

**The government's AI  
technology dilemma:  
Developing technology  
and safeguarding against  
the negative effects  
of proliferating  
technology**

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In recent years, governments have taken on a more active role in the development of emerging technologies like artificial intelligence (AI). The industrial policies of Asian nations such as China, South Korea, and Taiwan, alongside the new missions of the European Union, the rise of mission-oriented policies in other countries, and America's recent revival of industrial policy, have reignited the debate over the role of the government in shaping new technologies and industries. Today, governments are more interventionist than ever before.

The economic and social transformations caused by the rapid proliferation of technologies such as AI, demand that the government be more proactive, entrepreneurial, and swift in its policy making and implementation. AI technologies are evolving and spreading so fast that the government must strategically position itself between fostering technology development and regulating the new markets these technologies create. How can the government intervene in the emerging AI market? What can Türkiye do to advance AI technologies?

## What is artificial intelligence technology?

Artificial intelligence (AI) refers to the simulation of human decision making by computer systems. Computers process large amounts of data using these technologies and the system is trained to carry out specific tasks that humans do by identifying patterns within this data. Common applications, such as AI-driven chess games, autonomous vehicles, speech recognition, and real-time translation, rely heavily on deep learning and natural language processing. AI applications revolve around three critical elements: ***the data used for training, the learning models and the AI-generated output*** (e.g. a text, an image, a strategic decision in a production process or strategic decisions in production or corporate management).

Since the emergence of AI as a concept in the 1950s, significant advancements occurred in the 1980s when machines first learned from data.<sup>1</sup> Although big data and machine learning are important building blocks of AI, “doing the tasks that humans do” could only be possible with systems that mimic human decision making. Deep learning models and neural networks, which accelerated after 2010, enabled the development of models that imitate the learning

and decision making functions of the human brain. By 2020, the widespread adoption of generative AI revealed both the benefits and challenges of this technology. For example, a software developer can use AI to boost efficiency by automating routine coding tasks. The reason why there is more debate on AI technologies compared to other emerging technologies is that their social impacts emerge much faster and in different forms. AI can substitute labor, create algorithmic bias<sup>2</sup>, feed disinformation processes and increase the power of the state and big corporations by creating new forms of surveillance.<sup>3</sup>

## Why is artificial intelligence different from other emerging technologies?

There are three characteristics that set AI apart from other technologies. AI technologies;

- can substitute human skills associated with “decision making”,
- can create new forms of knowledge, though often controversially,
- is spreading at an unprecedented pace.

Discussions around the negative implications of AI often focus on its effects on the labor market. Every occupation consists of various tasks, and



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technology can complement some tasks while substituting others. Depending on the nature of these tasks, AI might replace some or all of a worker’s tasks.<sup>4</sup> Unlike industrial robots, AI can fully substitute tasks concentrated in the service sector and partially replace tasks related to decision making and problem solving. Tasks related to planning, routine coding, calculation, accounting can be completely substituted by AI, while tasks such as decision making, problem solving, etc. can be partially substituted (for the time being). For example, an accountant can complete routine bookkeeping tasks much faster with the help of AI. AI can now perform tasks ranging from invoices and contracts to data summarization and analysis, expense and payroll processing, fraud detection and even workflow automation. Given that in many countries the service sector accounts for between 70% and 80% of the total labor force, concerns about large-scale unemployment due to AI are growing. For instance, Goldman Sachs economists state that AI could replace 300 million jobs.<sup>5</sup> While industrial robots have largely caused blue collar

unemployment, AI threatens both blue- and white-collar jobs.<sup>6</sup>

AI is also unique in its ability to generate new knowledge. The way AI creates and transmits knowledge differs from traditional human methods and can be considered controversial. When humans transfer knowledge to a medium (e.g. paper) or to another human being, they break it down into small messages, and when these messages are followed in a certain order and actions are taken, the knowledge is transferred or codified. For example, patents create a set of messages for technological knowledge in the same way as described above, in a way creating a roadmap for the repeated application of that technological knowledge. When AI generates new content, does it process information like humans, or does it use different methods? Even this simple question about the process by which AI generates content remains a subject of debate among engineers and scholars alike. The uncertainty regarding a technology that is still not fully understood, fuels concerns about its broader societal implications.



**Due to these distinctive characteristics, government intervention in AI markets needs to be both rapid and strategic.**

AI technologies are proliferating at an unprecedented speed. Earlier technologies, such as electricity or household appliances, took decades to reach even half of the population. The internet, CD players, cable broadcasting and mobile phones spread much faster. The speed of platform technologies is even higher. For instance, while it took 3.5 years for Netflix to reach 1 million users, Spotify achieved this milestone in 5 months, and ChatGPT in just 5 days.<sup>7</sup> Mobile phones, which directly affect the way we do business, took about 16 years to reach 100 million users, compared to 6.5 years for the internet and only 2 months for Chat GPT.<sup>8</sup> IBM's Global AI Adoption Index shows that 42% of professionals in the information and communication sectors already use AI tools, while 40% are considering adopting them.<sup>9</sup> No other technology has influenced the way we work and live with such rapid adoption.

Due to these distinctive characteristics, government intervention in AI markets needs to be both rapid and strategic. On the one hand, states should encourage the development and diffusion of AI technologies; on the other hand, they must ensure that regulations addressing AI's potential negative effects do not hinder market creation.

### **How can the government support artificial intelligence technologies development?**

Over the past decade, we have witnessed governments directly intervening in markets shaped by emerging technologies, often taking the lead in creating new markets themselves. Countries like South Korea, Taiwan, and China's active roles in advancing scientific and technological knowledge since the 2000s<sup>10</sup>; the adoption of a mission-oriented approach by the European Union's most important research and innovation funding (the Framework Programs) in 2018<sup>11</sup>; and the "new industrial policy", which transfer large public resources to universities and companies for the development and dissemination of new technologies through the recent Chips Act, Science Act, etc., define a more **active, entrepreneurial and interventionist state**. The inability of the current neo-liberal economic policy to solve grand challenges such as climate change, healthy aging, etc. and the economic and social problems created by new technologies somehow legitimize this more active and interventionist approaches. Governments are rediscovering what the state is and what it can do.<sup>12</sup>



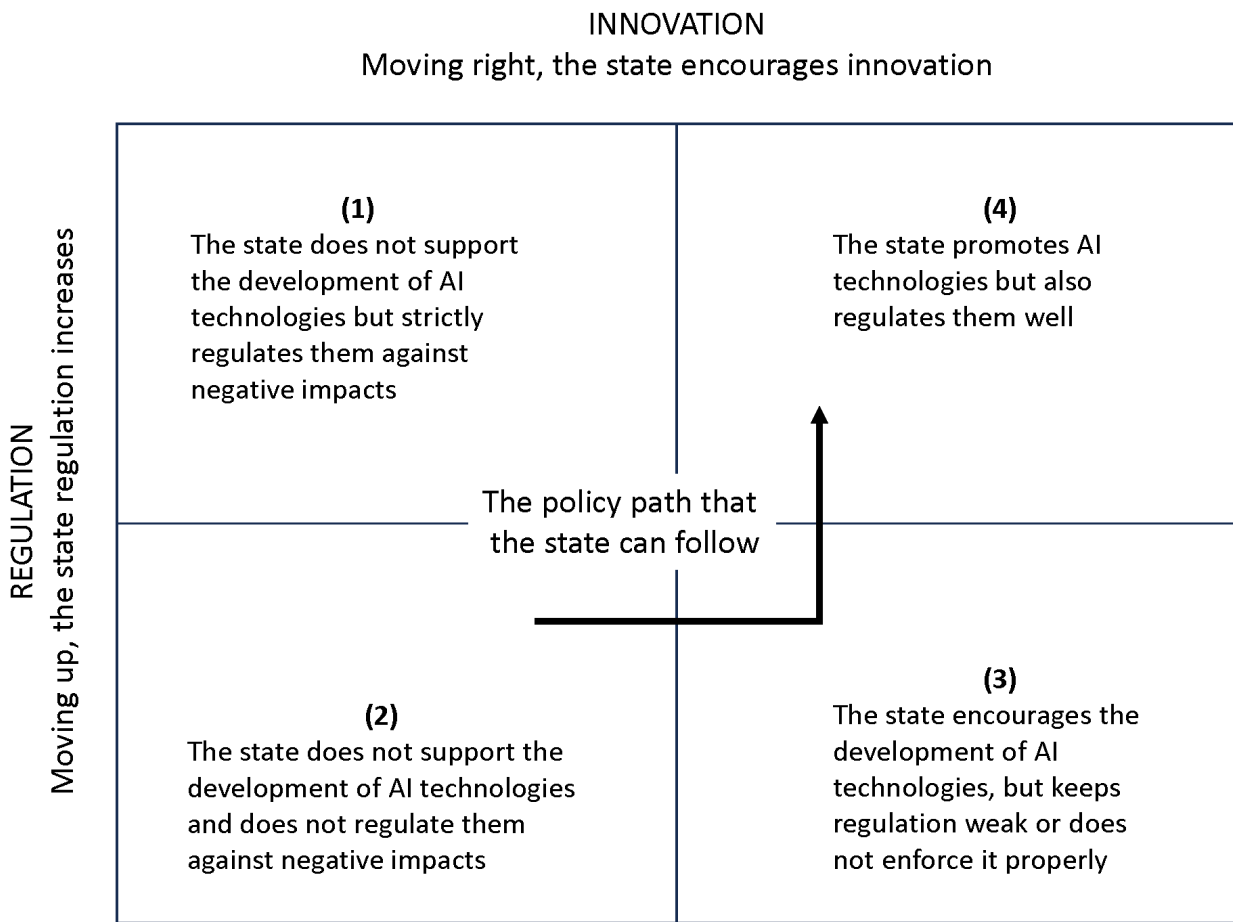
## **The rapid development in AI technology and its much faster effects on the social structure complicate the government's policy making processes.**

Contrary to the general belief, the state can play a vital role in the development of new technologies and the generation of scientific knowledge. In fact, a significant portion of early-stage funding for technology development comes from public sources. Historically, the state has been instrumental in creating industries such as Germany's chemical sector between 1880-1940, China's information technology and automotive industries post-1990, and the U.S. information and communication technologies sector between 1950-1990. In these cases, the state provided essential scientific and technological knowledge, R&D funds, and workforce support.<sup>13</sup>

The government can utilize a diverse set of tools to promote technology development: It can subsidize R&D and innovation processes, create an ecosystem in which new technologies can flourish, get involved in R&D processes directly by involving in R&D activities, regulate the market, and disseminate new technologies through public procurement. The state's toolkit is actually quite rich, but the neo-liberal view limits the role of the state to market regulation and support for R&D and innovation once the market is established. The *entrepreneurial state*, which we briefly mentioned above,

mission-oriented policies and new industrial policy, represent a break in this role of the government. This is because the government directly intervenes in markets with a rich set of policy instruments. New technologies are supported through instruments such as early-stage technology development funds, public procurement prioritizing innovation, the state's own involvement in the R&D process to create technological knowledge, and direct selection and incentivization of firms (e.g. the case of TOGG in Türkiye). Therefore, we see a departure from the neo-liberal policy framework, which is largely based on market regulations. Türkiye can also be considered to follow this trend. With policy instruments such as TOGG, HAMLE program, regional incentives, TÜBİTAK 1004 program, Law No. 6550 regulating Research Infrastructures, public procurement, and the recent HIT-30 program etc., we see that the state has started to intervene more directly in technology development processes.

The rapid development in AI technology and its much faster effects on the social structure complicate the government's policy making processes. While the government is actively supporting the development and dissemination



**Figure 1: What kind of policy path can the government follow to develop technology?**

of AI, it is also simultaneously trying to regulate the market. And these dual roles conflict. For instance, the proliferation of robotics and its labor market effects became visible over a longer period of time. There is even evidence that increased productivity with industrial robots has led to new investments in firms and created more labor demand.<sup>14</sup> This suggests that the government may prioritize its role in supporting technology development over its role in market regulation. However, AI technologies are rapidly developing and spreading. Especially because AI affects the services sector more, labor market effects may emerge much more rapidly. In such a situation, the government may be caught in a dilemma and may need to take on the roles of both supporting technology development and regulating markets without conflicting with each other.

### What kind of strategy can Türkiye pursue?

Developing countries like Türkiye should prioritize R&D and innovation support over regulation when it comes to the development of new technologies. Figure 1 illustrates a potential policy path the state could follow to foster AI technologies within the innovation-regulation spectrum. In Figure (1), the government regulates the market without supporting the development of AI technologies. A country that lacks sufficient physical, human and financial capital to drive technological development can at least impose regulations to mitigate the negative impacts of AI. Neither innovation nor regulation (2) is not a sustainable option for Türkiye, as AI's rapid proliferation will eventually force the state to regulate the market. Moving from (2) to (1)



is also a potential trap, as over-regulation at an early stage can stifle innovation activities and technological advancement.<sup>15</sup> Therefore, Türkiye should seek a transition from (2) to (3), adopting a more proactive role in fostering technology development while initially refraining from or limiting market regulation.

In the case of AI, technologically developed countries generally prioritize innovation over regulation. Both the United States and the European Union introduced AI regulations long after substantial technological advances had already been made. In fact, EU proudly announced its comprehensive AI regulations as “the world’s first most comprehensive AI law” in June 2023, but the “AI Act” did not come into force until August 1, 2024.<sup>16</sup> Similarly, the US began working on AI market regulation since November 2022 with its The Blue Print for an AI Bill<sup>17</sup> in different scopes.<sup>18</sup> These regulations impose obligations on both the developers of AI systems and the large-scale distributors and users of these systems (e.g. government and companies). They also place regulations on both AI system developers and large-scale distributors or users (e.g., governments and corporations). They govern how data is collected and utilized to train AI, how AI models are constructed, and how AI outputs are applied. However, we will be able to see the real impact of these regulations

only after 2025. Looking at the developments, we can say that AI technology is advancing much faster than regulation.

Can Türkiye adopt a similar attitude? In the current situation, Türkiye aspires to transition quickly from (2) to (3) but faces significant constraints. The vision statement in Türkiye’s National Artificial Intelligence Strategy gives a clear indication of this ambition: “creating value on a global scale with an agile and sustainable AI ecosystem for a prosperous Türkiye”.<sup>19</sup> In addition, several incentive mechanisms have already been introduced to support AI development. For instance, the TÜBİTAK 1711 Artificial Intelligence Ecosystem Call provides support to technology firms operating in the AI space.<sup>20</sup> However, these incentive mechanisms are small in scale, for example, TÜBİTAK has given a total of 6.7 billion TL support to AI-related projects in the last 20 years.<sup>21</sup> Globally, the AI market is projected to reach \$184 billion in 2024 and is expected to quadruple by 2030.<sup>22</sup> Within all, Türkiye’s share in these activities remains small.

There are several constraints to Türkiye’s ambitions. First, the state must enhance its capacity-both in terms of human capital and institutional organization- if it is to pursue a more active industrial and innovation policy. State capacity has always been a critical factor





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in the success of industrial and mission-oriented policy. Furthermore, Türkiye must assess whether its resources are adequate to move from (2) to (3) in Figure 1. A 2024 report estimates that there will be approximately 28 million software developers worldwide.<sup>23</sup> In the U.S., there are currently 4.4 million developers, 7.7 million in China, and 5.8 million in India. In Türkiye, this number is estimated to be around 160,000 in 2019.<sup>24</sup> This stark difference in workforce is particularly concerning given the recent increase in skilled labor migration from Türkiye. The data for AI investments paints a similar picture. According to ITOSAM's research, there are approximately 1,200 companies developing AI products in Türkiye.<sup>25</sup> However, in the U.S. alone, \$31 billion was invested in around 5,500 AI startups in 2023.<sup>26</sup> In contrast, Türkiye's investment in AI startups amounted to approximately \$270 million in 2022.<sup>27</sup> While this figure places Türkiye among the top 20 countries, there is still a substantial gap between Türkiye and other leading countries. Therefore, Türkiye is far behind leading countries such as Europe, US and China in terms of resources affecting the development of AI technologies.

Türkiye is lagging in the global race for technological advancement. Moreover, given the assumption that AI's societal impacts will manifest more rapidly, Türkiye could fall into the trap of prioritizing regulation over technological development. **To avoid this, Türkiye needs to;**

**1. enhance its state capacity to better adapt to technological transformations.**

The terms "agile" and "sustainable" in Türkiye's National Artificial Intelligence Strategy apply not only to emerging technologies but also to the government itself. Given that AI and related technologies are regarded as "general-purpose technologies," the state must be flexible, agile, and capable of designing and implementing complex policy instruments. This requires strengthening both the human capital of public sector employees and the organizational capabilities of public institutions.

**2. improve its human capital.** Which people with which skills can produce new technologies? Which skills will be prioritized in professions and sectors as a result of the spread of new technologies? A comprehensive skills development strategy is needed to address these questions.

**3. conduct a thorough assessment of the current situation to identify AI-specific niche areas.** Given its limited resources, Türkiye would benefit more from promoting niche areas aligned with its scientific, technical, and human capital structure that also show potential for global development, rather than adopting a broad, general AI strategy.

## NOTES

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## NOTES

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