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Contribution by Iran

to the CSTD 2021-2022 priority themes on “Industry 4.0 for inclusive development”
and “Science, technology and innovation for sustainable urban development in a
post-COVID world”

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STI for sustainable urban development in a post –covid world

1. What are the concrete challenges that your country has encountered in transition towards sustainable urban development to make cities productive, inclusive and livable?

The issue of sustainable urban development is very multidimensional and complex. Regarding transition towards productive, inclusive and livable cities, the policy makers should achieve acceptable results in various fields including economy, mobility, security, healthcare, environment (water, energy, and waste), poverty reduction, education, and community engagement. Each of these fields has different objectives and challenges. However, we could mention some important subject which affects all of them from a general perspective; the challenges are divided into five categories: community engagement challenges, lack of clear objectives, criteria, and proper monitoring system, infrastructure challenges, governance challenges and finally economic challenges:

- 1- **Community engagement challenge:** the first important challenge is community and stakeholder engagement namely citizens, governments, and technology development companies.

Maximizing the engagement of all stakeholders including citizens, businesses, the innovation system, as well as legislatures and investment groups, are key principles to the success of the transition towards sustainable urban development. In fact, sustainable urban development is not achieved through a mandatory policy or a top-down process alone, and citizens, and private sectors may resist the changes resulting from the government for a variety of reasons.

Citizens, as the end customers of urban management services, and private sectors as the executive part, can play an effective role in supervising and putting forth strategic proposals. *There are different reasons that hinder community engagement* such as the:

- a. *lack* of a comprehensive plan for citizens' supervisory engagement at the level of involved organization
 - b. *lack* of an incentive system to attract such engagement
 - c. *Lack* of an informative system on the importance of using community's opinions and providing feedback on the use of opinions.
 - d. *Also*, the transition towards sustainable urban development should be citizen oriented, people must be able to use the facilities and services of the city, and this raises the need for public education and extensive culture building
- 2- **Lack of clear objectives, criteria, and proper monitoring system:** The second important challenge is lack of precise and clear objectives and related criteria, as well as lack of

appropriate monitoring systems. so there are several indicators that need to be measured but those indicators need to be measured that are aligned with the project objectives. For example, if the main objective of a city transition implementation project is a green city, the evaluation and measurement of environmental indicators will be of higher priority. in the following we provide some example for different aspects of urban transition important dimensions:

- a. **Environment:** Along with the development of urbanization and industrialization, environmental conditions are also a source of great concern in cities so we need to define specific goals regarding *production and emission of greenhouse gases, air quality, water source protection, reducing dry waste production are among the top priorities.*
 - b. **Mobility:** we need to have a clear goal regarding improving public transportation and traffic reduction.
 - c. **Energy** and its supply is a major problem for the world as well as the cities today. There must be enough energy in the right place and at everyone's disposal. Creating a culture and system of proper use of energy and preventing its loss is a great challenge. so related criteria for both supply and demand sides are essential
 - d. **Security and privacy:** another challenge in this area is lack of adequate security. citizens' data and other sensitive information would be accessible in an integrated and extensive platform. so objectives and criteria regarding *data encryption, data ownership, cyber terrorism and so one should be difiend, implemented and evaluated.*
 - e. **Healthcare:** the health case is another important dimension. The ultimate goal here is to increase the quality and quantity of life. here to achieve these objectives urban management should defined many criteria and sub objectives like *Advanced treatment of chronic diseases, Use of data to combat preventable diseases, New ways to connect with patients*
 - f. **other dimensions:** *there are many other objectives and criteria needed to be designed and implemented regarding The Need for Education, Promotion, and Culture, and so on,*
- 3- **Advanced infrastructure and related technological challenges:** A major challenge related to transition towards sustainable urban development is the shortage of required infrastructure in transport, ICT, energy and so on:
- a. One of the most important required infrastructures is the development of information and communication technology. Low bandwidth of the Internet in

Iran and the need for high-speed Internet becomes increasingly significant, so development of the **5G** project as a flagship project is among the top priorities.

- b. Development of technology infrastructures independently and regardless of use in other fields is another problem. For instance, the **integration** of infrastructure in the various fields of energy, transportation, and information technology must be taken into account.
 - c. The complexity of designing and creating models that support new technologies like **IoT** also must be considered.
- 4- **Governance Challenges:** One of the most important challenges for developing countries like Iran is related to the governance challenges:
- a. One of the main problems in the governance challenge is the lack of integrated urban management which affects the transition to the sustainable urban city via related problems in decision-making and coordination. Considering the structure of urban governance in Iran, intersectoral cooperation and synergy of all stakeholders in urban governance, including various urban management, governmental, and governance institutions are also of particular importance and impact.
 - b. Lack of proper structure and division of labor for transition is another problem. we need to have a governance model in three different levels:
 - i. In the **first** stage, it is necessary for an independent institution to take on the task of policy-making and decision-making in all aspects of urban management.
 - ii. In **second** stage, an organization independent of the policy-making body should be held responsible for managing the integrated supervisory system
 - iii. **Finally**, the executive affairs will be left to the private sector. considering that one of the main goals of urban transition is to transfer the burden of service provision from urban management to private business
- 5- **Economic Challenges** - The transition towards sustainable urban development requires large investments from different perspectives. However, in developing countries, given the low incomes and economic hardship, this is a greater challenge.

2. How has the Covid-19 pandemic so far impacted on sustainable urban development, and what lessons could we draw from the Covid-19 pandemic on sustainable urban development?

High population density makes health services a challenge especially in the case of pandemic. Technology plays a critical role in medical care services:

One of the issues that have come to the world's attention following the widespread outbreak of Covid-19 in early 2020 is the use of innovative technologies to slow down or break the chain of the virus outbreak. Urban management and decisions in the cities are based on data analysis and various technologies and tools are used to improve the citizens' quality of life.

1- information and awareness:

- Urban and citizenship data and self declaration
- Hospital data collection
- Use apps for notification

2- promote online services and shopping

- Digitalization of services
- Mega app, digital platform
- Electronic payment

3- teleworking

- App for meeting
- teleworking
- Cloud program

4- Travel and traffic management

- Smart traffic ban
- Smart permission based pass
- Observe social distance

5- monitoring and tracking

- Smart controlling using traffic camera
- Using digital twin
- Smart fine

6- detection

- Various technologies for rapid and accurate detection

7- healthcare services

- Vaccination
- Drugs
- Medical devices

3. What projects/policies has your country implemented to use science, technology, and innovation to make cities productive, inclusive and livable? What are the main outcomes? What are the main challenges confronted while trying to implement these projects/policies?

we design and implement a framework for supporting, developing and disseminating innovation that include diverse dimensions: individual entrepreneurs, talents and innovative businesses, infrastructures, policy making and governance, market shaping and stimulation, synergy and networking, financing, commercialization infrastructure, education, and research.

Based on these dimensions, municipalities have important roles in supporting urban innovation by shaping the market and stimulating innovation demand, providing a platform for the development of innovative businesses, financing and capital provision, promoting innovation and entrepreneurship culture, providing physical and commercialization infrastructure, supporting training, research, networking.

4. Can you provide examples of policies/projects/initiatives aimed at strengthening national STI capabilities for sustainable urban development? For example, how does your country build technology and innovative capabilities through investments in R&D and human capital? What institutional and regulatory arrangements are in place to stimulate R & D and innovation, and to effectively address unintended consequences of technological innovation, such as privacy,ethical, gender and other concerns?

The public budget is not enough for transition toward sustainable urban development Therefore, the need to promote a new model of service delivery is vital.

In this model, the services and products should be provided in accordance with the needs of citizens, via the private sector. The government's role is to provide incentives for innovative business models.

One of the good examples of this approach is Smart Waste Management Systems in Iran. By considering the complexity of the contractors' agreements with the city administration, STI policy makers try to make the outsourcing process more transparent and attract the attentionof the startups and entrepreneurs to cooperate with the municipality administration

5. Could you suggest the contact person(s) of the nodal agency responsible for projects/policiesor international collaboration related to the theme? We might contact them for further inputs.

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Industry 4.0 for inclusive development

1. What are national strategies, policies, laws, programs, and initiatives concerning industry 4.0?

Smartness, digitalization and sustainability are at the core of future scenarios for societies and economies. In a few coming years, the world will change dramatically. Industry 4.0 is a key driver for these changes and will converge many advanced technologies especially digital technologies to boost productivity and disrupt the business models. Like the other developing countries, Iran understands the opportunities and great potential of industry 4.0 for achieving competitive advantages.

The 5 pillars of Iran policies to catch up in industry 4.0 are as following:

1. Faster commercialization of advanced digital and production technologies through digital hub, accelerators, and CVCs
2. Reducing demand-side shortages for products and technologies of the Industrial Revolution through encouraging big industries to launch industry 4.0 projects. Many of the heavy and chemical industries like steel, petrochemical and car auto makers launch programs to digitize their process.
3. Upgrade skills for advanced production through organizing boot camp, startup weekends
4. provide consulting services for digitalization via maturity models and transition roadmap
5. Industry 4.0 Innovation Ecosystem building by establishing specialized funds and accelerators.

2. What are the key industries that are pioneer Industry 4.0 innovation in the country? List the key actors in the national ecosystem of innovation related to Industry 4.0 in your country (firms, universities, financial institutions, regulators)? What are the key networks of the ecosystem in your country (including online networks, innovation hubs, forums, etc.)?

Heavy industries like steel industry and petrochemical mega plants are among the pioneers in using industry 4.0 in Iran. Transformation of these energy

intensive industries is vital for increasing their competitiveness and achieving sustainability by reducing energy and water consumption.

The key actors in Iran are the ministry of Industry, Mine and Trade, ministry of Communications and Information Technology, ministry of energy and vice presidency for science and technology.

3. What are the challenges that your government have faced or may face for promoting Industry4.0 in your country to contribute to national development priorities and accelerate the progress towards the SDGs?:

- 1- Lack of awareness about pros and cons of industry 4.0 among stakeholder including society and policy makers
- 2- The unilateral coercive measures which impede technology transfer and international collaboration and learning
- 3- Demand shortage: small size of the domestic market, and challenges of implementing export oriented policies
- 4- lack of regulation capability: there are many balckboxes and concern regarding industry4.0 including the new issues the data governance, privacy and ethical issues
- 5- lack of proper Standards
- 6- lack of Technology infrastructures like:
 - a. 5G
 - b. NB IoT and LORA
 - c. Platforms for communication
 - d. Wireless and mobile communication network infrastructure
- 7- lack of laboratories infrastructure
- 8- Small share of private sector investment
- 9- Lack of skilled human capital
- 10- Lack of specialized consulting services for digital transformation

4. What should governments, the private sector, labor unions and other stakeholders do so that developing countries can benefit from these technologies?

The government intervention is crucial for industry 4.0 development since the market mechanism is not enough for industry 4.0 development especially in developing countries.

- 1- Designing and implementing regulatory framework for industry 4.0 technology development , adoption and diffusion
- 2- Market formation for industry 4.0 via matchmaking and reverse pitch platforms and events, and public procurement
- 3- Invest in domestic industrial R&D capability and human capital development
- 4- Innovation ecosystem development via specialized corporate accelerator, vc funds, lab and r&d infrastructure

5. What actions can the international community, including the CSTD, take to help your country take advantage of Industry 4.0 for inclusive and sustainable development?

- 1- Establishing Knowledge sharing platforms
- 2- Promoting technology transfer
- 3- providing consulting services for smes and mature industries
- 4- providing framework and guidelines for target industries in developing countries especially those affect sustainability and inclusiveness
- 5- human capacity development
- 6- supporting R&D joint projects

6. Could you suggest some contact persons of the nodal agency responsible for projects/policies and international collaboration in this context as well as any experts (from academia, private sector, civil society or government) dealing with projects in this area? We might contact them directly for further inputs or invite some of them as speakers for the CSTD inter-sessional panel and annual session.

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