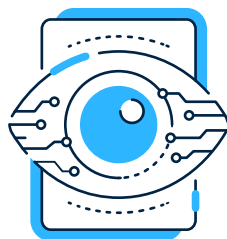
Right in this ocean of artificiality, what will save the future of communication is not how much we use artificial intelligence, but how well we can humanize the cold mechanics of that technology. Because no matter how perfect the words chosen by algorithms are, the formula for building a genuine connection with our target audience has never changed at the end of the day: sincerity, empathy, and that «authentic» storytelling that robots just cannot seem to master.

From Selling Features to Selling Emotions: The Beko Case Study

In fact, the marketing world has seen this movie before. If you recall, a language focused on «product and benefit» dominated traditional marketing trends for a long time. For instance, think of Beko's old commercials featuring Perran Kutman; they would explain for minutes how many revolutions the washing machine turned, its drum volume, technical specifications, and how durable it was. Because in the world of that era, «selling features» was enough.

So, what has changed today? In today's Beko commercials, we barely even see the machine itself. Instead, we watch environmental awareness, sustainability, the quality time families spend with their children, or that warm feeling of home. In other words, the brand no longer sells a washing machine; it sells emotions and values. As marketing guru Philip Kotler stated in his Marketing 3.0 and subsequent theories, consumers are no longer just interested in the functional benefit of a product; they look at its soul, the impact it creates in the world, and the emotion it evokes in them.

This is exactly where artificial intelligence poses a risk of throwing us back to that old «feature-explaining» era. When you ask AI about a technology project, it writes down its technical specifications, code structure, and functions; meaning, it only tries to «sell the product.» Yet, the duty of the modern communicator, just like Beko did, is to unearth the human emotion and social value behind that technology.



“In the era of AI-generated disinformation, the primary expectation of target audiences from corporations is ‘radical transparency.’”

The Perfection of Robots, the Imperfections of Humans

The greatest hallmark of artificial intelligence is that it does not make mistakes. Its punctuation is flawless, sentence structures are orderly, and data is precise to the millimeter. Yet, why does being “too perfect” backfire in communication? Because by nature, human beings trust sincerity and the reality brought by imperfections, rather than flawlessness.

Recent articles published in Harvard Business Review show that consumers and stakeholders develop an implicit “authenticity resistance” toward content they perceive to be entirely generated by AI. Instead of mechanical perfection, people are beginning to look for transparent narratives that carry human effort and consciousness behind them.

A robot can transform the technical details, budget analyses, and carbon emission rates of a well-supported deep-tech project into an excellent report within seconds. However, it cannot add to that report the excitement of the entrepreneur who worked day and night to develop that technology and stayed up until morning in the lab when the first prototype blew up. And without that excitement, you can neither sell emotions nor build a genuine connection with your community.

The Era of Trust and Radical Transparency

As technology evolves, “trust” stands out as one of the concepts undergoing the greatest erosion in the corporate world. **Global Edelman Trust Barometer** reports clearly reveal that while societies feel excitement toward technological innovations, they also experience a deep skepticism regarding how institutions manage and communicate these technologies. In an era of disinformation generated by artificial intelligence, the ultimate expectation of target audiences from corporations is “radical transparency.”

Humanizing technology is not just about making the language sincere; it is also about openly explaining to our community where, why, and how we use artificial intelligence. Honesty in communication is the only algorithm that AI cannot generate.

The Profession of the Future: AI Orchestration

There is hardly anyone who has not heard the whispers circulating in the market, asking, “Will artificial intelligence replace communicators?” Let's put this urban legend to rest: No, artificial intelligence will not replace a communicator; but a communicator who uses artificial intelligence effectively will definitely replace one who does not.

Our role here is no longer just producing content, but rather acting as an “AI Editor” or an “Orchestra Conductor.” Before us stands a massive group of instruments that piles billions of data in front of us within seconds. Our task is not to mute those instruments, but to produce a harmonious symphony from them that aligns with our corporate tone of voice, ethical values, and social sensitivities.

Artificial intelligence can offer us an excellent raw material, but there is a greater need than ever for a human eye—the refined taste of a communication specialist—to take that raw material and blend it with emotion. In short, artificial intelligence is not replacing us; it is freeing us from operational drudgery and transforming us into strategic curators.

Final Word: The Future Belongs to Those Who Can Touch the Heart

To sum up; being a corporate communication specialist in the age of artificial intelligence is not about turning one's back on technology, but rather standing at the very heart of technology and defending its human side. Speed, efficiency, and optimization may be the business of algorithms; however, trust, loyalty, and that sense of belonging are still equations that only the human heart can solve.

In the future, the difference will be made not by the institutions that use technology the best, the fastest, or the most intensively, but by those that succeed in remaining human within the massive speed of technology, touching people, and conveying an authentic emotion to their community. Robots may be able to tweet for us, write newsletters, or perhaps even present reports; but at the end of the day, no prompt will ever be able to replace those sincere partnerships established eye-to-eye during a coffee break.



“Being a corporate communications specialist in the era of artificial intelligence is not about turning one's back on technology, but rather standing at the very heart of it and advocating for its human side. Speed, efficiency, and optimization may be the domain of algorithms; however, trust, loyalty, and that sense of belonging remain equations that can only be solved by the human heart.”

IN TECHNOLOGY, ONE MUST DESIGN AND DEMONSTRATE RATHER THAN ADOPT A WAIT-AND-SEE APPROACH



DEĞERHAN USLUEL
TTGV, Chairman of the Board

INTERVIEW: Esra YAZDIÇ DEMİR
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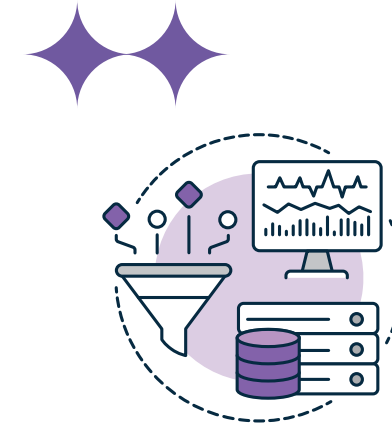


You can access the full
interview on TTGV's
YouTube channel.

Değerhan Usluel: Artificial Intelligence is a Paradigm Greater Than the Internet

As a businessperson with a high risk appetite and a keen interest in technology, Değerhan Usluel, Chairman of the Board of the Technology Development Foundation of Türkiye (TTGV), views entrepreneurship not as a career plan but rather as the natural outcome of curiosity. Having pursued his technological curiosity since his student years and developed web conferencing technologies at a time when audio and video transmission over the internet had not yet left the laboratories, we spoke with Usluel across a broad perspective ranging from the early years of technology entrepreneurship to Türkiye's technology production capacity, and from TTGV's new vision focusing on climate technologies to the transformative impact of artificial intelligence.

According to Usluel, artificial intelligence is a paradigm greater than the internet, and the most critical choice for institutions in the face of this transformation is shaped between waiting or taking action. TTGV exhibits a distinctive stance at this very point. Stating that "in technology, one must design and demonstrate rather than adopt a wait-and-see approach," Usluel emphasizes that Türkiye needs an approach that exhibits greater courage toward new technologies, acts as the first customer, and aims to shape the future.



"The major transformation has begun. Today, if you are not utilizing artificial intelligence in a medical diagnosis, it is considered professional negligence. In fact, in the United States, this has started to be referred to as 'medical malpractice.'"

This time, we are together with a name from our very own team, Değerhan Usluel, Chairman of the Board of TTGV. However, today I would like to host him not under this official title, but as a businessperson with a high risk appetite and a keen interest in technology. Mr. Usluel, what was the trigger that directed you toward the field of technology?

Actually, mine is something that happened by turning one's hobbies into their business. If you have a curiosity to read all the books on the computer shelf of the library while you are a student, it becomes clear where the business is headed. What you refer to as risk appetite and technological curiosity is about pursuing the question of "How can I step outside the standards?" This process started at university, and then a few opportunities came my way. Thanks to that, I found myself in the right place.

I want to go back to the beginning of the 1990s. You developed a web conferencing and online education platform. Today, we use these technologies very frequently, but how did it cross your mind to bring such an idea to life in the 1990s?

As I said, it was a stroke of luck. While I was doing my master's degree in the US—even though my background was actually in engineering—I was studying business administration. I went to ask for a teaching assistantship from the professor of the cost accounting course, but

I couldn't find him. There was a light on in the room next door; I knocked on the door and asked, "Hello professor, do you have any assistantship opportunities?" He replied, "I need a student in the business department who has technical knowledge. We want to get into topics called multimedia," and so I was chosen to do this work. I found myself in the laboratory where transmitting audio and video over the internet was being invented. It happened somewhat by chance.

While working there, the idea of distance education came to our minds as an application of transmitting audio and video over the internet. As three partners, we thought this was a usable and sellable idea, and we pursued this mission. While we were thinking that the people and the market needed to be educated, we suddenly realized that customers were secretly using our product to conduct sales presentations. It took us a year to understand this. After that, we got into the web conferencing business.

In other words, this process did not start by saying, "We are going to enter the web conferencing business with a grand vision." Frankly, it even took us some time to read the incoming signals. The market practically beat us into the right place. Looking back now, I wonder, "Could we have noticed these needs sooner if we had turned on our radar a bit earlier?" But as a twenty-four-year-old, I hadn't been able to notice it.



Since you mentioned it, let me ask now. In your opinion, was it the technology or the market gap that convinced the investors?

Neither of them. It was the crazy energy that my partners and I possessed. We were three partners. We pooled together a total of 5,000 dollars between us and established our company. Our first office was a single room for which we paid 300 dollars a month in rent. We also bought a computer for 3,000 dollars. The money was already practically gone. I developed a prototype on that computer. My partner borrowed the list of our university's donors and board of trustees and called a thousand people one by one. Out of those thousand people, he convinced thirty to come and visit us. Because we didn't have the money to buy plane tickets. In America, you don't have the opportunity to say, "I'll drive from Ankara to Istanbul" like in Türkiye. These people got on planes and came just to see our demo.

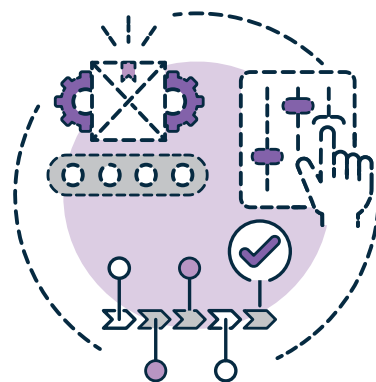
After the demo, we convinced three out of thirty companies to purchase a product that did not even exist yet. Looking back now, neither the technology was fully mature, nor was the market sufficiently defined. But what made people think "These guys can pull this off" was our belief in this work and the confidence we gave them. This trust enabled customers to purchase a product from us that wasn't ready yet. And investors thought, "If the customer saw this and bought it, then there must be something to it." If we hadn't projected that "We will achieve this somehow" energy, it would have been difficult for us to succeed.

On a maturity scale of technology production and consumption, Türkiye stands at a value of two and a half

We have been discussing technology in Türkiye for years, but we are progressing somewhat manually when it comes to the culture of technology development. What do you think is the reason for this?

What you call technology development is not something that the person producing the technology can do unilaterally. In fact, the point that most people sometimes fail to notice is this: Technological development begins with the pull of the need in the market. You need to coincide with a time when the market is ready to adopt it, which is not yet fully defined, where demand exists waiting for the valve to be opened, but this demand has not yet been fully expressed.

There is a maturity level scale for technology production and consumption. Türkiye stands at a level of two and a half out of four on this scale. This is an evaluation made according to the criteria of the World Bank. Two and a half means this: It uses existing technologies very well and adapts them according to its own needs. When you reach three, you create the next stage of existing technologies. When you reach four, you entirely create from scratch a technology that did not exist at all. There are only two countries in the world (Israel and the United States) at a level close to four. There is no country that has been able to reach a full level of four. There are many countries around three. Türkiye is around two and a half. Two and a half is a good level. Many countries, on the other hand, are around one and a half. In other words, they cannot even use the existing technology in the true sense.



In Türkiye, the demand of the market is generally in the form of "Let's see it implemented." Which other company of my scale in the world is using this? If this is a bank, has JP Morgan used it, I wonder? For this reason, when a technology that is not yet fully defined and whose valve is waiting to be opened emerges, a market that is ready to take it and use it at an early stage does not really exist in Türkiye. The mistake of entrepreneurs in Türkiye is this: When you accept the Turkish market alone as a real market and start working accordingly, you get stuck. If your product is going to be a global product at some point, then you need to target the global customer from day one. Targeting the global customer is difficult. Because if you are opening up to the world, your message must be clear. You will be clear enough to have correctly defined the problem you solve and to explain how you will be a remedy for the customer's trouble. Only after that can an interest regarding you begin to form in the customer. This, in turn, disciplines the entrepreneur. It forces them to go through the correct thinking processes.

When we talk about business models here, it is mostly progressed through a copying approach. I guess this situation also overlaps with the point you mentioned, doesn't it?

If your customer wants to see a product or service that has a precedent and asks, "Who else has used this?", then copying the business model from abroad is actually rational. However, if you are looking for something where you can say, "What did I change?", then this copying model, of course, remains limited.

"TTGV's journey consists of three main eras: The first is the support era, during which we pioneered the R&D support system in Türkiye. The second is the investment era, starting from 2001, where we catalyzed the sector as an anchor investor in venture capital funds. Today, as a result of institutional maturation in the ecosystem, we are in the customer era, positioning ourselves directly on the demand side rather than acting as a provider of support or investment."

When you become the customer, you start to clear the bottleneck in the system.

You said, "What did I change?" After becoming the Chairman of the Board of TTGV, you took a risk and went for a change in the roadmap by saying, "I want to turn toward climate technologies, what do you say?" What was the reason for this?

This was a decision taken through the collective wisdom of our Board of Directors. We went through a period where we pondered what our next step for Türkiye should be. I will talk about climate technologies, but first, let me mention why we turned toward climate technologies.

Our foundation was established in 1991. It is actually a very young foundation. When we compare ourselves with our counterparts in the world, most of the organizations we take as examples are 100-200-year-old foundations. TTGV has three main periods. The first period is our support period. A period where we developed a model. The period where we were the founder, pioneer, and implementer of the R&D support system in Türkiye.

The second period is our investment period. In the years when there was no venture capital in Türkiye, starting from 2001, it was a period where TTGV acted as the anchor institutional investor in almost all seed capital, private equity, venture capital, and funds in Türkiye, triggering the establishment of this sector. This became one of our fundamental approaches.

The third period is a period we have newly started to try in Türkiye: the customer period. In this period, we provide neither support nor investment. Because there are now institutions that do these. We are the customer. The fundamental obstacle before those who develop technology and start-ups in Türkiye is no longer support, grants, technology knowledge, or investment. The problem is the lack of customers. Because in high-risk businesses, there is no customer to take that initial risk. When you become the customer, you start to clear the next bottleneck in the system. Being the first customer in these new areas in Türkiye constitutes our approach in our third period. And when we looked at what the most valuable area was where we could realize this, climate technologies appeared before us.



When we say climate technologies, this has a threat dimension. For instance, in the European Union, which is Türkiye's largest export market, the carbon tax at the border is coming into effect. For this reason, a tax of approximately 10% will need to be paid. For many sectors in Türkiye, this rate is even above the profit margins obtained. In other words, we are talking about an obstacle that could pose an existential threat to Turkish industry. In fact, the establishment of TTGV had also taken place due to a similar threat. In the process of Türkiye's entry into the World Trade Organization and the European Customs Union, the risks it would face while transitioning from a closed market to an

open market had been a significant trigger. Secondly, the fossil fuel sector is an area where approximately 8 trillion dollars flow every year. The construction sector is of similar magnitude. Although agriculture is of a smaller scale, it is a highly critical area. Mobility, on the other hand, is an area that we all see in our lives every day. All of these harbor immense opportunities for Türkiye. Because when the direction of these large monetary flows begins to change, even shifting just 1% or 2% of this to Türkiye means innovations on a scale that will alter our future. The fundamental reason why we, as TTGV, directed our focus area to climate technologies was these opportunities it presents to Türkiye.

Artificial Intelligence is a paradigm greater than the internet

Now we have another massive challenge right ahead of us: artificial intelligence. In your opinion, is artificial intelligence a paradigm that will break new ground as much as the internet, or is it being overhyped?

It is a paradigm greater than the internet. The grand transformation has begun. Today, if you are not using artificial intelligence in a medical diagnosis, it is professional negligence. In fact, in America, they have started calling this "medical malpractice." Because when you look at the results, if you still have a human make the diagnosis just because they are human, knowing full well that artificial intelligence is more accurate, you are knowingly misleading the patient. This understanding needs to change.

On one hand, such acceptances are forming. On the other hand, we see this: we see that artificial intelligence is incredibly good in an area you would never expect,

but performs very poorly in areas you think are very close to it, where you say, "Since you do this well, then you can do this too." We have not yet been able to fully gauge where the boundaries of artificial intelligence lie. Furthermore, the "I asked something, it answered" mode in artificial intelligence, operating through the chatbots we have been using for a few years, was actually just a beginning. Artificial intelligence is now starting to carry out the thinking part as well. Humans, however, still need to do the understanding part themselves. We can delegate the thinking part to some extent. Yet, when we use artificial intelligence, will we lose not only the thinking part but also the understanding part? We do not know the answer to this yet. My opinion is that we will not lose it. Moreover, I believe that what humans will find most valuable in the future as well will be the relationships a subject establishes with other people and human-to-human interactions.

Long-term thinking is a muscle that needs to be developed

Where do you think we get stuck when it comes to technology development in Türkiye?

Every country has to live with its own realities. Factors such as the geography Türkiye is situated in, its geopolitical situation, our financial resources, our risk categories, and our options for securing foreign credit focus us a bit more on managing the short-term situation. There is indeed a reality where we failed to develop technology even when everything was smooth sailing. We have to accept this. But there is also this: We must remember that long-term thinking is a muscle that needs to be developed. When you say, "Can I think about one year, two years, five years, or even twenty years instead of thinking about today, a week, or three months from now?", many people look at it like, "What is going to happen twenty years from now anyway?" But you blink, and those twenty years have passed. The best time to plant a tree was forty years ago; the second best

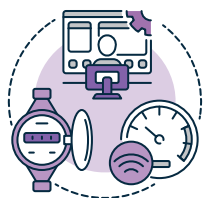
time is today. When you don't wait and instead take action, beautiful things can begin to happen.

Right now, everyone in Türkiye or in the world is actually rational. Everyone looks at the same data. However, different priorities emerge. If your time horizon is three months from now, the topics you think about regarding energy turn into questions like: where will the polyethylene come from, will there be natural gas, will I be able to produce fertilizer? You have to think about matters like whether natural gas will arrive or not. If your horizon is one year, you think about other things. If your horizon is five years, you start to think about what you can do in a world where the sun produces limitless and abundant electricity, the energy storage problem is solved, and electricity is so cheap that there is no need to even install a meter. When you think this way, you have a chance to be at a much better point five years later. If you do not think about these, then someone else reaches that point.

In one of our conversations regarding artificial intelligence, you defined it as an “intellect tap.” I suppose the primary thing that will matter in this regard will be the control mechanism.

I agree with the “intellect tap” analogy. There is electricity, we plug it into the socket and use it. There is water, we turn on the tap and use it. When there is such a limitless source of intellect, not using it would be somewhat unintelligent. Because with such an opportunity available, a platform emerges that truly makes human life easier, increases productivity, heightens the satisfaction gained from one’s work, and allows one to transcend the drudgery of the task to concentrate on its more enjoyable aspects. I think using this is a massive advantage.

But this is also true. A person writing something to ChatGPT and getting an answer is a personal mode of use. You either use the incoming response or you don’t. However, this becoming a self-operating agent increases the utility of the work much more. At the same time, it expands the risk area. Issues begin to come to the agenda, such as whether artificial intelligence makes a decision based on a person’s appearance when rendering a credit decision, whether it hallucinates information about that person that does not actually exist, or whether it records these onto the person’s criminal record. It is not possible for us as humans to accept such risks. If you start tracking which agents will operate in which areas within an institution, what these agents are doing, what matters they are deciding upon at the moment, on which data they base the decisions they make, and the evolution of these decisions over time through robust infrastructures, at that point you can set these agents free. Right now, setting agents completely free would be dangerous. However, when you establish the necessary control mechanisms, we will be able to utilize them much more comfortably.



“As corporations renew themselves, they need to ask this question: What is my purpose, and what is my tool? It is essential to ask these questions frequently.”



An institution that designs and demonstrates instead of adopting a wait-and-see approach

You mentioned technology governance. Considering technology management, how would you like to describe your moves regarding the future?

When institutions renew themselves, they need to ask this question: What is my purpose, and what is my tool? It is necessary to ask these questions frequently. When TTGV set out, its goal in 1991 was for Turkish industry to be competitive in the world, to fight neck and neck with its competitors and win, and to realize this through the vision of a Türkiye that produces technology.

You need to reinterpret why you exist each time and ask the question, “This is my reason for being. So, how will I realize this?” TTGV also says: “We are an institution that designs and demonstrates instead of adopting a wait-and-see approach.” Our duty is to conduct the experiments and to demonstrate these experiments. It is to explain both the ones that succeed and the ones that fail.

So, what should young people do today?

What should young people coming out of Türkiye do? I will have advice for entrepreneurs, but before entrepreneurs, there is actually something I need to tell young people of all ages: you must continue to remain curious. You need to tinker with things that you like. In other words, you shouldn’t leave hobby activities behind. When I say a hobby, this might be collecting butterflies for someone. Collecting butterflies is a hobby, of course, but at the same time, it can be a pursuit that expands your knowledge. Perhaps from there, you turn toward biology, or maybe toward natural sciences. This is also quite possible. When you tinker with something and pursue it, over time you start to become good at that subject. The subject you are good at begins to give you pleasure. The subject you take pleasure in begins to produce a benefit. You become even better. Perhaps a business opportunity is born from there.



Unfortunately, there is an expectation seen in every country, but which I think is a bit more common in our country: let the state show us the way, provide us with a place, tell us what to do. However, things usually do not work that way. You need to dig around and tinker yourself. If you don’t know what to do, you can ask artificial intelligence. Beautiful conversations and exchanges of ideas can happen there. But if your goal is to set up a venture, to create a startup company, my general advice is this: don’t do it.

Why not do it?

It is very difficult. It is truly very difficult. I mean, looking at it from the outside, it seems a bit romantic, but it is very difficult.

Aren’t the results enjoyable?

To get to that enjoyable stage, there are certain stages you need to go through. I am the one who has to make the decisions here. I also have to live with the consequences of the decisions I make in an environment where information

is scarce. This is a difficult state of mind. I am not saying “let my supervisor tell me, and I will do it,” but working in a defined environment makes life easier. For instance, you work at a bank in Türkiye. That bank has a plan. The general manager has given a direction to this plan. Above the general manager, there is a board of directors. They, too, have determined some priorities. In the structure you call a startup, on the other hand, none of these exist. You can do whatever you want. Although this sounds like a beautiful thing, it is actually perhaps the most difficult situation. Not everyone enjoys this. A person discovers this only by trying, by doing, or by failing to do it.

Before setting up a company and undertaking the obligations and responsibilities brought by the investor, it is possible to try it as a hobby. Take a look and see, does it work? Try it. You don’t need to name it entrepreneurship. Just do it. You don’t need to get permission from anyone either. If you are someone who can do it, you are already aware of it. Then, pursue your hobby before starting fully. Pursue your curiosity.

A NEW LAYER OF WORK FOR INNOVATION AGENCIES: MANAGING AGENTS PROPERLY



EVREN BÜKÜLMEZ

TTGV, Development Programmes Director



“The key point is not that artificial intelligence eliminates human decision-making, but that it moves human expertise to the right place.”

Artificial intelligence is no longer merely a technology area supported by innovation agencies; it is becoming a new layer that is transforming the way these institutions work. From the design of grant and support programs to project/grant application management, from expert matching to portfolio monitoring, from impact analysis to ecosystem mapping, many processes are now being rethought through AI-supported tools and, increasingly, “agent” structures. Such applications are, of course, not specific only to innovation agencies; they also present similar opportunities for banks, NGOs, universities, and various public institutions.

In my view, the key point here is not that artificial intelligence eliminates human decision-making, but that it moves human expertise to the right place. In innovation agencies, a significant portion of experts’ time is spent on high-volume but repetitive operational tasks, such as the preliminary review of applications, checking for missing documents, initial classification according to program criteria, preparing application summaries, or generating reports from portfolio data. When AI functions in these areas as a first-reading, first-summarizing, and first-routing layer, teams can shift their time toward more strategic issues such as program design, technology foresight, impact analysis, and ecosystem development.

In recent months, during a TAFTIE meeting, I had the opportunity to hear a good example of this while speaking with an official from Estonia. She explained that Estonia’s e-Residency program had achieved significant efficiency in its operational processes through an AI agent they had developed themselves. e-Residency is a well-known public program that enables entrepreneurs from around the world to establish and manage companies through Estonia’s digital infrastructure. As the program grew, support requests also increased. Instead of responding to this demand solely by adding more human resources, the team introduced an AI assistant connected to a live chat interface. I see this example not merely as a “chatbot” application, but as a small yet important signal of how innovation institutions can redesign their operations.

A similar approach can also be applied to support programs. By integrating an AI agent into the application process, an innovation agency can provide preliminary guidance to applicants on program eligibility, identify missing fields, and pre-classify applications according to technology area, maturity level, or impact potential. It can prepare shorter and more standardized summaries for expert evaluators. The critical line here is very clear: the final decision must not be transferred to artificial intelligence. AI should be viewed as an auxiliary layer that makes the evaluation process faster, more readable, and more traceable.

However, for more boutique institutions such as TTGV, which operate at the interface of technology and innovation, I believe the real potential of AI lies not only in operational efficiency. The more important area is the capacity to understand, interpret, and share new technologies with the ecosystem. Developments in deep technology fields are advancing very rapidly; simply following news and trends is often not enough. A technology’s maturity level, industrial applicability, investment risk, regulatory dimension, impact on the value chain, and areas of opportunity for Türkiye must be assessed together. **AI-supported analysis**

tools can systematically scan scientific publications, patents, startup investments, global demonstration applications, regulatory developments, and corporate use cases, helping expert teams make deeper and more comparative assessments.

The issue is not answering the question “What is the technology?”

This capacity also strengthens the role of institutions such as TTGV as a “trusted knowledge interface” within the ecosystem. For example, in areas such as hydrogen, carbon capture, artificial intelligence, advanced materials, agriculture, food, biotechnology, or energy storage, the issue is not simply answering the question, “What is this technology?” We carry out extensive work to compare different technology options, show in which use cases they are more meaningful economically and technically, monitor the first demonstration investments around the world, and open discussions on which industrial actors in Türkiye they could be matched with. Our focus in this area is the valuation of early-stage technologies. Here, AI is not positioned as a mechanism that replaces experts; rather, it is a decision-support tool that scans broader data sources, makes alternatives visible, classifies uncertainties, and enables both developers and investors to approach new technologies with greater confidence.

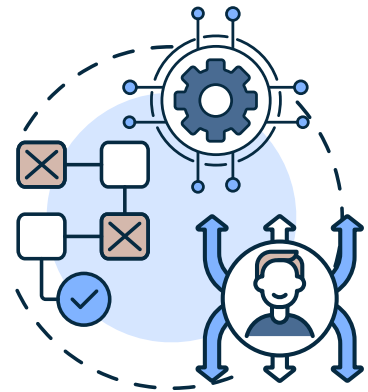
For this reason, AI transformation in innovation agencies should not be seen merely as a matter of “purchasing a tool.” The truly critical issue is developing the ability of experts and managers within the institution to work with these tools. The first stage often starts quite simply: summarizing meeting notes, drafting reports, conducting literature reviews, extracting main themes from application texts, or classifying stakeholder interviews. But over time, these individual experiments turn into institutional workflows. Teams learn together in which processes AI can be used, at which decision points human oversight is essential, which data can be used, and which outputs require quality control.

This learning process is not limited to training sessions;

INTERFACE

it develops within real workflows. An expert learning to distinguish a good AI-generated summary from a superficial one, a program manager seeing how AI-supported analyses can be integrated into strategic decision-making processes, and legal or data security teams clarifying risk boundaries are all part of this process.

The role of managers is also highly important here. Because using AI is not only about becoming accustomed to new tools; it also means rethinking ways of working, responsibilities, approval processes, and risk management.



“The role of managers is also highly important here. Because using AI is not only about becoming accustomed to new tools; it also means rethinking ways of working, responsibilities, approval processes, and risk management.”

Pay attention to portfolio management

Another important area for innovation agencies is portfolio management. Supported startups, projects, mentoring processes, investment readiness activities, patent outputs, commercialization indicators, and internationalization performance often remain scattered across different systems. AI-supported analysis tools can derive early signals from this data: In which technology areas are applications increasing? Which support mechanisms generate higher impact? Which startups need follow-up support? In which sectors are capacity gaps emerging? In this way, the agency ceases to be merely an institution that opens calls and evaluates applications; it becomes an organization that produces ecosystem intelligence and manages its resources more agilely.

Of course, this entire transformation must progress together with the principles of trust, transparency, and accountability. As AI agents become more autonomous, data security, the risk of bias, human oversight, evaluation criteria, and appeal mechanisms will become more critical. Therefore, AI capability should not be considered merely as a “tool-use skill,” but together with ethics, data governance, quality control, institutional learning, and change management.

Ultimately, artificial intelligence appears likely to become much more than a temporary technology trend for innovation agencies. When used properly, it becomes a capacity-building tool that increases internal efficiency, shifts expert time toward more valuable areas, improves stakeholder experience, and generates deeper insights about the ecosystem. In my view, the institutions that will make a difference in the coming period will be those that treat artificial intelligence not only as a subject of the projects they support, but as a natural part of their own ways of working. For structures such as TTGV, which operate at the interface of technology and innovation, this area offers an important opportunity both to accelerate institutional learning and to introduce new analysis, guidance, and demonstration investment models to Türkiye’s innovation ecosystem.



OVERCOMING THE “VALLEY OF DEATH” IN EARLY-STAGE CLIMATE TECHNOLOGIES: WHY IS PoC CRITICAL?



ESRA KAYA

TTGV, Pioneering Project Program Specialist

One of the fundamental questions we frequently encounter in early-stage technology development processes is this: If a technology shows promising results in a laboratory environment, does this mean it will also work in the field, be adopted by industry, and become commercialized?

The answer to this question is often not as simple as it seems. Especially in fields like climate technologies, which involve high technical uncertainty, long development periods, intensive capital requirements, and complex value chains; a good scientific output or a strong prototype alone may not suffice for a market transition. It is necessary to see how the technology performs under real-world conditions, what need it addresses on the industrial side, which technical requirements it can meet, and whether it can transform into a scalable business model.

In literature, this transition phase is frequently defined as the “valley of death.” The valley of death refers to the critical gap that a promising solution faces when moving from the research and technology development phase to the commercialization and widespread application phase. In this gap, technical risks remain high, costs are significant, customer and market validation is limited, and investor interest is often cautious, awaiting more concrete evidence. For early-stage climate technologies, this problem is even more pronounced; because the vast majority of these technologies develop not just through a software or digital product logic, but alongside multi-layered processes such as physical infrastructure, manufacturing, field application, regulations, supply chains, and industrial integration.

The issue is not a lack of supply and demand...

Therefore, the issue is often not merely a matter of a lack of supply or demand. Early-stage deep-tech startups and technology developers may have shortcomings in areas such as scaling, validation, certification, field data, clarifying technical requirements, and business models. On the industrial side, it is not always easy to allocate time, a production line, data, a team, and a risk budget to an early-stage technology. In order to bridge the gap between these two sides, intermediary frameworks are required where the technology is matched with the right need, the risk becomes measurable, and it is carried to its first real-world use case.

Our field experience at TTGV through the Tohum (Seed) and Demo programs very clearly demonstrates this need. The Tohum Program offers an important foundation for early-stage technology developers to assess, mature, and evaluate the commercialization potential of their technologies in a more systematic manner. The Demo Program, on the other hand, provides a more focused growth area for technology-based startups in their business models, investment readiness, customer validation, and growth journeys. Yet, for certain technologies, another need emerges either alongside or parallel to these two frameworks: testing and validating the technology under real field conditions together with a potential industrial partner.

PoC, namely Proof of Concept, addresses exactly this need. The goal here is not merely to answer the question, “Does the technology work?” What is more critical is to observe under what conditions the technology operates, by which performance indicators it can be evaluated, in which use-case scenario it creates value, which operational need it addresses on the industrial side, and which assumptions hold true on the path to commercialization.



“The PoC process is not just a technical testing ground for the technology developer or startup. It is also an opportunity to obtain early customer feedback, move closer to product-market fit, develop a collaborative working culture with industry, clarify technical requirements, and present more concrete evidence to investors.”

At this point, the PoC phase is a critical tool that enables the technology developer and the industrial stakeholder to align on the same goal, scope, and measurement framework. Within this framework, where and under what conditions the test will be conducted, which technical requirements will be met, what data will be generated, how success criteria will be defined, what responsibilities the parties will undertake, and what outputs will be expected at the end of the process are clarified. Thus, the PoC ceases to be merely a well-intentioned trial; it transforms into a structured validation process that is measurable, traceable, and enables mutual learning between the parties.

From this perspective, the PoC process is not just a technical testing ground for the technology developer or startup. It is also an opportunity to obtain early customer feedback, move closer to product-market fit, develop a collaborative working culture with industry, clarify technical requirements, and present more concrete evidence to investors. For a startup, there is a significant difference between “a well-explained technology” and “a technology that has been tested in the field and has generated measurable outputs.” PoC is the critical step that makes this difference visible.

From the industry side’s perspective, PoC also serves an important function. Directly purchasing an early-stage climate technology, integrating it into the production line, or making a large-scale investment decision is naturally a risky step for most corporations. A PoC provides the opportunity to handle this risk within a more controlled, limited, and measurable framework. The industrial enterprise gets to know the technology developer and the solution under real conditions; meanwhile, the technology developer learns the actual needs, constraints, and decision-making dynamics of the industry. Thus, rather than a mere supplier-customer

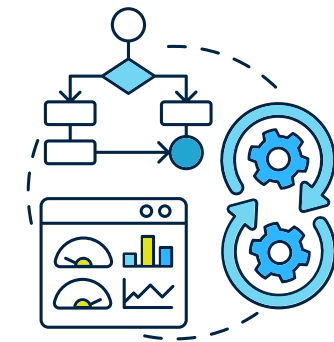
relationship, a healthier ground for collaboration based on mutual learning is established between the parties.

This need lies behind TTGV’s decision to integrate the PoC phase into the Tohum and Demo programs. The core issue we observe in the field is that early-stage technologies often face difficulties in progressing not merely due to a lack of funding, but because they cannot be tested in the right environment, cannot meet the right industrial partner, cannot demonstrate their performance under real conditions, and cannot test their assumptions on the path to commercialization early enough. Within TTGV’s internal documents, the PoC phase is defined as a complementary field application stage designed interactively with the Tohum and Demo programs, enabling technology developers to test and validate the solutions they have developed under real conditions alongside industrial stakeholders.

Therefore, the PoC phase should be viewed not as an independent support program, but as a critical link in the early-stage technology development chain. While Tohum focuses on understanding and maturing the potential of the technology, and Demo focuses on supporting the development and investment journey of the startup, PoC strengthens the validation layer where these two tracks interface with the field. **In other words, PoC functions as a bridge that helps the technology developer cross the valley of death in a more controlled manner during the transition from laboratory to field, and from field to market.**

The need for transformation in the field of climate technologies is immense; however, for this transformation to take place, the mere emergence of new ideas and research outputs is not enough. These ideas must be tested under real conditions, interface with industry, have their technical and commercial assumptions proven, and transform into scalable solutions. This is precisely why the PoC process is critical: it offers startups and technology developers not just an opportunity to “try,” but the chance to learn, validate, build trust, and take more solid steps on the path to commercialization.

From TTGV’s perspective, the PoC phase is positioned as a complementary mechanism that supports not only the development of early-stage climate technologies but also their adoption in the field and their transformation into solutions that can create impact. In this regard, PoC is an important validation step that carries the impact of the Tohum and Demo programs into the field, aiming to build a stronger bridge between research, entrepreneurship, and industry. It may not be possible to completely eliminate the valley of death for early-stage technologies; however, through well-designed PoC processes, it is possible to make this valley more visible, more manageable, and surmountable.



“The core issue we observe in the field is that early-stage technologies often face difficulties in progressing not merely due to a lack of funding, but because they cannot be tested in the right environment, cannot meet the right industrial partner, cannot demonstrate their performance under real conditions, and cannot test their assumptions on the path to commercialization early enough.”

TÜRKİYE'S WATER CRISIS BEGINS IN THE FIELD: MORE WATER IS NOT MANDATORY FOR HIGHER YIELD



HASAN ARKİN DEMİR
Al Ghurair Foods, Exec VP

INTERVIEW: Esra YAZDIÇ DEMİR
TTGV Corporate Communications and
Media Manager



The Main Problem in Agriculture is Not the Lack of Technology, but Water Management

One of the critical topics that will determine Türkiye's future food security is how water will be managed. According to Hasan Arkin Demir, a sustainable agriculture and food leader who has been working in the fields of agriculture, irrigation technologies, and AgTech for many years and currently serves as Executive VP at Al Ghurair Foods in Dubai, a significant part of the solution is actually known: micro-irrigation systems, the right crop pattern, and data-driven agricultural practices. However, unfortunately, technology alone is not enough.

Advocating that micro-irrigation must be made mandatory in certain regions of Türkiye, Demir says that the true cost of water is not being recognized, and the current system threatens both resources and production efficiency. We talked with Arkin Demir about his comprehensive evaluations, extending from artificial intelligence in agriculture to satellite-assisted irrigation, and from water policies to farmer behaviors.



Micro-irrigation must be made mandatory for certain regions and crops

Climate crisis, increasing population, and depleting water resources... All these headlines are bringing the agricultural sector to the brink of a transformation more critical than ever. In water-stressed countries like Türkiye, there is now a single question at the center of this transformation: How can higher yield be achieved with less water? Looking at the current picture, where do you see the critical breaking points in terms of water efficiency?

In times of water scarcity, achieving higher yield is, of course, crucial. In this regard, proven micro-irrigation methods known as drip irrigation and micro-sprinkling have been utilized for a long time both worldwide and in our country, and the increases in yield are very clearly observed. Thanks to lower fertilizer consumption, the carbon footprint and labor costs are also reduced. But is this enough? Unfortunately, no.

In many water-scarce countries around the world, using micro-irrigation systems has become mandatory both regionally and for certain crop patterns. In Spain, and even in Morocco, you cannot plant corn or sugar beet—which are among the crops requiring the most water per decare—in an arid climate like the Konya Basin and irrigate them with simple sprinkling methods. Furthermore, the fact that 70% of the wells are unauthorized makes controlling the amount of water impossible. Similarly, for higher yields compared to dry farming, our farmers in Southeastern and Eastern Anatolia utilize wild irrigation, consuming three times the amount of water needed. We pump water coming from dams in the Southeastern Anatolia Project (GAP) or well water into the fields using electricity that we do not pay for.

In 2018, as the Pressurized Irrigation Industrialists Association (BASUSAD), we were conducting a joint project with the State Hydraulic Works (DSİ) in GAP. We saw that 90%

“The government, instead of giving support per decare, should restrict the crop pattern in regions and establish a system that bases yield increase on the irrigation technology used.”

of the lost electricity in the region was used in agricultural irrigation, which is also equivalent to the annual electricity generation of the Atatürk Dam. Dicle Elektrik's illegal loss is reflected in electricity bills across all of Türkiye; we all pay for it. Yet, if we made micro-irrigation mandatory for certain regions and crops and gave the systems away for free, there would be less economic damage, and farmers would also prosper because the yield rises when transitioning from wild irrigation to micro-irrigation. When we look at this situation for cotton, we were able to reduce imports by 50% through yield gains and, if I remember correctly, decrease the foreign trade deficit by 300 million dollars annually.

Farmers cannot use the technology

How much of a difference do technologies like soil moisture sensors, IoT-based irrigation systems, and data analytics really make in the field? Could you share a measurable example of water savings?

Yes, absolutely, it is very clear. AgTech solutions do make a difference. By receiving the right data at the right time, you can perform optimum irrigation and increase yield, while also achieving water and fertilizer savings. Today, you can schedule your field's irrigation program from your mobile phone and ensure it adjusts according to weather forecasts. You can even see how much your field has been irrigated and which parts are more or less humid via satellite imagery. You can monitor plant development in your area and carry out pinpoint spraying and fertilization work.

At this point, I have a few comments that will disappoint both the companies providing these technologies and AgTech enthusiasts. Unfortunately, with the exception of a few countries (and Türkiye falls into this category), not even 1% of farmers use or can use these technologies. There are a few main reasons for this. First, in every country, farmers represent the least educated and most conservative

population. There is a lack of capacity and desire to make the change. This is true for a smallholder farmer in Brazil, just as it is for a farmer in Adana.

The second reason is that, by the very nature of the agricultural business, natural variables in open fields make a positive or negative difference beyond any kind of technology. The amount of rainfall, the distribution of precipitation throughout the year, temperature, and natural disasters are so critical that as long as you cannot control the environment, your impact on the final result remains low no matter how much technology you use. Perhaps you can mitigate certain damages, but you cannot zero out the risk. Consequently, 99% of farmers remain distant from utilizing AgTech technology and adapt over a very long period of time.

At the market-leading micro-irrigation company where I previously served as a manager, we offered an irrigation monitoring and planning program via satellite. Massive yield increases and water savings per decare were possible. Initially, we decided to implement an annual subscription per decare. We provided training and conducted promotional activities for years, yet only a very limited number of farmers transitioned to using it. We made it free for those who purchased the drip irrigation system; still, we could not achieve success in Australia or in Chile. We ended up transferring it to another AgTech company. Are there good examples? Yes, especially in greenhouse cultivation, AgTech is not a choice, it is already mandatory. However, protected agriculture accounts for less than 1% of the world's total agricultural area. There are also firms in Türkiye like Doktor that develop very successful solutions regarding AgTech. Last year in Dubai at Gulfood, under the sponsorship of Invest in Türkiye, numerous AgTech startup companies shared agricultural solutions.

How do precision agriculture applications utilizing satellite data, drone imagery, and decision support systems make it possible to irrigate a plant exactly as much as it needs? Could you expand a bit on the technical working logic of these systems?

1) *Satellite Imaging (Remote Sensing)* - The most critical technology.

The following satellite sources are generally used:

- Planet Labs
- NASA
- European Space Agency Sentinel satellites
- Landsat
- MODIS

These satellites collect data in bands other than visible light, such as:

- Near Infrared (NIR)
- Thermal Infrared
- Shortwave Infrared

From these bands, plant health, canopy density, water stress, soil moisture estimation, and evapotranspiration (ET) are calculated.

2) *NDVI / Vegetation Index Technologies*

The most common index: It shows how actively the plant is photosynthesizing, and whether it is healthy or under stress. In addition to this, advanced indexes such as NDRE, SAVI, EVI, and the Crop Water Stress Index are also used. For example, if the NDVI value of an area is dropping → there might be a lack of water. If the temperature has risen at the same time → evapotranspiration has increased. The system can say “recommend 12 mm of irrigation tomorrow.”

3) *Evapotranspiration (ET) Models* - This is the heart of the irrigation decision.

The basic logic: How much water did the plant + soil lose?, How much precipitation occurred?, What is the remaining available water in the soil?, The FAO56 Penman-Monteith model is very common. For this, temperature, wind, humidity, solar radiation, and the crop coefficient are used.

Companies like Phyttech combine this with: satellite imagery, actual weather conditions, forecasts, and the crop stage.

4) *Artificial Intelligence and Machine Learning*

The AI part does the following:

- Pattern recognition: Which fields are entering stress?, Which regions are constantly over-irrigated?
- Prediction/Forecasting: Will there be water stress in 3 days?, Is there a risk of yield loss?
- Recommendation/Advice engine: How many mm of irrigation today?, Which block should be irrigated first?, Should fertigation be reduced?

Some even use what is known as reinforcement learning.

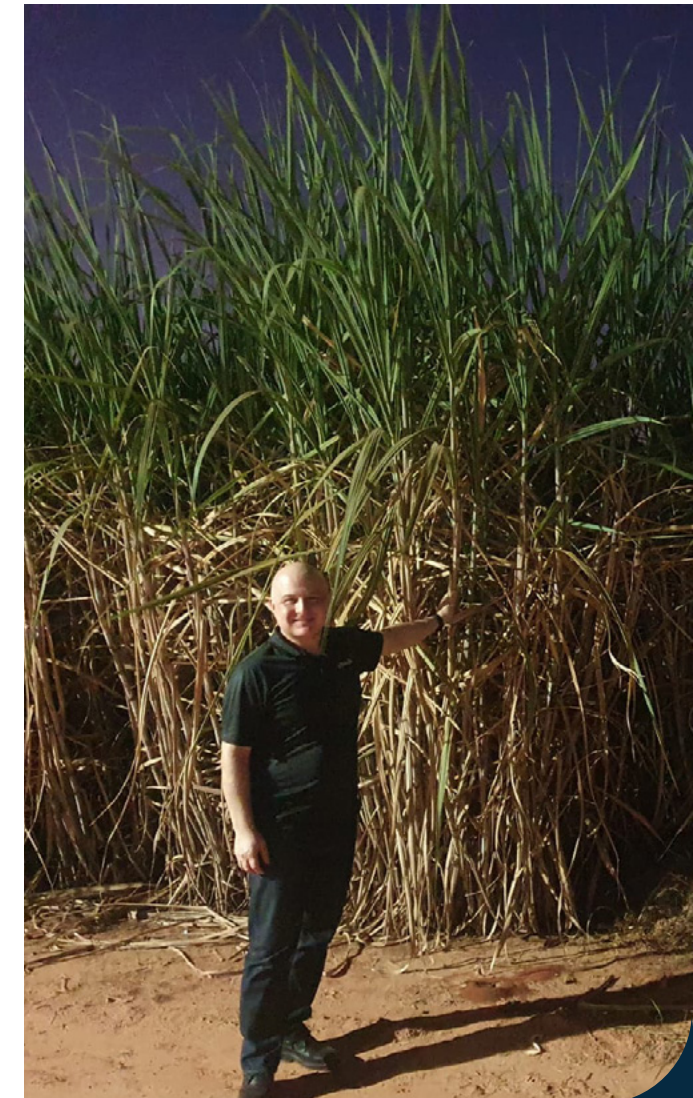
Instead of the government providing support per decare...

For water efficiency, how should state incentives, regulations, and private sector investments be balanced? Is Türkiye on the right track?

The state, instead of giving support per decare, should restrict the crop pattern in regions and establish a system that bases yield increase on the irrigation technology used. Water use must absolutely be charged; when you do wild irrigation and pay for water at the highest tier, the farmer immediately looks at efficiency. Without agricultural reform in Türkiye, the private sector will not and cannot invest in agriculture. Besides, there is no land in our country of a size that the private sector would invest in. If you consider mechanization, return on investment, etc., below 500 hectares, there is no way for agriculture to be profitable. There are thousands of such agricultural enterprises in Brazil or Argentina. In our country, according to the 2007 Turkish Statistical Institute (TÜİK) Turkey Yearbook, it is not more than 57. What we call the private sector in our country consists of investments made almost like a hobby by white-collar retirees or agriculture-volunteer industrialists. Look at the large agricultural companies, Tekfen Tarım, Anadolu Grubu, etc., all of them are either reducing their areas or exiting agriculture. The state needs to carry out consolidation on a basin basis, create large agricultural lands, and provide incentives to landowners with tax advantages and annual rent guarantees. Otherwise, we can focus on greenhouse cultivation, supported by geothermal heating, and grow in a specific product group. In the current system, it is very difficult for us to do open-field farming and be efficient.



“The state needs to implement basin-based land consolidation to create vast agricultural lands, and incentivize landowners with tax advantages and annual rental guarantees.”





My hope is for young people to turn toward agriculture through artificial intelligence

How will artificial intelligence-backed irrigation, automation, and big data transform agriculture in the next 10 years? Where should Türkiye position itself in this race?

I think that in the world, artificial intelligence will make a difference first in services, then in industry, and lastly in agriculture. If you look at the adoption and utilization rates of technologies that provide a very clear yield increase in agriculture, it can give you an idea about the future. Today, the average age of a farmer in Türkiye has exceeded 55, and their average education is not even 7 years. I wish I could say that artificial intelligence will create miracles. My hope lies in the possibility of the young population turning toward agriculture with the advancement of artificial intelligence. Inevitably, there will be large masses left idle due to the efficiency and production increases provided by artificial intelligence, and they will transition to agriculture out of both lifestyle choices and necessity. Then, adaptation will be faster.

How widespread are the next-generation technologies developed for climate change-resilient agriculture (drought-resistant seeds, closed-circuit irrigation systems, etc.) in the world and in Türkiye, and where do you see the biggest opportunities in this field?

Drought-resistant seeds have existed for a long time. In many products from cotton to corn, seed selection is chosen to match the soil along with the precipitation pattern of the region. Closed, or in sector terms, pressurized irrigation is very limited in the world. There are regions where it reaches perhaps around 20% in countries like Spain and Italy. In Türkiye, with a correct decision, DSI has been establishing all irrigation systems as closed systems for the last 10 years. It is also converting old open channels into closed systems. Today, closed irrigation systems do not exceed 35%, but I am sure we will reach around 70% in the 2030s. We have no other alternative.

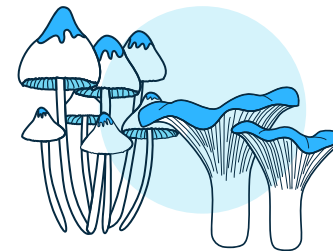


THE SILENT TRANSFORMATION OF MUSHROOMS: FROM FOOD TO BIOMATERIALS, FROM WASTE TO CLIMATE SOLUTIONS



AYŞE GÖKNUR TANSU ÖNCEL

TTGV, Pioneer Investment Program Specialist



“Fungi are among the most powerful living organisms that remind us that, in nature, there is no such thing as waste; they transform decay not into an end, but into the beginning of a new cycle of production.”

The climate crisis is forcing us to rethink food production systems not only in terms of productivity, but also in terms of resource use, waste management, carbon footprint, biodiversity and ecosystem health. Drought, water stress, declining soil organic matter, dependence on agricultural inputs and rising production costs all make it necessary to develop more resilient and circular models in agriculture. One of the striking yet often underrecognized actors in this transformation is fungi.

Although mushrooms have long been viewed mainly as edible products, organisms encountered in nature or part of traditional consumption habits, fungi are now beginning to occupy the center of a much broader technological field. From mycelium-based biomaterials to alternative proteins, from the valorization of agricultural residues to bioremediation, and from microbial fertilizers to functional food ingredients, fungi-based systems offer new opportunities at the intersection of agriculture and climate technologies. For this reason, mushrooms should be considered not only as edible products, but also as visible representatives of fungi within the circular bioeconomy. Fungi-based systems have the potential to transform low-value organic materials into high-value products, adapt to different production scales and create new links between agricultural production and industry.

Why Are Fungi a Strategic Technology Area?

One of the most remarkable characteristics of fungi is their capacity to decompose and transform a wide range of organic materials. In nature, fungi can develop on wood, leaves, plant residues and various organic substances, and they play a critical role in material cycles by breaking down lignocellulosic structures. This biological capacity offers an important opportunity for agricultural production systems. In particular, cereal straw, corn cobs, cotton residues, sunflower stalks, hazelnut husks, olive pomace, grape pomace and similar agricultural residues can be used as substrates in mushroom cultivation under appropriate processing and production conditions. In this way, biomass left in the field or used with low economic value can be transformed into higher-value outputs such as food, feed, biomaterials or bioactive compounds.

Unlike conventional agricultural production, mushroom production can be carried out under controlled environmental conditions and is therefore compatible with vertical farming, indoor production, urban production and small-scale entrepreneurship models. In this respect, mushrooms are important not only for rural development, but also for urban agriculture, local food systems and short supply chains. In addition, when product value per unit area, product diversity and processed-product potential are considered, mushroom cultivation stands out as a strong field for agricultural entrepreneurship.

Beyond Food: New Uses of Fungal Technologies

The potential offered by fungi is not limited to table mushroom production. In recent years, mycelium-based biomaterials, fungi-based proteins, fermentation products, mycoproteins, biopesticides, biostimulants and bioremediation applications have attracted increasing interest worldwide. This development shows that fungi are extending beyond the food and agriculture sectors and intersecting with diverse fields such as materials science, environmental technologies, textiles, packaging, construction and biotechnology.

Mycelium-based materials are among the most visible examples of this transformation. Mycelium, the root-like structure of fungi, can be used to produce lightweight, biodegradable and moldable materials when grown on suitable substrates. These materials are being evaluated in different areas such as packaging, insulation, furniture, decorative products and leather-alternative materials. In the search for bio-based solutions that can replace fossil-based plastics and certain materials with high environmental impacts, mycelium technologies stand out as a noteworthy option. Another important area is alternative protein and fermentation technologies. Mycoproteins and fungal biomass-based products are considered among protein alternatives with the potential for lower environmental impact compared with animal-based protein sources. The value here is not limited to protein content alone. Properties such as fiber, bioactive compounds, texture-forming capacity and processability also make fungi-based systems important for food technologies.

Bioremediation is another critical area in which fungi can contribute to addressing environmental problems. Some fungal species are being investigated for applications such as the degradation of organic pollutants, heavy metal adsorption, improvement of wastewater sludge and support for biological treatment processes in contaminated sites. Especially in the management of municipal waste, agricultural residues and food industry by-products, the biological transformative role of fungi strongly aligns with the circular economy approach.

Industrial-Scale Use of Fungal Technologies

Today, mycelium-based biomaterials are moving beyond laboratories and being actively used in industrial settings thanks to the bio-entrepreneurship ecosystem. Bio-ventures that create innovative businesses by using biological systems offer concrete solutions, particularly in construction, textiles and packaging, as alternatives to fossil-based production models.

In the construction sector, Italy-based Mogu produces mycelium wall panels with high acoustic performance by using agricultural residues such as rice straw and coffee grounds, while UK-based Biohm develops mycelium insulation composites with exceptional thermal properties. In fashion and wearable technologies, Bolt Threads commercialized its vegan mycelium leather called “Mylo” with global brands such as Adidas and

Lululemon. MycoWorks, through its “Reishi” brand, provides a customizable alternative to traditional animal leather, while Netherlands-based NEFFA is transforming the supply chain by producing seamless and compostable textiles using recyclable 3D molds. In packaging, US-based Ecovative has made its 100% bio-based and compostable products, which replace plastic foams, available to major technology companies in the field, including IKEA and Dell.

The industrial commercialization of fungal technologies and the ability of companies to establish a strong market position depend on robust intellectual property rights. The registered and patented technologies that define the strength of global bio-ventures in the field are summarized in the table below:

Table 1. Patent and Intellectual Property Assets of Global Bio-Ventures in Fungal Technologies

Company Name	Origin and Establishment	Registered/ Patented	Scope of Intellectual Property in the Field
Biohm	United Kingdom (2016)	Mycelium-Based Composites	Its high-performance biomaterial production process using agricultural and synthetic by-products has been patented in approximately 60 countries worldwide.
MycoWorks	USA	Fine Mycelium™ & Reishi™	Its proprietary bioengineering technology directs mycelium cells during growth to form three-dimensional and durable structures.
Bolt Threads	USA (2009)	Mylo™	A registered network process that rapidly produces vegan leather by growing mycelium networks on renewable organic matter.
Ecovative	USA (2007)	Mushroom® Packaging	A patented technology for packaging forms produced from mycelium and agricultural residues that replace fossil-based expanded polystyrene (EPS) foams.
NEFFA	Netherlands (2014)	MycoTEX	An automated production invention that bypasses traditional sewing processes by pressing fungal biomass into 3D molds.

Despite these commercial successes in the field, there are technical bottlenecks that limit the industrial-scale diffusion of mycelium-based materials. The high tendency of these materials to absorb moisture makes their use as insulation materials difficult, especially in areas exposed to water leakage. In addition, conventional industrial processes such as CNC cutting and milling can damage the outer surface of the material, weakening its water resistance and overall structural strength. During production, the fact that mycelium is a living organism requires very precise control of temperature, humidity, airflow and CO₂ levels, which complicates operational scaling.

In the future, these technical limitations are expected to be addressed through the integration of Artificial Intelligence (AI) and gene-editing tools such as CRISPR. Through the optimization of fungal genetics and the application of heat treatments, it is aimed to increase the compressive strength and water-repellent (hydrophobic) properties of mycelium biocomposites. Alongside these industrial innovations, the transformative power of fungi in natural ecosystems is carrying out its greatest revolution underground, within agricultural production systems.

Opportunity Area for Türkiye

Türkiye has strategic potential in fungal technologies thanks to its agricultural production diversity, rich biomass resources, different climatic regions and developing food industry. According to official data, mushroom production in Türkiye has gained steady growth momentum in recent years, with production volume rising from 39,495 tons in 2015 to 55,455 tons in 2020 and reaching 75,340 tons as of 2024. This expanding production capacity includes not only edible species

such as white button mushrooms, chestnut mushrooms, oyster mushrooms, truffles and morels, but also value-added mushroom species such as “reishi,” which are used in biotechnological and medicinal fields. At the regional level, Antalya leads with 22 thousand tons of production, followed by Ankara with 14 thousand tons and Isparta with 10 thousand tons; provinces such as Afyonkarahisar, Konya, Istanbul and Adana are also strongly integrated into the production ecosystem.



Figure 1. Mushroom Production and Foreign Trade Data in Türkiye by Year (2015-2024) - Production Volume (Tons)

Agricultural by-products generated in large quantities across different regions of the country constitute an important raw material base that can be used for mushroom cultivation and fungal bioprocesses. This creates new opportunities, particularly for the circular economy, rural development and local production models. This biological transformation is also supported by institutional financing instruments provided by the state. Under modern fixed investments for agricultural production, mushroom enterprises can receive 50% grant support in all 81 provinces, while this support can reach up to 65% through programs of the Agriculture and Rural Development Support Institution (ARDSI/TKDK). In addition, low-interest loans provided by Ziraat Bank significantly reduce investment costs for bio-entrepreneurs and producers.

Because mushroom production can be carried out

under controlled conditions and allows for product diversification, it offers a highly suitable field for women entrepreneurs and small and medium-sized agricultural enterprises (SMEs). Indeed, the “Regulation on the Registration System for Indoor Plant Production” introduced by the Ministry of Agriculture and Forestry has enabled mushroom production areas to be officially registered, accelerating the sector’s transition toward a more traceable, technology-oriented and institutional structure. However, this consistent increase in production has not yet been reflected at the desired level in foreign trade and value-added creation processes. Export data in the sector follow a fluctuating trend: mushroom exports, which ranged between USD 4.7 million and USD 5.4 million during the 2021-2023 period, declined to USD 3.5 million in 2024. This situation is a concrete indication that the sector should shift toward technology-intensive, high-value-added products rather than relying mainly on

raw material or fresh product sales. Dried mushrooms, mushroom powder, functional food ingredients, extracts, biomaterials and the reuse of spent mushroom substrate constitute critical and profitable links in this value chain that need to be developed.

For this strategic field to develop in Türkiye, it is essential to adopt a holistic and multidisciplinary approach extending from agricultural production to markets, from R&D to regulation, and from technology development to consumer awareness. Positioning mushrooms beyond their consumption as food, under the headings of climate technologies, bioeconomy, waste management and biotechnology, will broaden Türkiye’s potential in the sector and enable it to become a competitive actor in the global market.

The Future Ecosystem of Fungi-Based Technologies

As agricultural and food systems around the world transform toward lower-carbon, more resource-efficient and more resilient models, fungi are emerging as a versatile technology platform in this transformation. Fungi-based systems attract attention with their potential to transform waste into resources, produce bio-based materials, develop alternative protein sources, support the biological structure of soil and contribute to the reduction of environmental pollution. Therefore, the role of fungi in the future ecosystem of agriculture and climate technologies should be considered from a broader perspective. Mushrooms are not merely products placed on the plate; they are the visible outputs of a biological infrastructure that can help redesign production systems. Supporting this infrastructure with the right R&D investments, entrepreneurship models, public-private sector collaborations and scalable technologies can create a new bioeconomy field for Türkiye.

In the coming period, the real question will be in which technology areas, value chains and business models the potential of fungi can be put into practice. In a world that is fighting the climate crisis, using its resources more efficiently and seeking more sustainable production models, solutions that are not immediately visible may assume a far more strategic role than they appear to have.



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CLIMATE CRISIS, ARTIFICIAL INTELLIGENCE, AND FOOD SECURITY: WHERE DO WE STAND IN AGRICULTURE'S NEW EQUATION?



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Başkent University, Vice Director
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INTERVIEW: Esra YAZDIÇ DEMİR
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You can access the full
interview on TTGV's
YouTube channel.

Climate change, water scarcity, disruptions in global supply chains, increasing population pressure, and shrinking agricultural lands are transforming agriculture and food from being merely economic activities into a strategic security priority. Today, the future of nations is shaped not only by their access to energy, industry, or technology, but also by their capacity for secure and sustainable food production.

At the center of this transformation lie digitalization, artificial intelligence, precision agriculture applications, and next-generation agritech solutions. In our interview with Assoc. Prof. Dr. Cem Erdoğan, Deputy Director of the Institute for Food, Agriculture, and Livestock Development at Başkent University, we discussed Türkiye's current position in agricultural technologies, the risks posed by climate change, the new doors opened by next-generation agritech in production, and the future of sustainable agriculture. According to Erdoğan, the most critical question in the coming period will not just be how much we will produce, but with which resources, what technology, and within how resilient a system we can achieve it.

Agriculture and food security have now transformed into a national security issue. There is a need for a national action plan in this area, but where should we begin first? What is the most risky area in Turkish agriculture?

Recent geopolitical developments have removed agriculture and food from being subjects evaluated merely under production amounts or economic activity. Geopolitical fractures experienced on a global scale, climate change, energy crises, water stress, logistical disruptions, the shrinking of agricultural lands, and the younger generation distancing themselves from agriculture have elevated agriculture and food directly to the dimension of national security. For this reason, agricultural policies must now be handled beyond the classical production perspective, within a broader and holistic framework. In the future, not only the military capacity of countries but also their agricultural and food capacity is expected to be a determining factor in international balances. On the other side, risks tied to climate change are becoming more visible on our country's agriculture day by day. Irregular precipitation regimes, long periods of drought, sudden temperature fluctuations, frost events, the decrease in water resources, and increasing biotic stress factors reduce predictability in agricultural production. Especially water stress stands out as one of the most critical structural threats of the upcoming period for Türkiye. Potential efficiency losses in agricultural irrigation have the potential to affect not only the production amount but also food prices, rural development, and social stability. Climate change simultaneously alters the spread dynamics of harmful organisms, plant diseases, and invasive species. Pests not seen in specific regions in the past can now appear in new production areas due to differing climate conditions. This situation can increase pesticide use pressure, yield losses, and production costs. The process forms a multidimensional risk area not only for agricultural production but also for environmental health, biodiversity, and public health. To reduce these vulnerabilities, swift and effective integration of next-generation agricultural technologies into production systems carries immense importance. The critical point here, just as in the defense industry, is strengthening local and national capacity in next-generation agricultural technologies.

The obstacle before the producer: Financial constraints

To what extent are precision agriculture technologies applied in Türkiye? What is the biggest obstacle?

Sensors, satellite data, artificial intelligence-backed decision systems, and drone applications are increasingly coming to the agenda in Türkiye and are applied in some enterprises. However, these technologies have not yet spread to the entire producer base. According to research conducted with my master's student Ms. Sevim Karasungur, 62% of producers apply next-generation irrigation systems in their own enterprises. This is a highly significant indicator because water management is a critical area from both an economic and environmental perspective. Yet, when we look at advanced technologies, usage rates are seen to be still low. Precision agriculture applications are applied at 26%, digital agriculture at 7%, and data analysis at 5.3%. This picture shows us that producers adopt technology gradually. Producers first turn to more tangible and accessible technologies whose direct benefits they see, and then transition to more complex systems.

The biggest obstacle before the producers is financial constraints. While 59.2% of participants state that they need grant or loan support, 53% emphasize high interest rates. A segment of approximately 33% expresses technical consultancy and lack of knowledge as an important problem. Especially high-cost technologies can remain far from being accessible for small producers. At this point, gradual financing models gain importance:

- First stage: Grant support for basic technologies,
- Second stage: Hybrid models,
- Third stage: Low-interest loan mechanisms.

Cooperative-based shared technology use also stands out as a critical model. For example, a drone or a data analysis system might be costly for a single producer; however, it can be used jointly within cooperative structures. Likewise, expanding next-generation agricultural technologies through a leasing model carries significant potential.

In our research, the age factor is also seen to be a determining factor. While producers aged 31–45 stand out as the most innovative group, 84.2% of this group state that they are open to new technologies.

This rate drops to 43.8% in the group aged 60 and over. This situation reveals that different communication strategies must be developed for different age groups.

When viewed in terms of gender, 83.6% of participants are seen to be male. While this picture shows that the sector still possesses a male-dominated structure, it also reminds us that female producers must be supported.

The importance of the correct diagnosis and dose

Is the same yield possible with fewer chemicals through artificial intelligence and data analytics?

Yes, this is possible when the correct system is established. However, the important thing here is not an unrealistic approach like “using no chemicals at all.” The goal is responding to the correctly diagnosed pest with the correct pesticide, at the correct time, in the correct dose, and with correctly calibrated equipment. Artificial intelligence can be used in many areas of agriculture, ranging from irrigation and spraying systems to soil and plant analysis, from weather forecasts to pest detection. Simultaneously, it provides indirect contributions to protecting biodiversity, ensuring food security, and combating climate change. The use of artificial intelligence in agriculture first started in 1985 with a simulation model developed in cotton production. Since that day, artificial intelligence-based systems have developed and expanded, and they have been appearing before us with different applications in Türkiye for the last 25–30 years. Today, artificial intelligence-backed systems are used effectively in data collection and analysis, product forecasting and production planning, early detection of

pests, and the management of automated agricultural machinery. Operating integrated with the Internet of Things (IoT), sensor networks, and cloud computing technologies, these systems make it easier to make more conscious decisions according to environmental conditions. For instance, by making it possible to apply the correct dose of agricultural pesticide solely toward the target pest, it both increases efficiency and contributes to the protection of human health, environmental health, and biodiversity. Agriculture is a multifaceted system stretching from natural resource management to technological applications, from food security to economic development, and does not consist solely of plant or animal production. Therefore, cultivating the expert human resource that understands and can correctly guide these systems is of immense importance, just as much as the effective use of artificial intelligence technologies.

The market size of artificial intelligence-backed agricultural applications on a global scale is estimated to be 1.7 billion dollars in 2023 and is expected to reach 4.7 billion dollars by 2028, increasing approximately threefold. Artificial intelligence-backed systems possess the potential to reduce fertilizer use by 25% and deliver savings of approximately 10% in total production expenses. For example, by analyzing leaf sap, the plant nutrient or nutrients lacking in the leaf can be given solely to the plant, preventing unnecessary chemical input use. Again, since only infested areas can be determined early, the problem can be solved with just a small application without spraying the entirety of the field. While these lower the input cost, they simultaneously provide significant contributions to the protection of our surrounding biodiversity and natural resources. In addition, with the support of digitalization, the younger generation distancing themselves from agriculture is expected to show interest in the sector once again. However, we cannot ignore the fact that this issue has socioeconomic dimensions as well.



At what stage is Türkiye regarding sustainable alternatives?

In Türkiye, there is a serious expertise and knowledge accumulation regarding biological control, biotechnical control, integrated pest management, good agricultural practices, and smart agriculture. However, the prevalence of these practices in the field can vary according to product pattern, regional conditions, and producer profile. Türkiye is not at the “starting point” of this transformation; yet, it is not at a “fully expanded” stage either. The most critical issue here is that sustainable alternatives do not remain solely at the project or pilot application level, but become a natural part of the producer’s daily decision support mechanisms. This, in turn, requires more training, more technical extension work, and a stronger interaction in the field.



“The critical issue is for sustainable alternatives to not remain merely at the project or pilot application level; they must become a natural part of the producer’s daily decision support mechanisms.”





Farmer behavior...

Does digital agriculture change farmer behavior?

Yes, digital agriculture changes producer behaviors. However, this transformation does not occur at the same speed in every producer group. Large-scale enterprises, those working for export, or those engaged in contract manufacturing can adapt to digital tools more rapidly. In small and medium-scale producers, on the other hand, trust, cost, technical support, and habits stand out as determining factors. The education level also creates a significant differentiation here. Producers with a university education or higher are at a more advanced point in technology use. This group simultaneously accesses digital information sources such as the internet and social media more frequently.

Consequently, digital literacy becomes one of the decisive elements in the adoption of technology. When the producer sees that the technology used delivers an advantage in yield, quality, cost, or market access, the behavioral change becomes more permanent.

Is vertical farming, hydroponics, and controlled environment agriculture a solution or a niche area?

Vertical farming, hydroponic systems, and controlled environment agriculture carry a significant potential for Türkiye, especially under conditions where water resources are limited, production areas are shrinking, or high-value-added products are targeted. It would not be correct to evaluate these systems as a single and general solution that will transform the entirety of agriculture. Rather, they need to be handled as a

strategic complementary area for specific products, specific markets, and specific climate-risk conditions. Therefore, controlled environment agriculture can be an important tool within the agricultural systems of the future; however, it should not be viewed as the sole model that will replace all production systems.

Technologies reducing the carbon footprint and economic benefit to the farmer

Technologies reducing the carbon footprint in agriculture must be considered together with energy efficiency, water management, precision fertilization, the utilization of waste, and digital monitoring systems. The important thing here is not only imposing environmental responsibility on the producer but also being able to develop models that have an economic return. If the technology used reduces the farmer's diesel, water, fertilizer, pesticide, or labor costs, it will simultaneously deliver economic benefit while lowering the carbon footprint. For the permanent transformation to become sustainable, environmental benefit and economic gain need to progress together.



“For permanent transformation to become sustainable, environmental benefit and economic gain must progress hand in hand.”

Is the start-up ecosystem focusing on the correct problems? Where is the greatest opportunity?

There is a serious dynamism in terms of agricultural technology start-ups in Türkiye. However, from time to time, a distance can form between the actual needs in the field and the technological solutions developed. The start-ups that will be successful in agriculture will not only be those that develop good software, but those that can correctly read the real needs of the farmer, the agricultural engineer, the food industry, and the public authority. Today, among the greatest opportunity areas lie climate risk management, water efficiency, the optimization of pesticide use, traceability, and bringing waste into the circular economy.

It is no longer possible to evaluate agricultural, food, and climate technologies as separate headlines. All of these must be handled as interconnected parts of the same system.

FOOD PROCESSES AND THE CURRENT STATE OF THE SECTOR IN CANADA



MEHMET ÇAĞLAR TÜLBEK

President of Saskatchewan Food Industry Development Centre Inc.

Canada is recognized as one of the countries with the most reliable and advanced food systems in the world. The country possesses an integrated supply chain extending from food production to processing, distribution, and export. In this way, Canada both meets the food needs of its own population and delivers a significant amount of agricultural products and processed food to world markets. Food processes in Canada generally consist of production, processing, quality control and assurance, packaging, distribution, and export stages.

The foundation of the food safety system in Canada is established by the Canadian Food Inspection Agency, Health Canada, and the Safe Food for Canadians Regulations. Food businesses are required to establish traceability systems that enable them to track their products from production to the end consumer, prepare preventive control plans aimed at identifying and controlling risks in advance, and implement food safety systems based on the Hazard Analysis and Critical Control Points (HACCP) approach. Thanks to these practices, Canada holds a strong and reputable position internationally in terms of safe and quality food production.

Canada's agriculture, food, and beverage processing sector stands out as one of the largest manufacturing and production fields in the national economy. As of 2025, while the total sales volume of the sector exceeded 180 billion dollars, the export of agricultural and food products reached approximately 100 billion dollars.

The sector directly and indirectly provides employment opportunities for approximately 2 million 300 thousand people. Processed food products manufactured in Canada are shipped to more than 200 countries across the globe, occupying a significant place in international markets.

Sectoral Opportunities and Challenges

As of 2026, Canada's agriculture and food sector faces both significant opportunities and certain challenges. The increasing global demand for protein consumption is paving the way for new investments in areas such as plant-based protein products, functional foods that offer additional health benefits, biotechnology applications, and more environmentally conscious, sustainable production methods. Particularly, provinces in the Prairie region—such as Saskatchewan, Alberta, and Manitoba—are showing remarkable growth in the production of pulses, oats, wheat, and canola, as well as in higher value-added processed food products.

At the same time, the sector is grappling with various issues, including labor shortages, high costs required for investment and production, uncertainties in global trade, disruptions encountered in logistical processes, and rising food prices. In recent years, the Canadian government has implemented new investment and support programs aimed at further strengthening food security, increasing domestic food processing capacity, and making supply chains more resilient. The multi-billion-dollar funds announced in 2026 aim to incentivize the growth of projects carried out in agriculture and food processing and to support the development of the sector.

In the coming years, the most critical factors driving the growth of Canada's food sector are expected to be the development of higher value-added products, the widespread adoption of sustainable production technologies, increasing investments in alternative protein sources, the growth of bioeconomy and bioprocessing fields, and the diversification of export markets. In the long term, the contribution of these areas to the Canadian economy is projected to be between approximately 80 and 100 billion dollars. While Canada continues to advance its strong global position

in safe, high-quality, and sustainable food production, it also maintains its efforts to increase trade volume and create new cooperation opportunities with Asian countries, the European Union, and many countries in the Middle East.

What About Türkiye?

When viewed from the perspective of Türkiye, the transformation achieved by Canada in the agriculture and food sector offers significant opportunities. By directing its strong agricultural production infrastructure toward the development of higher value-added products, Türkiye can increase its investments, particularly in the fields of plant-based proteins, functional foods offering additional health benefits, sustainable food technologies, bioprocessing applications, and food ingredients. In addition, strengthening collaborations between universities and industrial enterprises, improving research and innovation capacity, increasing alignment with international quality and food safety standards, and supporting export-oriented production models are of paramount importance.

Food innovation centers, entrepreneurship and incubation programs, and models for the commercialization of technologies that are successfully implemented in Canada can also serve as guiding examples for Türkiye. Especially thanks to its close proximity to the European Union, Middle East, and Asian markets, Türkiye has the potential to become a regional hub in the production and export of high value-added food products.

In the coming period, the more widespread use of digital technologies in the food sector, the development of sustainable production practices, increasing investments in alternative protein sources, and taking strategic steps in the field of biotechnology will strengthen Türkiye's position in the global food value chain and significantly enhance its international competitiveness.



DR. E. SERDAR GÖKPINAR

TTGV, Innovative Technology Programmes
Director

In recent years, as artificial intelligence has taken center stage in every sense, companies around the world have begun showcasing, one by one, their efforts to make sound use of this new paradigm. Observing this new structure—which Türkiye is striving to catch up with and adapt to—in Japan, a country that has been competently leveraging it in virtually every field, from healthcare and education to defense, agriculture and the economy, proved to be an experience of an altogether different kind. With the aim of witnessing the latest developments in this area firsthand, we travelled to Tokyo for SusHi Tech 2026 together with TTGV Board Members Ş. Yaman Tunaoglu and Onur Özcan. We had the opportunity to observe Japan's current innovation policies, Tokyo's strategic orientation along the axis of startups and urban technologies, and the potential areas of technology cooperation that could be developed between Türkiye and Japan.

TOKYO AS AN INNOVATION LABORATORY

Reflections from SusHi Tech 2026

Japan's Technology and Innovation Strategy

In order to properly contextualise the approach observed at SusHi Tech 2026, it is useful first to touch briefly on Japan's technology and innovation strategy. Japan's technological innovation system can be summarised as a coordinated model in which the state provides strategic direction and where large industrial groups, universities, public research institutions and regional ecosystems work together. The distinctive elements of this system can be set out as follows.

Society 5.0: Japan's core vision is to develop solutions—through artificial intelligence, robotics, IoT, data and cyber-physical systems—to challenges such as the ageing population, healthcare, disasters, transportation and productivity. In this approach, innovation is positioned not merely as a driver of economic growth but as an instrument of societal transformation.

Integrated Innovation Strategy: Updated each year in line with the Science, Technology and Innovation Basic Plan, the Integrated Innovation Strategy defines priority policy and investment areas, and stands out as one of the principal frameworks ensuring coordination between public policy and technology-development domains.

Artificial Intelligence, Semiconductor and Robotics Push: High-performance/low-power AI chips, multimodal foundation models, physical AI and general-purpose AI robots are positioned among the critical areas in Japan's current strategies. The products and solutions on display at SusHi Tech 2026 likewise reflected an alignment with these priorities.

Green Transformation (GX): Japan treats innovation in conjunction with its decarbonisation and energy-security objectives. The GX2040 Vision brings together industrial competitiveness and emission-reduction targets across areas including clean energy, advanced manufacturing, batteries, hydrogen, nuclear and fusion.

Expanding the Startup Ecosystem: Traditionally centred on large corporations, the Japanese innovation system has in recent years been working to strengthen its entrepreneurial side, with the Five-Year Startup Development Plan launched in 2022 setting a target of 100,000 startups and 100 unicorns.

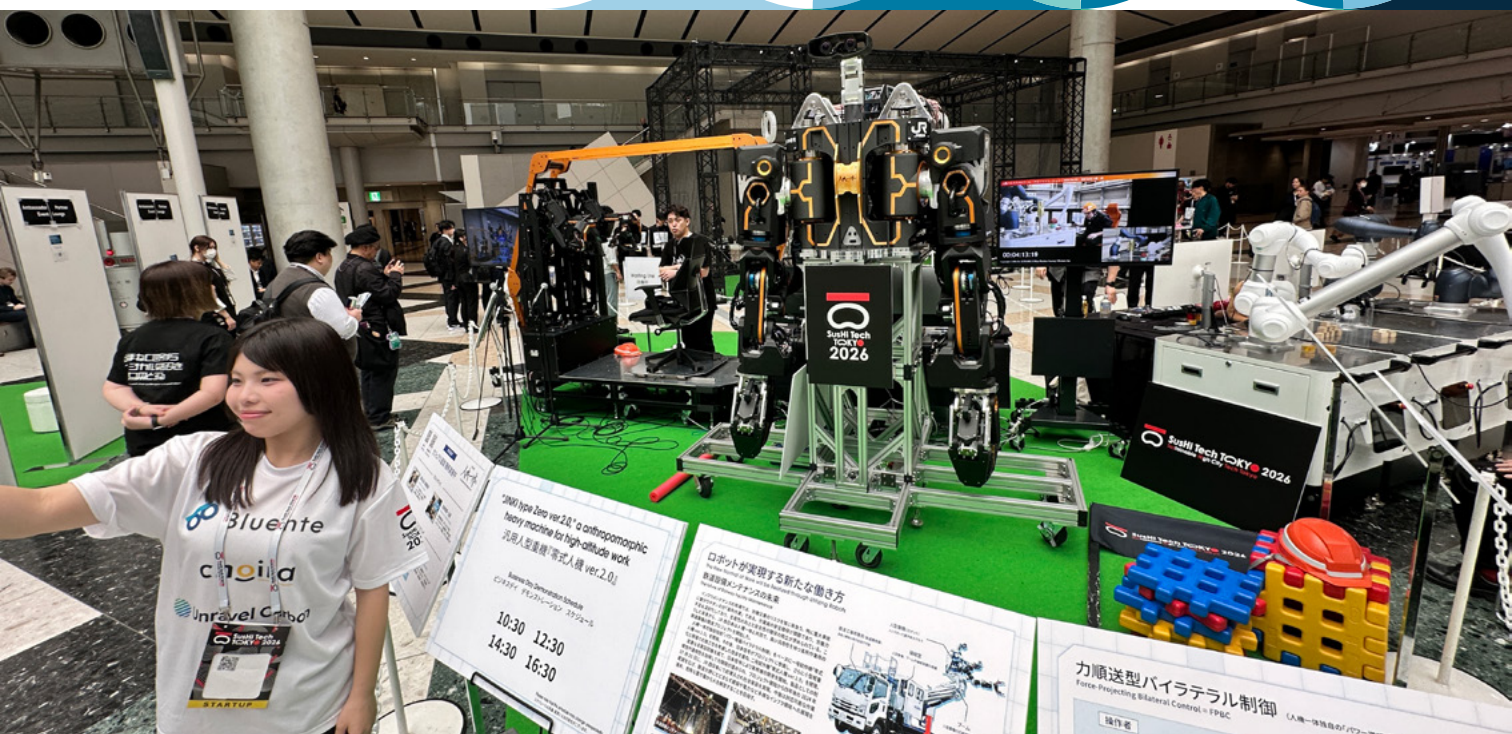
Resilience and Economic Security: A disaster-resilient society, supply-chain security, autonomy in critical technologies, the defence–technology nexus and standard-setting capacity have become increasingly central to Japan's innovation strategy.

In sum, Japan's model can be characterised less as a free-market-driven entrepreneurial ecosystem and more as a mission-oriented innovation system, integrated with industrial policy, focused on solving societal problems and pursuing competence in strategic technologies. Its greatest strengths lie in long-term coordination and deep engineering capacity; its principal areas for development are venture capital, rapid scaling, entrepreneurial culture and the attraction of international talent.



SusHi Tech: A Global Meeting Platform for Sustainable Urban Technologies

SusHi Tech Tokyo is a global innovation event organised under the leadership of the Tokyo Metropolitan Government, built around the expression “**Sustainable High City Tech Tokyo**”. The event is positioned, on the one hand, as a strategic technology platform focused on sustainable urban technologies, and on the other, it creates a memorable brand identity by drawing on “sushi”—one of the most internationally recognised symbols of Japanese culture.



SusHi Tech 2026: Scale, Themes and the 10×10×10 Strategy

SusHi Tech 2026 opened with a keynote by Tokyo Governor Yuriko Koike, with the event's main themes shaped around artificial intelligence, robotics, resilience and entertainment technologies. One of the most important strategic frameworks highlighted at the event was Tokyo's **10×10×10 target**: an ambitious ecosystem-expansion strategy aimed at increasing the number of startups, the number of global unicorns and the number of public-private joint projects by a factor of ten. It is also notable, as a measure of the financial weight behind this strategic orientation, that the cumulative startup-funding target of USD 1 billion over four years—announced in 2023—has by 2026 been exceeded, reaching approximately USD 1.3 billion.

The scale of the event likewise supports Tokyo's claim in the field of innovation. SusHi Tech 2026 reportedly drew around 60,000 attendees, some 770 exhibiting organisations and international participation from 55 different cities. These figures indicate that the event is steadily evolving into an increasingly visible meeting platform within the Asia-Pacific technology ecosystem.

Prominent Technology and Sector Areas at the Event

We observed that SusHi Tech 2026 brought together a very broad range of technology and sector areas. Humanoid robots, physical AI and robotic systems were particularly prominent, while a large number of startups and solutions were also on display in fields such as AI infrastructure, semiconductors, edge computing, carbon management, sustainable materials, water and waste management, resilience solutions, smart agriculture, food and fermentation technologies, healthcare, wellness and biotechnology.

Smart city, digital twin, mobility, entertainment and consumer technologies were likewise among the event's significant components. On the energy side, fusion, hydrogen and energy storage were visibly represented; meanwhile, investment institutions, public agencies, ecosystem-support structures and academic/research partnerships reinforced the event's role not only as a technology showcase but also as a forum for developing cooperation and building ecosystems.

As a side note, the winner of the SusHi Tech Challenge 2026 competition held during the event was the company **Qarbotech**. Qarbotech was selected as the winner because



it offers a globally transferable and scale-proven solution at the intersection of climate and agriculture, having demonstrated—through third-party-verified field data across 12 countries—yield increases of +30% (and as much as +85% in Pakistani cotton) using its chemical solution that accelerates photosynthesis in plants.

Overall Observations on SusHi Tech 2026

We observed that SusHi Tech 2026 presented a holistic ecosystem supporting technology development, market validation, public-private cooperation and internationalisation by bringing commercialised technologies and early-stage prototypes onto the same platform. While sustainability, robotics/physical AI and urban resilience came to the fore at the event, AI was clearly positioned as a foundational technology enabling cross-sector transformation. In addition, carbon management, the circular economy and advanced materials technologies showed that Japan places sustainability at the very heart of its next-generation industrial and urban solutions. Tokyo positions the city itself as an innovation laboratory in which technologies are tested and scaled, while the event also made clear that opportunities in AI are not confined to large corporations; significant potential exists for small-scale companies operating in niche areas as well.



Areas of Potential for Türkiye–Japan Technology Cooperation

Observations from SusHi Tech 2026 indicate strong cooperation potential between Türkiye and Japan in areas such as artificial intelligence, robotics, digitalisation, carbon management, circular economy, advanced materials, healthcare, agriculture, biotechnology, energy, water and built-environment technologies. The technology-development capacity present in both countries suggests that cooperation can be approached through a perspective of mutual learning, joint technology development and joint entry into third markets. We consider joint accelerator programmes, soft-landing mechanisms, thematic matchmaking activities, investor-entrepreneur meetings and joint pilot projects to be among the key cooperation instruments to be evaluated in this regard.

CLIMATE PIONEERS

#ClimatePioneer



ÇAĞATAY ALP ARSLAN

TTGV Climate Pioneer
Vicat Group Turkey R&D Director



THE VALLEY OF DEATH IN SCALING CLIMATE TECHNOLOGIES

When it comes to climate technologies, we now live in a remarkably productive era for generating innovative ideas. Carbon capture systems, alternative energy sources, industrial symbiosis, green hydrogen production methods, industrial waste recovery processes, and much more — thousands of teams across research centers around the world are producing promising results in these fields. But to be honest, the vast majority of these technologies never make it beyond the walls of the laboratory. International literature has even coined a specific term for this phenomenon: the Valley of Death — the scaling valley. This metaphor was not chosen lightly. The distance between a technology working under controlled lab conditions and being reliably implemented in an industrial facility producing thousands of tons per day is far deeper than it appears from the outside. Shutting down cement kilns, steel production lines, or chemical processes carries serious costs and operational consequences. Moreover, integrating new equipment or switching to an unfamiliar raw material is not merely a technical matter — it is also a significant economic risk. This is why industrial organizations approach technologies that have not yet been field-tested with caution. It may look like a questionable stance, but it is actually a very understandable reflex.

The core of the problem lies here: universities and research centers do good work. They produce publications, file patents, and gain visibility on the international stage. However, a technology being scientifically successful is no guarantee that it will work at industrial scale. Many technologies developed without pilot-scale trials

or testing under real field conditions never manage to cross the commercialization threshold. When we look at the trajectory of the climate crisis, it is clear that we can no longer afford this luxury. Producing «publishable technology» may count as success in the scientific world — but what we actually need is «applicable technology»: solutions that work in real conditions, in real facilities, at real scale. Today, serious steps are gradually being taken to close this gap. In our country, industrial support programs and Green Transformation Programs for R&D, and at the European level, mechanisms such as Horizon Europe, the Innovation Fund, and the Net-Zero Industry Act, are all focused precisely on this intermediate zone. These support frameworks, structured around Technology Readiness Levels (TRL), aim to reward researchers not merely for generating knowledge, but for progressing from the laboratory to the pilot site, and from the pilot site to the industrial demonstration stage.



“A technology being scientifically successful is no guarantee that it will work at industrial scale.”

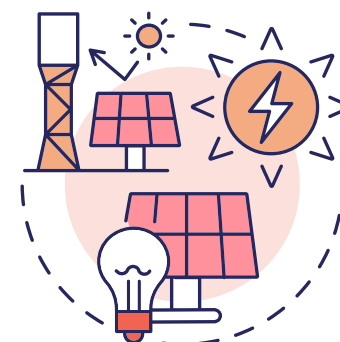
The fate of technology...

The now-accepted reality is this: the fate of climate technologies will not be determined by successful work on paper, but by demonstration sites that are actually up and running. The most critical approach at this juncture is building a solid relationship among three actors — universities, industry, and the public sector. Today, a coordination gap in acting together all too often exists among this trio. While universities focus on generating knowledge, industry questions how well that knowledge aligns with its own reality. The role of the public sector becomes all the more decisive at exactly this point: creating mechanisms that make risk shareable between the two sides. Particularly for technologies with high initial installation costs — and the great majority of climate technologies fall into this category — it is not realistic to expect the private sector to enter these areas without publicly supported pilot facilities.

Beyond this, strengthening only the supply side — that is, R&D funding — is not enough. Tools to transform demand are also needed. Green public procurement

practices are gaining increasing traction for exactly this reason. For instance, the national Communiqué on the Promotion of Green Cement Use made a significant impact across the cement industry. Preferring low-carbon materials in public tenders creates a strong and predictable demand signal for industry. Carbon footprint-based incentive systems, meanwhile, reward environmental performance rather than production volume, opening the way for sectoral transformation. These may sound like abstract policy recommendations, but when well-designed, they can become instruments that concretely influence the decisions and strategies of investors and plant managers alike.

Perhaps the real question is this: does it matter more how original a technology is, or how quickly and reliably it can be deployed in the field? The race against the climate crisis shows us that alongside long-term perfect solutions, we also need good-enough solutions that can scale rapidly. In the period ahead, real success will come from ecosystems capable of taking the most brilliant technologies and delivering them to the real world in a reliable, economical, and scalable way.



“The fate of climate technologies will not be determined by successful work on paper, but by demonstration sites that are actually up and running. The most critical approach at this juncture is building a solid relationship among three actors — universities, industry, and the public sector.”

CLIMATE PIONEERS

#ClimatePioneer



TUĞBA UÇAR DEMİR

TTGV Climate Pioneer
Eczacıbaşı Holding Senior Innovation
Manager



WHILE BUILDING CONNECTIONS: THE TRUE BEGINNING OF COLLABORATION

Over the past year, through the Built Environment work I conducted under TTGV Climate Lab, I had the opportunity to come together with institutions, experts, and decision-makers from different sectors. Throughout this process, there was one phrase I heard frequently: “We need to collaborate more.”

No one actually argues otherwise.

Given the complex nature of climate transformation, there is now broad consensus that no single institution, sector, or technology will be sufficient. Topics ranging from resource efficiency to the circular economy, from alternative materials to industrial symbiosis, naturally require multiple stakeholders to act together. Yet something else gave me pause throughout the process.

Despite everyone agreeing on collaboration, collaboration itself often doesn't emerge as easily as we expect. Someone needs to remind, facilitate, or follow up on the process. After a while, I started reading the reason for this from a different angle. Perhaps the issue isn't an unwillingness to collaborate — it's assuming that we're all looking at the same problem.

In workshops, I sometimes observed that institutions sitting at the same table were actually chasing different questions. For one institution, the priority might be reducing carbon emissions; for another, coping with rising costs; for yet another, preparing for upcoming regulations or sourcing alternative raw materials. While from the outside we may appear to be speaking under the same heading, when the problems we are trying to solve differ, acting together becomes more difficult.

This becomes especially visible in the built environment. Because the issues we discuss here are not simply about improving a product or a process. We are dealing with a broad system that stretches from raw material extraction to production, from logistics to use, and all the way to end of life. Each actor in the system looks from a different vantage point and naturally carries different priorities.

We describe solutions quickly, but...

This observation also reminds me of a situation I frequently encounter in innovation work. Sometimes we describe solutions so quickly that we don't spend enough time on the problem. For example, when we say “I need a table,” we have already described a solution. Yet if we step back and think a little further, what we might actually need is simply a surface to set our glass on. When we start by describing a solution, we narrow our options. When we try to understand the problem, new possibilities emerge.

We encounter a similar situation in climate transformation. Sometimes we think we're discussing the same solution — but in reality, everyone is trying to solve a different problem.

“This is why being able to align on the problem before moving into the search for solutions becomes one of the most critical preconditions for collaboration.”

Perhaps this is why collaboration is often not the starting point, as we tend to think, but a result — a result of being able to define a shared problem, of understanding each other's needs, and of building the trust that value can be created together.

One of the most valuable gains for me throughout the TTGV Climate Lab process was precisely this. Beyond the ideas that emerged from the workshops, it was striking to see people from different sectors begin to hear each other's agendas. Sometimes we saw different sides of an issue at the same table for the first time. And sometimes we observed once again how important it is to discuss the problem definition before jumping to solutions.

Perhaps this is why I've begun to think that a significant portion of the barriers to climate transformation are not technical, but relational. Because we have methods for developing technology. We can create financing models, run pilots, design new solutions. But for institutions from different worlds to hear, understand, and begin moving together — that so often takes much longer.

Some collaborations have not yet turned into projects. Some ideas may never come to life. But people from different sectors listening to each other's problems, discovering shared opportunities together, even beginning to propose solutions on each other's behalf, and forging new connections — that feels like a meaningful achievement in itself. Because transformation usually begins not with big decisions, but with small contacts. With a relationship formed before an idea takes shape, with a conversation, with goodwill and trust that grows like a snowball.

In climate transformation, we need technology, finance, and innovation more than ever. But perhaps before all of that, we need to define the common problems we can work on together more clearly, and to multiply the environments where we can think about those problems together. Because people come together not around solutions, but around problems they find meaningful.

Perhaps the most critical technology of climate transformation is not a new material, new software, or a new energy system — but our capacity to think together, learn together, and create together. That, I believe, is where the real breakthrough point for our sectors lies.



“Because perhaps what we need is not only to develop new solutions, but to multiply the environments in which those solutions can emerge together.”



PROF. DR. GÖKŞEN ÇAPAR

TTGV Community Member
Ankara University, Institute of Water Management

SMART IRRIGATION AND MULTI-STAKEHOLDER COLLABORATION FOR THE CLIMATE ADAPTATION OF AGRICULTURAL PRODUCTION

Climate change has become one of the most significant risks affecting agricultural production on a global scale. Rising temperatures, shifting precipitation regimes, increasingly frequent drought periods, and the mounting pressure on water resources are placing ever-greater strain on the resilience of food production systems. Reports by the United Nations and various international organizations indicate that, in the coming years, the sustainability of agricultural production will depend largely on the effective management of water resources. For this reason, water efficiency and smart irrigation practices lie at the heart of climate change adaptation policies.

Türkiye is located in the Mediterranean Basin, a region that experiences the impacts of climate change intensely. The droughts of recent years, the decline in groundwater levels, and the increasing pressure on water resources raise significant questions regarding the future of the agricultural sector. While approximately three-quarters of the water used in Türkiye is consumed in agricultural irrigation, traditional irrigation methods remain widely employed in many regions. This situation both increases water losses and heightens producers' vulnerability to climate-related risks.

In this context, innovative approaches such as sensor technologies, data-driven decision support systems, remote monitoring solutions, and precision agriculture applications

offer considerable opportunities. Through smart irrigation systems, the volume of water a crop requires can be applied at the right time and in the right amount, thereby conserving water while enhancing productivity. Particularly in water-stressed regions, these technologies stand out as critical instruments for the sustainability of agricultural production.

The Technology Development Foundation of Türkiye (TTGV) has operated since 1991 as one of the pioneering institutions supporting the technology development capacity of the private sector and bringing together the public sector, academia, and the entrepreneurship ecosystem. Having intensified its activities in the field of climate technologies in recent years, TTGV focuses on developing knowledge-sharing and collaboration mechanisms that support climate transformation across different sectors.

Within this scope, the TTGV Climate Lab Community Program brings together, on a shared platform, experts working in sectors with a high impact on climate change — such as energy, industrial production, mobility, the built environment, and agri-food. Based entirely on voluntary participation and comprising more than 500 professional stakeholders, this community constitutes a dynamic ecosystem in which experts from different disciplines can share their experiences, reflect collectively, and develop new forms of collaboration.

One of the activities conducted within the community is the «Water Efficiency in Agriculture through Smart Irrigation and Precision Farming» working group. This group brings together numerous leading figures and institutions in the sector, including representatives from the private sector, public institutions, academia, start-ups, and the consultancy field. Sustained over twelve weeks through regular online meetings, the working group convenes specialists in agricultural technologies, irrigation systems, water management, and data analytics, as well as representatives from academia and the public and private sectors. Its objective is not merely to evaluate existing technologies, but also to jointly develop innovative application areas and potential project ideas that can contribute to Türkiye's water efficiency and climate adaptation targets.

Complex issues such as water efficiency in agriculture and climate adaptation cannot be resolved by a single institution or a single field of expertise. For this reason, working groups and community structures accelerate collaborative learning processes by bringing together diverse perspectives. The convergence of public institutions, private sector representatives, researchers, entrepreneurs, and practitioners on a common platform enables needs to be defined more accurately, innovative solutions to be disseminated more rapidly, and joint projects to be developed. In efforts to mitigate and adapt to climate change, multi-stakeholder collaboration is no longer a matter of preference but a necessity.

The Water Risks Project

One of the key examples addressed within the working group was the Water Risks Project, carried out by the Ankara University Institute of Water Management with the support of the Sustainable Development Association and the main sponsorship of Ülker. Implemented in the Delice district of Kırıkkale, the project constitutes an important case demonstrating the field-level impacts of smart irrigation practices. Conducted in two phases, the study addressed sensor-supported irrigation systems, soil and water quality analyses, meteorological data, water footprint calculations, and economic assessments in an integrated manner.

In the project, water-use efficiency and productivity analyses were performed by comparing different irrigation methods in wheat production. Using data obtained from soil moisture sensors and meteorological stations, irrigation decisions were planned on a data-driven basis. The results demonstrated that significant water savings

could be achieved relative to conventional practices, while productivity could simultaneously be increased. The analyses conducted within the project determined that a reduction of approximately 21% in the total water footprint and an increase of up to 30% in water efficiency were achieved. In addition, the effects of climate-related risks — such as soil salinity, drought, and precipitation irregularity — on production were examined in detail.

One of the most important outcomes of the Water Risks Project was its demonstration that the use of technology alone is not sufficient. As much as sensors, data collection systems, and modern irrigation infrastructure, farmer training, the monitoring of field practices, and the strengthening of decision-making processes are also of critical importance for success. In this respect, the project reveals that technological innovations must be supported by field-level implementation and capacity-building activities.

In the period ahead, the widespread adoption of smart irrigation technologies is of great importance for enhancing the climate change adaptation capacity of Türkiye's agricultural sector. However, this transformation should not be confined to technology investments alone. It is necessary to develop data infrastructures, expand farmers' access to digital tools, strengthen financing mechanisms, and support public-private sector collaboration. At the same time, the development of policy and incentive mechanisms that place the true value of water at their center emerges as a critical need.



“As much as sensors, data collection systems, and modern irrigation infrastructure, farmer training, the monitoring of field practices, and the strengthening of decision-making processes are also of critical importance for success.”

DOÇ. DR. MÜGE İŞLETEN HOŞOĞLU

TTGV Community Member
Gebze Technical University, Institute of Biotechnology

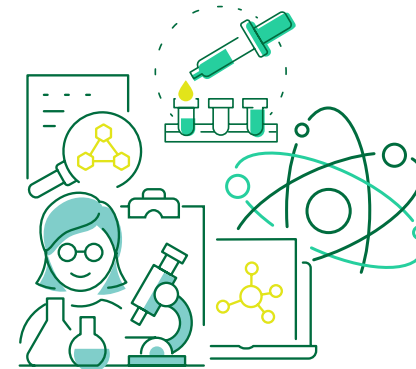
RESOURCE, NOT WASTE: NEW VALUE CHAINS THROUGH BIOTECHNOLOGICAL UPCYCLING

Sustainability is no longer merely an environmental objective; it has become one of the defining determinants of economic competitiveness, resource security, and social well-being. Today, as countries reconsider their energy, food, and raw material security, they have begun to view resources long defined as “waste” in a new light.

Türkiye holds a significant advantage in this transformation. Owing to our robust agricultural production infrastructure, millions of tons of plant-based waste are generated each year through agricultural practices and industrial processes. However, a substantial portion of these resources is still utilized in low-value-added applications or leaves the system without generating any economic value. Biotechnological upcycling, by contrast, offers powerful tools capable of returning these resources to the economy. Today, agricultural waste is regarded not merely as material to be disposed of, but as a strategic feedstock for biomaterials, bioenergy, and bio-based products. Through microorganisms and biological processes, these resources can be converted into high-value-added products, thereby moving beyond waste management to establish a genuinely circular bioeconomy model.

What is truly transformative here, however, is not only the technologies being developed, but the new economic paradigm to which these technologies give rise. In the production systems of the future, one enterprise's by-product will become another enterprise's raw material; biological resources will be valorized across different sectors within multiple value chains. Shaped by the industrial symbiosis approach, this model lays the foundation for the transition from carbon-intensive production systems to circular production systems centered on resource efficiency.

Given Türkiye's wealth of biological resources and its developing biotechnology ecosystem, biotechnological upcycling represents not only an environmental necessity but also a substantial opportunity for development and competitiveness. In the years ahead, the success of nations will be measured not by how many resources they produce, but by how much value they are able to create from the biological resources they possess.



“In the years ahead, the success of nations will be measured not by how many resources they produce, but by how much value they are able to create from the biological resources they possess.”

A shared vision is essential

For this transformation to materialize, it is of great importance that diverse disciplines and sectors converge around a shared vision. Community structures that bring together academia, industry, the entrepreneurship ecosystem, and public institutions serve as vital platforms—accelerating knowledge sharing, enabling the development of joint project ideas, and facilitating the translation of innovative solutions into practice. The “Working Group on Value-Added Production from Agricultural Waste,” conducted under the TTGV Climate Lab Community Program, was likewise established with this understanding. The working group aims to develop ideas for converting agricultural waste and by-products into high-value-added products within the framework of circular economy and industrial symbiosis approaches, to strengthen the exchange of knowledge and experience among stakeholders from different sectors, and to uncover concrete opportunities for collaboration. In addressing complex, multidimensional challenges such as the valorization of agricultural waste, strong partnerships and a culture of collective learning will continue to be among the most important driving forces of sustainable transformation. Perhaps the most valuable raw materials of the future are the very resources we still regard as “waste” today.



İSA ÖZDEMİR
Teknoloji Yatırım A.Ş.
Investment Analyst

IS SAAS DEAD? A VENTURE CAPITAL PERSPECTIVE ON THE AI-DRIVEN TRANSFORMATION OF SOFTWARE

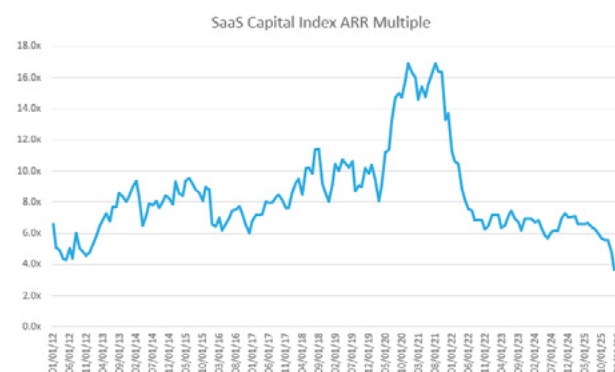
As an analyst at TTGV's Technology Investment Fund, I have the opportunity to meet many new startups. To avoid wasting time on meeting notes, I tried various AI tools that generate meeting summaries. However, when none of them delivered the result I expected in Turkish, I vibecoded my own meeting-notes tool using Claude Code and the Gemini API, and integrated it into the platform I had built for portfolio and pipeline tracking. This solution gave me the flexibility to produce summaries in the format I wanted at a reasonable cost. That said, once Google Meet and Zoom offer their meeting-summary tools for free with Turkish language support, I will likely use them more than my own solution because they are easier to access.

My experience reflects a broader shift taking place across the software industry. Thanks to AI, product development has become easier; individuals and companies have begun building their own software instead of subscribing to SaaS products. In addition, giants such as Google and Anthropic are threatening SaaS companies by directly offering the functions of existing SaaS tools themselves. Moreover, because these players are also LLM and API providers, they are the real winners: as companies and individuals consume tokens, their revenue increases. From a broader perspective, infrastructure layers such as cloud and data centers, chip and semiconductor providers, and energy and cooling are, so to speak, selling shovels in the AI Gold Rush. These companies are creating a massive internal economy through billion-dollar purchase agreements and strategic investments with one another.

The financial implications of this transformation have also

been striking. Public SaaS stocks came under significant pressure at the start of the year. Following Anthropic's release of Claude Cowork plugins and a wave of subsequent AI product launches, publicly traded SaaS companies collectively lost roughly \$285 billion in market value in total.¹ The market priced this risk in real time as a structural threat created by AI. However, as SaaS companies that converted AI into real revenue stood out with strong balance sheets, the market showed a recovery. The index-level rise is largely driven by infrastructure companies, while the median SaaS company is still trying to climb out of a deep hole. In short, the market is moving from an indiscriminate existential-threat narrative to a more selective view that separates winners from losers.

The picture is quite clear when looking at valuation charts. According to SaaS Capital data, the median annual recurring revenue (ARR) multiple of publicly traded SaaS companies fell to its lowest level in more than a decade in the first half of 2026, at 3.4x. By contrast, this metric was in the double digits during the pandemic period.²



The transformation on the investment side is perhaps even more striking than the decline in valuations. In Q1 2026, AI companies accounted for approximately 80% of global venture capital investments.³ AI startups raised a record \$255.5 billion globally in the first quarter of 2026, according to PitchBook. This figure surpassed the entire 2025 total of \$254.4 billion, making Q1 2026 the strongest quarter for AI investment on record. However, the distribution was extremely uneven: roughly two-thirds of this amount came from only three deals: OpenAI (\$122 billion), Anthropic (\$30.6 billion), and xAI (\$20 billion). The remaining \$83.5 billion was spread across 1,543 separate deals.⁴ This highlights how difficult it has become to compete with the dominant players in the AI race. We are likely to see many AI startups displaced when large foundation-model providers integrate similar features directly into their platforms.

AI VC deal activity by quarter



According to investors surveyed in Crunchbase's 2026 forecast report, it will now be extremely difficult for a SaaS company that lacks embedded or agentic AI capabilities to raise venture capital at any stage.⁵

So how will SaaS companies survive in this environment? The clearest evidence of the transformation is the fundamental shift in pricing models. As AI agents take over the work of employees, per-seat pricing is beginning to be replaced by usage-based and outcome-based models. Another requirement for survival is the transition to AI-native architecture; companies where AI is not an add-on feature but the core design of the product are standing out. In addition, vertical and specialized solutions are gaining ground. AI-based SaaS providers that target complex sectors such as healthcare, law, finance, and manufacturing, and that rely on unique and proprietary

data, represent the segment with the highest likelihood of survival.

AI is fundamentally changing how software is produced, priced, distributed, and consumed. This is not the first time the software industry has faced a fundamental shift. The move from on-premise software to the cloud redefined market leaders. Later, the transition from perpetual licenses to subscription-based business models reshaped the industry once again. AI is now driving a similar transformation, and it will likely create a new set of winners and losers.

For startups that solve a real problem with the tools of the AI era, have a data advantage, and align their pricing model with customer value, the next five years may offer the greatest opportunity of the past two decades. SaaS is not dead; it is being reborn.

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“The market is moving from an indiscriminate existential-threat narrative to a more selective view that separates winners from losers.”

REDESIGNING THE WORLD ACROSS THE AXES OF HUMANS, SOCIETY, AND NATURE



CENGİZ ULTAV

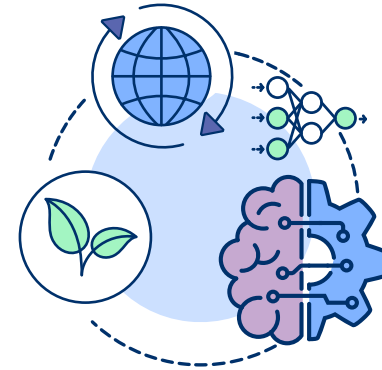
Zorlu Group Board Member
Former Chairman of the Board of TTGV

INTERVIEW: Esra YAZDIÇ DEMİR
TTGV Corporate Communications and
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You can access the full
interview on TTGV's
YouTube channel.

The chaotic period filled with uncertainties that the world has been experiencing for nearly a decade has turned into an unprecedented crisis as a result of a pandemic and two seemingly local wars merging on a global scale. Some scientists go even further, starting to construct doomsday scenarios in a world where nearly 15% of the global population has migrated to psychological sanctuaries of tyranny and 80% (whether poor, middle-class, or rich) to those of indifference. New archaeological findings indicate that the number of apocalyptic cycles is greater than previously known. The inference that every apocalypse has a way out is a comforting thought for humanity. The impulse generated by such times reveals the necessity of managing fear, passion, and courage all at once.



“Science, which strives to contribute to the individual, society, and nature simultaneously, and artificial intelligence, rising from tens of thousands of years of accumulated data, emerge as primary tools in eliminating indifference.”



Science, which strives to contribute to the individual, society, and nature simultaneously, and artificial intelligence, rising from tens of thousands of years of accumulated data, emerge as primary tools in eliminating indifference. Seeing, showing, and connecting the holism in the big picture with concrete realities has now become far more achievable. Meanwhile, even if jokingly, the saying “If you choose the hardest of the three alternatives you encounter, you are innovating” is being treated as the new definition of innovation.

We did not have many reasons to claim that Classical Economics, which took shape rapidly over the last three hundred years, and the Digital Transformation, whose foundations were laid nearly a hundred and fifty years ago and gained momentum in the last fifty years, were not going well. Innovation drew its strength from its characterization in the early twentieth century as “the fastest route between an idea and money.” Although sustainability was one of the main themes of economics, it could overshadow the friction within the human-nature-society-machine balance around a poetic idealism. Our performance in making things smart was quite good on desktops and in pockets; there seemed to be no significant problem regarding integration within

network structures—shallow though it might be—and in terms of being able to connect with one another on every matter. The four supporting pillars of Classical Economics, as described by Niall Ferguson, consisted of democracy, capitalism, the rule of law, and civil society. It was stated that there was a certain amount of degeneration in these areas; however, there was little doubt that we were managing this situation. Ultimately, we could say that Classical Economics was not doing badly.

When the impulse to look more carefully at the big picture and examine it more deeply emerges, it becomes clear that we no longer have the luxury of denying certain realities. The excessive and incorrect use of land and its derivatives, air and its derivatives, and water and its derivatives—which are key components of Classical Economics—has caused high-level and sometimes irreversible damage, driven primarily by growth strategies anchored heavily in finance that have become seemingly indispensable; manifesting first in nature, environment, and climate, and subsequently as rising frictions and inequalities in society.

Although there are those who seek the solution on Mars



or the Moon, following the pandemic and geopolitical crises, the time seems to have come for us to look at our world through a different lens. Differing from its definition at the beginning of the last century, innovation is now defined—not jokingly this time, but with a realistic approach—as “the fastest scientific and technological solution to real-world problems.”

Sustainability must move beyond idealism and focus concretely on the triangle of advanced materials, energy efficiency, and the sharing economy. Making things smart must scan wider horizons, moving far beyond desktop and mobile applications. Frictionlessness is becoming a crucial element in preserving social and global balances. Managing increasing chaos and uncertainty requires scientific foundations to grow stronger every day in order to build the resilience of institutions alongside that of individuals and society. The concept of interconnectedness, which describes something beyond mere collaboration, underlines

the necessity of teamwork across different cultures and fields. Circularity, on the other hand, makes it mandatory to shape efforts not just by joining the ends of waste, but in line with the need to connect knowledge, economy, and energy to one another. Managing sustainability, making things smart, frictionlessness, interconnectedness, resilience, and circularity—the defining elements of the upcoming period—within a holistic framework is gaining greater importance than ever before.

Data Science is Now Taking Its Place as a Fourth Scientific Domain

Slowing down, or even freezing, growth in the post-crisis period is among the topics being debated. However, it is explicitly clear that this is not possible. There is an obligation to maintain growth; in fact, it is even stated that exponential growth will be needed for a certain period.

On one hand, slowing down, stopping, and repairing the destruction on the environment and climate in line with sustainability; on the other hand, addressing social inequalities and managing increasing chaos and uncertainty stand before us as primary problems to be resolved. Achieving exponential growth alongside all of these presents an exceptionally massive challenge.

It appears that the legacy we inherited from Classical Economics may fall short in confronting this challenge across finance, production, agriculture, and many other fields. Looking from a more positive perspective, however, recent developments in the field of science—which we have neglected for some time—particularly in quantum physics and biotechnology, hold the potential to create revolutionary differences in numerous areas ranging from transportation to agriculture.

Alongside these, Data Science is rapidly beginning to take its place as a fourth scientific domain, next to Empirical

Science, Theoretical Science, and Computational Science. The transformation from Classical Economics to the Data Economy involves reconstructing the whole and filling numerous gaps across a vast spectrum with new efficiencies and value-added inputs, primarily in the light of Data Science. This spectrum features the holism of human-nature-society-science on one axis, and the holism of interconnectedness, resilience, circularity, making things smart, sustainability, and frictionlessness—as stated in the previous paragraph—on the other.

In the upcoming period of emerging from the crisis, the individual-society-nature triangle stands out as the most critical and urgent platform for elevation. Therefore, focus should be directed solely toward efforts that contribute simultaneously to all three elements located at the corners of this platform. Efforts that touch only one or two corners of the triangle should be relegated to second and third priority.

FROM LAB TO FACTORY: THE COMMERCIALIZATION JOURNEY OF CLIMATE TECHNOLOGIES WITH OSTIM



ORHAN AYDIN
OSTİM OSB
Chairman of the Board

INTERVIEW: Esra YAZDIÇ DEMİR
TTGV Corporate Communications and
Media Manager

A Total Mobilization is Essential for University-Industry Cooperation

The true impact of climate technologies manifests not merely in their development, but when they are applied in industry and transformed into economic value. In the globally accelerating green transition process, ecosystems that can shorten the distance between research laboratories and production fields gain more importance than ever. Representing Türkiye's manufacturing power, OSTİM forms a remarkable model in this arena with its structure that brings university, industry, and entrepreneurship components together.

While speaking with Orhan Aydın, Chairman of the Board of OSTİM OSB, regarding the commercialization processes of climate technologies, the green transition needs of SMEs, and the new industrial understanding shaped on the axis of digitalization and sustainability, we addressed the dynamics of the new era that will define Türkiye's competitiveness through Aydın's insights.

Considering Ostim Teknopark's structure, which is intertwined with manufacturing, what is your most critical advantage in accelerating the transition process "from lab to market" in climate technologies?

The most significant advantage of Ostim Teknopark is that R&D and manufacturing meet within the exact same ecosystem. While the technologies developed in many technoparks take time to meet industry, startups and tech firms at OSTİM can establish direct contact with manufacturing companies. Thanks to the industrial infrastructure formed by thousands of enterprises operating in sectors such as defense, medical, machinery, energy, and electronics, developed climate technologies can be swiftly prototyped, tested, and reach their first customers. This circumstance significantly shortens the transition time from laboratory to market.

Carbon Transformation Has Become a Matter of Survival

What are the greatest technical barriers for SMEs in Türkiye during the carbon transformation (decarbonization) process? How does OSTİM tangibly support this transformation?

The carbon transformation (decarbonization) process for SMEs in Türkiye is no longer just an environmental policy; it has become a matter of survival due to the European Green Deal (EGD) and the Carbon Border Adjustment Mechanism (CBAM).

As one of the largest ecosystems in Ankara and Türkiye, OSTİM (Middle East Industrial and Trade Center) deploys the «clustering» model and academic collaborations to overcome these barriers. Thanks to the OSTİM Renewable Energy and Environmental Technologies Cluster, the manufacturing of SPP (Solar Power Plant) panels, wind turbine components, and energy storage systems required by SMEs is encouraged through domestic means. Furthermore, by bringing software firms that perform carbon measurement together with manufacturing SMEs, «technical cooperation» is ensured.

On the other hand, within the scope of the World Bank-supported «Türkiye Green Industry Project,» we utilize massive funds directly as a lever for the technical transformation of SMEs. Through these projects, we do not

merely provide theoretical consultancy to enterprises in the region; we personally «green» the operational processes of SMEs by offering a vast spectrum of services—ranging from the installation of high-capacity Solar Power Plants like 2 MW to the modernization of the fiber communication infrastructure between transformer stations.

How do you measure and manage the harmony formed in the fields of energy, sustainable manufacturing, and circular economy within your clustering model?

We view clustering not merely as a structure where firms operating in the exact same sector come together, but as an ecosystem that generates shared value by organizing knowledge, technology, and cooperation. Therefore, metrics such as the number of joint projects, university-industry collaborations, technology transfers, intra-cluster trade volume, and sustainability-focused activities serve as vital performance indicators for us to measure harmony in the fields of energy, sustainable manufacturing, and the circular economy.

At OSTİM, firms, universities, the technopark, and startups reside within the same ecosystem. The fact that a cluster has become a partner in a technopark for the first time in Türkiye is a tangible indicator of this approach. Thanks to this model, a stronger bond has been established between the needs of industry and R&D or technology development processes.

As the Renewable Energy and Environmental Technologies Cluster, we accelerate the green transition by bringing manufacturing firms together with technology developers, consultancy firms, and financing mechanisms. Success for us means increasing cooperation among firms, transferring innovative solutions to industry, enhancing resource efficiency, and making our companies more competitive in international markets.

Firm-Investor Matchmaking Meetings

What is the commercialization rate of climate technologies developed at Ostim Teknopark? What mechanisms have you deployed to increase this rate?

OSTİM is a production ecosystem possessing interfaces that generate answers to entrepreneurs' needs—stretching all the way from «I have an idea» to «I want to open my company to the stock exchange.» Together with OSTİM Endüstriyel



Yatırımlar ve İşletme A.Ş., OSTIM Technical University Technology Transfer Office, OSTIM Venture Capital Investment Fund, Ostim Teknopark Angel Investment Network, Inno14 Startup Acceleration Center, PROTA Technology Manufacturing Workshop, and the Clusters, we support all processes of our entrepreneurs from idea to commercialization.

To support the commercialization of technologies developed at Ostim Teknopark, we attach immense importance to strengthening access to finance mechanisms. In this context, we carry out efforts that ensure startups meet angel investment networks, venture capital investment funds (VCFs), and distinct investment instruments. In recent years, significant progress has been recorded in the investment acquisition processes of our firms operating especially in next-generation technologies and the green transition arena.

Our firms operating within the technopark and developing solutions in the green transition field have accelerated their growth processes by receiving investment support. Alongside this, we have companies working in carbon footprint calculation, monitoring carbon emissions, sustainability reporting, and environmental performance measurement. While these companies develop innovative solutions contributing to the green transition process of industry, they are simultaneously supported in their commercialization and investment processes.

We aim to accelerate the market access of climate technologies through events that ensure our firms meet investors, investor-entrepreneur meetings, and business development programs. Thus, we aim to increase the number

of companies that are not just developing technology, but can transform the technology they develop into a sustainable business model.

As an industry-oriented technocity, how do you bridge the gap between financing and technical capacity in green transition investments?

The green transition is not solely a matter of financing; it simultaneously demands knowledge, technology, and implementation capacity. While we offer information and project development support regarding access to financial resources at OSTIM, on the other side, we assume a bridge function among universities, research centers, and industrial organizations. Thus, firms can both reach appropriate financing tools and develop the technical capacity to utilize these resources effectively.

In the context of the European Green Deal, which technology areas do you prioritize to increase the competitiveness of firms in the OSTIM ecosystem?

The European Green Deal and the accompanying Carbon Border Adjustment Mechanism (CBAM) are no longer a technical preference for the OSTIM ecosystem, but a necessity to remain within the global supply chain. In this context, to protect and increase the competitiveness of our firms, we primarily focus on industrial systems with high energy efficiency and electrification technologies; since reducing the share of fossil fuels in manufacturing is the fastest route to evade the carbon tax.

Simultaneously, carbon monitoring and digital management software (IoT and cloud-based systems) are our priorities, because it is impossible for us to manage and report an



emission to Europe that we cannot measure. Furthermore, by investing in renewable energy technologies (especially the transition to rooftop SPPs and energy storage solutions) and circular economy-oriented recycling technologies, we aim to lower raw material costs and maximize resource efficiency.

We support all these technological focal points with our smart infrastructure services integrated into our Green OSB certification process and World Bank projects. Thereby, we transform the green transition of our SMEs from being a mere cost item into making them strategic players who stand out in the international market with “green and digital” (twin transition) competence.

A Total Mobilization is Essential for University-Industry Cooperation

“Where do you think the greatest structural disconnect occurs in Türkiye regarding university-industry collaborations: the commercialization of research output, human resources, or incentive mechanisms? How does the OSTIM model bridge this gap?”

One of the most vital developments at OSTIM is OSTIM Technical University commencing education and training. When we descend to the field, the main headlines of enterprises' problems are as follows: First, a qualified workforce. Without this, it is impossible to manufacture high-value-added products and compete with global nations. Industry stands in dire need of a qualified workforce. Second, a massive need is felt for university-industry cooperation. Enterprises must be able to incorporate the accumulation of knowledge from the university into their systems; they must be able to manufacture more innovative, competitive new

products. It must be able to boost the quality and nature of its existing manufacturing to be competitive.

These two headlines are highly critical. We set out on this journey to generate solutions to these two topics. We designed a setup to cultivate a type of engineer—a qualified workforce—whose hands can touch the work, who understands the job, and who is embedded within life. At the same time, we entered into an intense struggle to ensure that all our academicians in the school, alongside other universities to be included in this network, meet with industry. We are practically trying to alter traditional concepts.

A total mobilization is essential for university-industry cooperation. We need to bring the academician to industry, and we must bring the industrialist together with the academician. We must transform both into value. This is one of our core reasons for embarking on this journey in the academic arena.

How will we explain the world's new concepts—such as artificial intelligence, smart factories, and Industry 4.0—which are frequently discussed, to enterprises so that we can ensure this transformation? What will be the future status of the firms here? How will we emerge from the tsunami bearing down upon us? To prepare for this, firms, universities, and the public again need to display intense efforts, and everyone must assume a duty. For this, we have declared a mobilization.

On the other hand, the most critical issue is the commercialization of research outputs. Very valuable academic studies are conducted in Türkiye, yet a significant portion of them cannot transform into industry. The OSTIM model steps in at this exact juncture. Universities, researchers, entrepreneurs, and industrialists meet within the same ecosystem. Thus, studies at the idea stage can match the needs of industry at an earlier period, and their commercialization potential increases.

Green Transformation and Digital Transformation Complement One Another

The digital transformation is a must-have for the green transformation to materialize. We have placed this approach—expressed as inseparable twin pieces that entered our lives with the concept of “twin transition”—among our priority agendas.

In line with the core purpose of the twin transition, we added the headlines of digital transformation, green transformation, and sustainability to the services of our Organized Industrial Zone to ensure our member firms achieve both their short and long-term goals in terms of sustainability and competitiveness. With our team providing these services, we engage in activities to raise the awareness of member firms, inform them on current regulations, bring them together with technology providers, and form a roadmap for our firms on how to progress in this process.

By evaluating the technologies or products developed by entrepreneurs coming to our region within the scope of the green and digital transition in line with the needs of our member firms, we bring them together. We provide the training and certifications required to increase the competencies of the firms in our region within the scope of the EU Green Deal. Furthermore, we provide consultancy to our firms regarding the matters to be complied with within the framework of Green OSB criteria.

We carry out efforts to support the capabilities of our firms in our region to manufacture with the goals of efficiency, savings, and environmental sensitivity by forming maturity analysis reports in the field of digital and green transition.

In the process of digitalization, we offer support in coordinating the digital transformation applications of manufacturing firms in the regional ecosystem and determining a firm-specific roadmap.

At OSTIM, which operates as a manufacturing and solution center, our efforts to contribute to the steps our firms will take in digitalization and digital transformation continue rapidly, so that their competitive manufacturing structures can be strengthened and efficiency gains can be achieved. In these efforts, we aim for our firms to increase their efficiency with their existing resources, deliver savings, and arrive at a position where they can compete on a global scale.

In the manufacturing industry, digital technologies such

as the Internet of Things, remote monitoring, industrial robots, and 3D printing enable traditional manufacturing to become safer, more efficient, more sustainable, and more cost-effective. Simultaneously, within the scope of the green transition, it creates benefits against environmental impacts by reducing energy consumption per product and the carbon footprint.

Our innovative applications, structures, and platforms that we brought to life before the pandemic—with the aim of our firms in our region expressing themselves in the digital environment during global competition and moving their products to the e-commerce arena—indicate that our decisions made to foresee the future were highly accurate. For this purpose, we brought two critical applications to our agenda: First, we carried our Foreign Trade Coordination Department a step further, transforming it into the Foreign Trade Intelligence and Consultancy Center. Second, we formed a structure we name the Digital Transformation Office, where we will support firms in our region to accelerate their digitalization phases and increase efficiency.

At OSTIM, which is in continuous development and swiftly adapts technological advancements into its structure, one of the pioneering steps of the digitalization process is our Virtual Factory efforts that we placed on our agenda many years ago. In our project, all workshops, machine tools, and personnel were accepted as parts of a virtual factory.

In addition to the developments enumerated above, a new zoning plan was brought to life in our region in 2014 with an economic, technological, ecological, and future technology region vision. Within the scope of the plan, firms rebuilding their workplaces were mandated to install solar panels on their roofs with an understanding of “on-site manufacturing, on-site consumption,” and to utilize environmentally sensitive materials during the construction phase. With the investments made, a total SPP installed power capacity of 3.295 MW has already been formed at OSTIM. OSTIM OSB also established the Zero Waste Management System in 2021 and received the Zero Waste Certificate.



4 Projects Approved Under the Türkiye Green Industry Project

Acting with the vision of being a sustainable, global, and pioneering industrial zone that guides Turkish industry with leading-edge services and domestic/national/competitive solutions that are the first to come to mind in manufacturing and procurement, OSTIM Organized Industrial Zone sets an example for many OIZs in Türkiye with its nearly 60 years of experience and is modeled by countries aiming for development. With the value of protecting tomorrow's nature today, OSTIM exhibits a proactive management approach through its eco-friendly and ecological balance-preserving applications.

In this context, the Green Transformation and Sustainability Office has been established with the vision of revealing an industrial model that is fully integrated into nature rather than acting in spite of it, and the mission of integrating the industrial organizations in OSTIM into nature through the most accurate model, structuring industry as completely embedded within the renewable natural resource cycle, and continuously improving it within this cycle.

Foremost among the works carried out by the office are 4 projects approved under the World Bank-funded Türkiye Green Industry Project, which is conducted by the Ministry of Industry and Technology. The projects are as follows:

1. Carport Type Solar Power Plant Project (Fieldwork has commenced)
2. Transformation of Street Lighting to LED Technology Project (Completed)
3. Fiber Communication Infrastructure Between Transformer Kiosks Project** (Completed)
4. OSTIM Digitalization (Single Factory) Project (Tender processes are ongoing)

The total green transformation and sustainability value added that these projects will deliver:

- Over 15,000,000 kWh of electricity will be saved annually.
- Approximately 11,000 tons of carbon emissions will be prevented annually.
- The annual equivalent forest area required to sequester this carbon will be 12,815 decares.
- Energy equivalent to the electricity generated by 6,000 tons of coal annually will be saved.
- Electricity savings equivalent to 5 million liters of gasoline annually will be achieved.

Thus, as a solution center in meeting national needs, we will have both strengthened our service provision in our region—which possesses international brand value—and prepared our industrialists for future market conditions.

As a result of all these achievements, our Ministry and the Turkish Standards Institution (TSE) awarded us the “Silver” category in Green OIZ certification. We will further increase our efforts and our sensitivity toward sustainability to ascend to the gold category.

In line with Türkiye's “2053 Net Zero Emission Target,” trainings, seminars, meetings, and conferences are organized to help our companies reduce their carbon emissions, and green transformation mentorship is provided.

Establishing zero waste management, ensuring sustainable manufacturing with green energy, creating a circular value chain for efficient, on-site consumption, and building a green industrial ecology under the slogan “Smart Industry” remain our primary goals across every period.



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