



# BEYOND DIGITAL, BRAZIL SHOULD FOCUS ON BUILDING THE MARKETS OF TOMORROW?

*Attilio di Battista*

Recovery from the economic downturn attributed to the COVID-19 pandemic calls for an inclusive and sustainable economic transformation capable of economic growth that is conducive to the broader societal and environmental objectives to be achieved over the coming decade. The impact of the pandemic has exacerbated the social crises prevalent in many parts of the world before its onset and created new ones to the extent that the risk today is not only to see decades of progress in fighting poverty around the world obliterated, but also public and private leadership retracting on commitments and actions taken to protect the environment at a time when the very opposite is needed: economic transformation that can provide economic growth while meeting the needs of society and the environment.

The functioning of economies is the result of the technologies at work in societies and their established “social code”<sup>1</sup>, the formal and informal institutions that determine the way people behave, interact and organize in a community. Economic value is produced by means of the technological capabilities available and organized and distributed through the formal and informal institutions that have been developed to structure behaviour: from public policies and procedures to habits and norms, shared beliefs and perceptions. Each market is a subset of the broader technological and socio-institutional systems most closely linked to the exchange of a specific good, service or asset.

***Building the markets of tomorrow to achieve such economic transformation requires a creative combination of breakthrough technological and socio-institutional innovation.***



Conceptually, a new market builds on and replaces previous ones and can become a piece of a new paradigm, driving economic transformation. Economic transformation requires a transition from one set of technologies and institutions to another<sup>2</sup>. The goal of such innovation would be to produce not only more or better, but to transform economies by establishing new technological and institutional systems to resolve the most pressing societal issues. Such transition is driven by the creation of new markets that combine technological and socio-institutional innovation to generate new sources of value adapted to societal objectives.

***While each country should find its own path to economic transformation, twenty markets of tomorrow have been considered particularly promising in that they could support inclusive and sustainable revival of growth. The establishment of some will rely on advances in breakthrough technological innovation (e.g. broad-spectrum antivirals, space flights), others will require radically new social and institutional structures (e.g. skills capital, water rights and quality credits).***

others still a combination of both (e.g. data, genes and DNA sequences). Each of these markets could offer potential benefits across multiple dimensions, for example, by helping to increase well-being and empower people (e.g. precision medicines and orphan drugs, EdTech and reskilling services), advance human knowledge and understanding (e.g. artificial intelligence, satellite services) and protect the environment (e.g. electric vehicles, hydrogen). Some of them have a global (e.g. greenhouse gas allowances) and others might have a stronger national (e.g. skills capital) or local component (e.g. water rights and quality credits).

# Markets of tomorrow can transform our economies



## Safeguarding planetary boundaries

1. Electric vehicles
2. Greenhouse gas allowances
3. Hydrogen
4. Plastics recycling
5. Reforestation services
6. Water rights and quality credits



## Empowering and protecting people

7. Broad-spectrum antivirals
8. Care
9. Data
10. Digital financial services
11. EdTech and reskilling services
12. Hyperloop-based transport services
13. New antibiotics
14. Precision medicine and orphan drugs
15. Skills capital
16. Unemployment insurance



## Advancing knowledge

17. Artificial intelligence
18. Genes & DNA sequences
19. Satellite services
20. Space flights

Source: Markets of Tomorrow 2020, World Economic Forum.

Each of the markets of tomorrow requires seven key conditions to develop to maturity:

- A new product must be invented that can be sustainably produced (invention)
- A set of companies is able and willing to produce and market it (production)
- Product demand is sufficient to sustain a commercially viable market (demand)
- A set of market standards for the new product has emerged among actors in the ecosystem (standards)
- Society is aligned on how to value the new product (value)
- The legal frameworks allow to identify, hold and exchange the new product (codification)
- The necessary infrastructure (physical, digital, intangible) to exchange, distribute and store the new product needs to be in place (infrastructure).

# Pathways to creating the markets of tomorrow



## Exogenous Landscape

**Landscape:** Exogenous conditions – static and dynamic – which affect the possibility of agents to establish the relevant target conditions for transition to Markets of Tomorrow

## Target conditions for establishing the Markets of Tomorrow

**Invention:** Has a relevant product or asset that can be sustainably produced at scale been invented?

**Production:** Are any producers mature enough and ready to reliably provide the product or asset to the market?

**Demand:** Is the demand sufficient to sustain a commercially viable market?

**Standards:** Have clear market standards for the new products or asset emerged among the actors in the market ecosystem?

**Value:** Is there sufficient convergence and a common judgement of the value of the new product or asset?

**Codification:** Do clear legal frameworks codified for that specific product or asset exist that make the market economically and legally viable?

**Infrastructure:** Is the complementary infrastructure necessary for the market to exist already in place?

## Agents of change and innovations they pursue

**Actors:** Individual actors, public and private organizations and other social groups

**Technological innovation:** Changes in science, technology and socio-technical systems

**Socio-institutional innovation:** Changes in rules and institutions (formal, normative or cognitive)

New markets may be supported by government incentives, private investment and public-private collaboration. Coalitions at the country and global levels can together pursue the establishment of these conditions. For example, a group of leading edtech companies – the Skills Consortium – has come together to create a new set of standards for the market<sup>3</sup>, help assess the value of online learning, improve mass delivery and stimulate demand through innovative funding mechanisms.

The creation of new markets can occur only when sufficient public and private stakeholders join forces, together with civil society and research institutions. The existing landscape influences the possibility for these actors to succeed. It includes all the elements that are structural or the result of long-term processes and cannot be easily influenced by the actors that pursue the creation of a new market. These elements can suddenly or slowly change over time, and this can play a key role in allowing new niches to emerge and replace established paradigms.

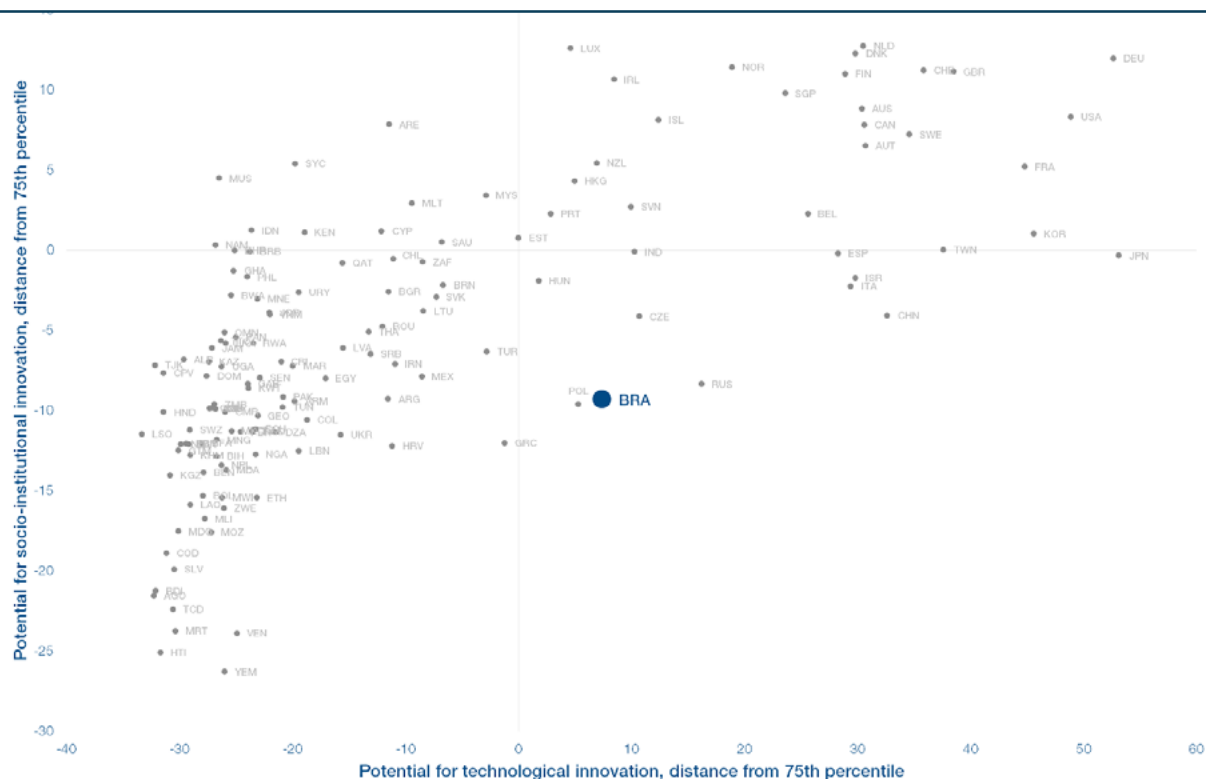


The COVID-19 disruption represents a unique opportunity to pilot breakthrough technological and socio-institutional innovations that have the potential to grow into entire new markets. Countries in which actors will be able to mobilize and coordinate, and where market concentration in industries adjacent to the new markets is not too high – those that can either participate or otherwise be affected by them – are likely to benefit the most.

For optimal societal outcomes, the markets of tomorrow should be designed around fair and sustainable ways of producing and distributing value, for example through a more symbiotic collaboration between the public and private sectors and innovative models of financing research and development, managing intellectual property and designing the public sector's risk-taking into the new ventures. Especially at the country-level, public institutions have a key role to play in catalysing public-private collaboration and creating the systemic conditions for selected markets to emerge.

## THE OPPORTUNITIES FOR BRAZIL

The available data on technological development is limited, and is even rarer on socio-institutional innovation. Preliminary mapping of country readiness reveals that countries with advanced technological capabilities, strong social capital and public institutions that shape future oriented visions are likely to be better placed to successfully create a broader range of markets for economic transformation.



Selected indicators from the World Economic Forum's Global Competitiveness Index 2019 have been used to provide an initial assessment of country capacity to develop new markets across the two dimensions of technological and socio-institutional innovation, thereby transforming their economies.

The two dimensions are proxied respectively by their performance on research and development (patent applications, scientific publications, R&D expenditures and prominence of scientific institutions), and their level of social capital and future orientation of government (commitment to sustainability and capacity to provide a long-term vision for the country, adapt legislation to changes and new technologies, and provide policy stability).

The figures are centred on the 75th percentile of each dimension. As shown in the figure, countries with a potential for socio-institutional innovation above the 75th percentile of the distribution lie in the upper part of the plot; countries with potential for technological innovation above the 75th percentile appear on the right-hand side.

Countries in the upper-right quadrant present favourable conditions to develop and pilot both breakthrough technological and socio-institutional innovations. These countries are predominantly advanced economies. India, Spain and Japan are just below the bar in terms of socio-institutional innovation, while the economy of Taiwan, China, is just above.

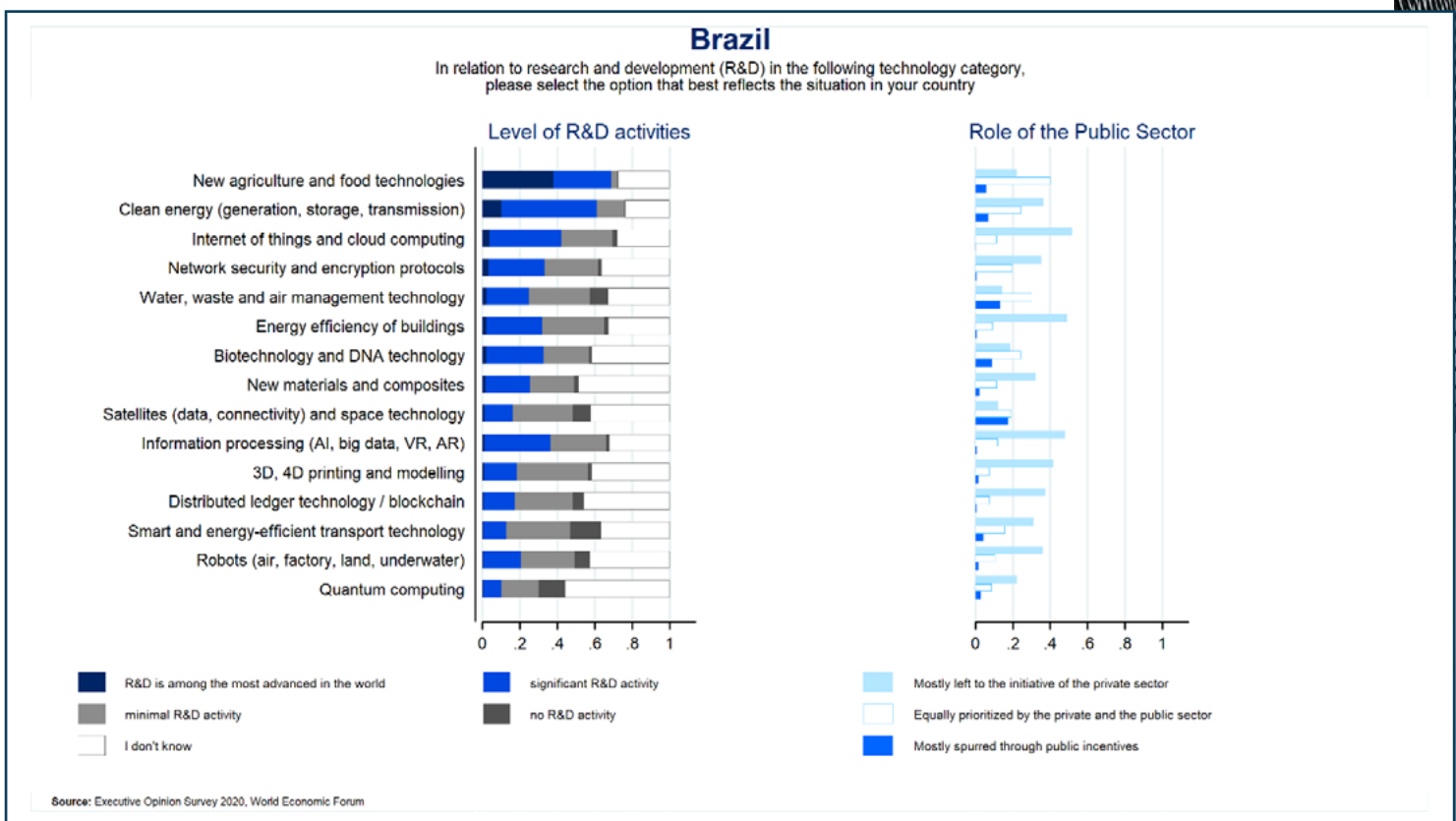
The upper-left quadrant includes countries that can rely on high levels of social capital and future orientation of policy-makers but do not yet have a mature technological system. They are well positioned to transform their economies experimenting solutions based on socio-institutional innovation. They include many high-income economies from the Middle-East (Bahrain, Saudi Arabia, United Arab Emirates) and East Asia (Indonesia, Malaysia) as well as a number of small island states at various levels of development (Barbados, Cyprus, Malta, Mauritius, Seychelles) and emerging African countries (Kenya and Namibia).

A third group of countries present solid technological systems but not an equally solid and dynamic social and institutional fabric. They appear in the bottom-right quadrant. Brazil falls within this last category, together with India, Spain and Japan – already mentioned – a handful of advanced economies



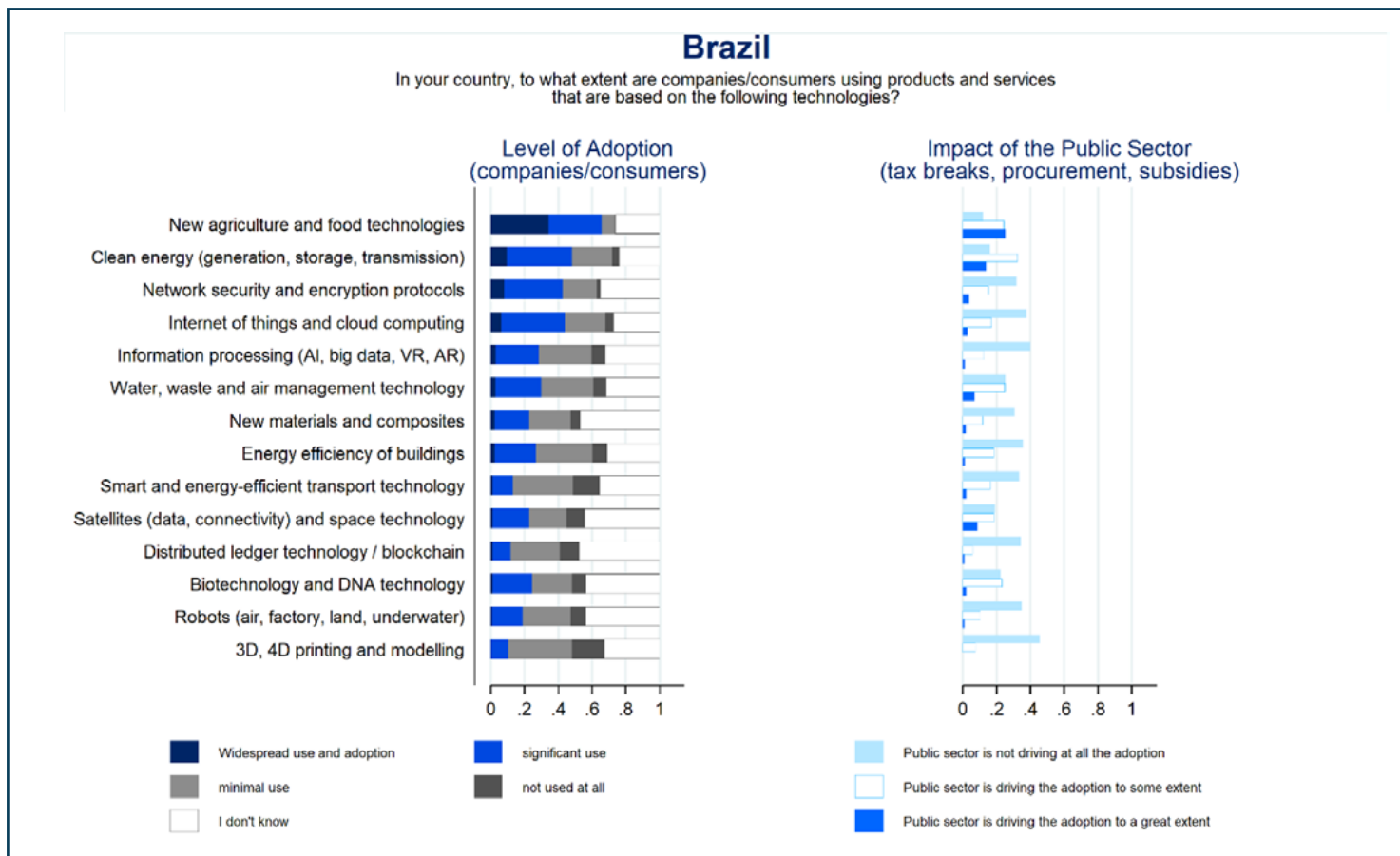
(Czech Republic, Israel, Italy), the rest of the “BRIC” and other emerging countries (Hungary, Poland, Russian Federation and China).

Data from the World Economic Forum Executive Opinion Survey, conducted in Brazil in collaboration with Fundação Dom Cabral, can help identify where the strengths lie in terms of technological innovation, and what role public institutions are playing in driving advances in both research and development (R&D) and adoption of fifteen technology clusters. The invention and production of many new markets will depend on the know-how present in the country related to one or more of these clusters.



New agriculture and food technologies are by far the cluster where Brazil can compete at global levels, with almost 40% of respondents stating that R&D in the country is among the most advanced in the world. There is significant R&D activity also in internet of things and cloud computing and in information processing technologies (AI, big data, VR and AR). The public sector plays a role in the development of many of these technologies, but data shows that countries are usually most successful in areas where both the public and the private sector equally prioritize development. Agrotech and foodtech are among these examples.

With the partial exception of information processing, technology clusters where R&D efforts are mostly left to the initiative of the private sector – with little or no public sector investment or co-investment – tend to appear in the bottom half of the ranking.



The role of the public sector appears similarly important in driving the adoption of products and services based on some of these technologies. Clean energy and – particularly – agrotech and foodtech are the clusters where government is most driving adoption through tax breaks, subsidies and public procurement. The support of the government is not as strong when it comes to the adoption of some of the IT-related technologies.

This information can be used to help identify which new markets Brazil might be able to nurture on the basis of its current technological know-how. Yet, it sheds light only on some of the conditions necessary for creating new markets (mostly invention and production). All new markets also require a dose of institutional innovation (new standards, codification, alignment on value) and a combined technical and institutional effort to foster demand and update infrastructure.



The assessment of the markets of tomorrow most relevant to each country will have to rely mostly on a consultative process and the qualitative assessment of stakeholders at the local level. Foresight methodologies such as Delphi surveys can be used to find convergence within the community and choose the directions to give to national industrial and innovation policies. The “embeddedness”<sup>4</sup> of public institutions within the broader technological and institutional ecosystem, the understanding of the knowledge and innovation capabilities available, and the connections and linkages among the different actors will determine the success of experimentations around these markets.



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Attilio Di Battista leads the development of a network of country-level public-private partnerships that focus on closing skills and innovation gaps. This includes the Brazil Closing the Skills Gap Country Accelerator established in partnership with the Ministry of Economy. His areas of expertise include innovation, technology and human capital. He leads the Forum's workstream on the Markets of Tomorrow and he has co-authored a number of flagship publications including the Global Competitiveness Report, the Global Information Technology Report and the Global Enabling Trade Report. Prior to joining the Forum, he has worked on developing export strategies at the International Trade Centre, a joint agency of the UN and the WTO. He holds a Masters' Degree in International Economics from the Graduate Institute of International and Development Studies of Geneva.



## NOTES AND REFERENCES

- 1 Cottam, Hilary, Welfare 5.0: Why we need a social revolution and how to make it happen, UCL Institute for Innovation and Public Purpose, Policy Report, 2020
- 2 This approach follows, among others, Geels, Frank, "From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory", *Research Policy*, vol. 33, no. 6-7, 2004, pp. 897-920; and Geels, Frank and Johan Schot, "Typology of sociotechnical transition pathways", *Research Policy*, vol. 36, no. 3, 2007, pp. 399-417. They define institutions (socio-technical regimes) as the set of formal and informal rules and beliefs shared within a broad community of citizens, policy-makers, scientists, businesses and social actors. This community of actors also shares the same socio-technical system – technology – which includes both the physical artefacts and the knowledge, capital, labour and cultural meaning that they embody and that are necessary to fulfil fundamental societal activities. Our notion of "technological systems and institutions" also echoes that of "technoeconomic paradigms" put forward by Freeman, Christopher and Carlota Perez, "Structural crisis of adjustment, business cycles and investment behaviour" in *Technical Change and Economic Theory*, edited by Giovanni Dosi, Christopher Freeman, Richard Nelson, Gerald Silverberg and Luc Soete, 38-66, Pinter, 1988.
- 3 World Economic Forum, *Building a Common Language for Skills at Work: a Global Taxonomy*, 2021
- 4 Rodrik, Dani, *Normalizing Industrial Policy*, The World Bank Commission on Growth and Development Working Paper, no. 3, 2008.