POTENTIAL IMPACTS OF NATIONAL ABSORPTIVE CAPACITY IN INTERNET OF THINGS TO SOCIO-ECONOMIC ASPECTS IN SOME COUNTRIES AND LESSONS FOR VIETNAM

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Abstract:

From study of experience of some countries in determination of potential impacts of national absorptive capacity in Internet of Things (IoT) to socio-economic aspects, particularly to contributions to national GDP growth, as well as some international studies on the nature of national absorptive capacity and the linkage between this capacity and the extent of socio-economic impacts and its spillover effects, the paper will present the proposal of the research team on the project of analysis frame of national absorptive capacity in IoT of Vietnam in compatibility to socio-economic development and particularly in context of transition of economic structure to market mechanisms and international integration. Also, the paper provides some initial recommendations for policies to enhance the national absorptive capacity in IoT of Vietnam.

Keywords: *National absorptive capacity; Technological and economic spillover; Industrial IoT.*

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1. From technological spillover to economic spillover in industrial Internet of Things (IIoT)

1.1. Technological spillover

In efforts for shifting from industry based economy (industrial economy) to information based economy (digital economy) many countries put focuses on Internet of Things (IoT) applications in industry and manufacturing sectors which are considered as means for fast growth rate. However, they would not successfully exploit and maximally use IoT offered opportunities if they do not construct adequate facilitating conditions. In order to achieve these expected outcomes, the nations get aware of importance of National Absorptive Capacity (NAC) which disabilities to use innovations for

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creating successes of economic development and social fair and then, through them, make impacts to national economic growth. IIoT is understood as "the use of internet of things technologies to enhance manufacturing and industrial processes"[2], which were shaped from industrial application of networks of technologies containing physical objects for communication and interaction with environment. In industrial sector, the creation of linking networks through sensors which monitor operation of machines/equipment and production conveyors in mining sector allowed the reduction of production costs on basis of optimization operations in production procedures. In agricultural sector, similar networks were built up in farms for effective use of natural resources and higher crops of cultivation activities. In health care sector, some applications were made in digital health care practice to orient to environment friendly living styles.

In the process of electrification process of Western countries, the US made many successes in the whole national economic system thanks to exploitation of far going propagation of electrical technologies. Finally, thanks to these technologies, the US achieved the electricity use rate per capita higher than European countries do - the fact considered as important to enhance the speed of national economic growth. This reason explains the electricity based outstanding development of the US where these technologies were applied largely in the whole US economy. This is the background for proposal of advanced production organizing modes for maximal exploitation of potentials of technologies for socio-economic development.

The set up of electrically run plants in the US justifies the above noted argument. Before the start of electrification process, workers had to gather around terminals of production procedures to convey semi-products from line to line and then assembled final products. Electrification changed the assembling concepts and practice which allowed to shorten and to facilitate the transportation of semi-products by conveying lines which were operated by electrical engines without needs to make workers move from terminal to terminal. This renovation allowed saving thousands working hours, lowering production costs and leading to standardization of producing/manufacturing operations. During 1920s, the US industry was designed to operate series of plants on basis of proposals by manufacturing engineers and retraining courses to adapt workers to the new working climate. After many decades, electrification passed over producing sectors and started causing impacts to production of goods. By 1950s, about 94%

[2] Definition of Industrial Internet of Thing (IIoT). From "IIoT use cases put spotlight on IoT benefits,challenges.<https://internetofthingsagenda.techtarget.com/definition/Industrial-Internet-of-Things-IIoT#>

of US families used electrical home appliances which offered great demands for production of electrical home appliances.

The US abilities to exploit electricity use for higher economic potentials, better than other countries do, illustrate a truth that the technological spillover is different from economic spillover. While the technological spillover exhibits a narrow process of technological adaptation, the economic spillover implies greater economic shocks. This process begins with the technological spillover but also exhibits the growth, renovation and finance resources scattering over all the economic and industrial sectors. The entrepreneurship and consuming culture in the US combined with favourable business climate pushed up electrification in the whole national economy. In this process of economic spillover another revolution started, namely the one of individual modes, entrepreneurship and government staffs in their daily practice of routine works. Actually, we are observing a similar revolution which is the one of IIoT. The problem here, however, is the level of success of these nations to exploit IIoT offered economic potentials depends on their abilities to construct favourable conditions for economic spillover from IIoT.

According to Ian Goldin, professor from Oxford University, "Electrification changed all the ways we live and work and the extent of shocks from these shifts may occur similarly for IIoT".

1.2. Economic spillover

The extent of technological spillover as well as the one of economic spillover is different between countries in the world. In the US, an entrepreneurship culture combined with favourable climate was successful in exploitation of economic shocks/economic spillover of electrification. If a nation is not aware of the difference between technological spillover and economic spillover, and fails to constructive supports for economic spillover of IoT, there would be a high risk for failure of this nation in its efforts to create positive shocks from IIoT offered economic spillover.

The economic spillover of technologies is a process with 4 segments on basis of their successive sequences and mutual heritages.

Segment 1 - Appearance of technologies

First all, technologies come from a group of users in some parts of markets and economic sectors. At this stage, the intervention by the State plays important roles to support development of technologies up to its economic spillover and it is important efforts to help Internet become a background of IIoT.

Segment 2 - Innovation and large application

When technologies keep on to be improved, there comes the process of State or market controlled process to build up standards. At this stage, other industrial sectors begin conducting the process of renovation of core technologies and exploitation of values offered by these technologies. We can sense the dynamism of technological companies which wish to become leading figures in IIoT, and products gradually shift to consumption and trade fields (Consumer Internet of Things - CIoT) *(Miraz M. et al., 2018)*. This process passed fast thanks to the IIoT infrastructure which was built on background of communication infrastructure. Then users/clients, businessmen and innovating actors can exploit the IIoT offered advantages with relatively low costs.

Segment 3 - Organizational and social transition

Actually, many developed economies in the world are in this stage when the IIoT related technologies start changing the society. The US electrification experiences still keep high values of reference. When the technologies experience large possibilities of application the electricity becomes a component not separated from production systems. Then electrolyzed consumption products, from vacuum cleaners to radio and television sets, have changed the individual daily living mode. The deep and broad change deriving from electrification may be repeated now with the IIoT development.

Segment 4 - Development cycle and self-created sustainable innovation

Technologies experience such a spillover in the whole economy at the extent that no one can exist without using advances offered by these technologies. It was a long process from electrification which leads to electronic sector, high performance, actual Internet and close future IIoT.

Possibility of being left behind:

Despite of high potential of transformability of technologies, the nations can be left behind in process of economic spillover if the constructive conditions were not formed immediately since starting stages. Actually, many countries make efforts to create accessibilities to Internet of the whole economy. Many leaders do their best to pass over obstacles of IIoT development through promulgating policies to support development of infrastructure, and to build up skills of labour resources, better management system, openness and linkage to global economy and innovation.

There is, however, no single answer to different problems. National leaders should recognize challenges in maximal exploitation of economic spillover

from IIoT. The answers to the following 4 questions help them get optimal strategies.

Question 1 - Which is the field the nation needs most to improve for maximal exploitation of economic potentials offered by IIoT? What to do for creating factors necessary for IIoT? As to build backgrounds of skills for IIoT, would the nation develop itself talents from its available national resources (doing itself) or issue immigration policies to attract talents from external sources (buying)?

Question 2 - Where does the nation focus resources for IIoT development? The time and finance factors play important roles in selecting resources for gaining benefits from IIoT. In case of nations with agriculture based economy, the building of sensor networks would help agricultural cultivation and irrigation to maximally mobilize effective use for exploitation of their competitive advantages.

Question 3 - Who will determine directions of economic spillover of IIoT? The nation has to face the choice between the participation by the State and the contribution by private resources. Not important who guide this process, in any case the State needs to play the supporting roles for cooperation between the State and related parties (enterprises, training and research sectors and NGOs) for promotion of economic spillover of IIoT and for insurance that the existing regulations do not cause impacts preventing innovation.

Question 4 - When is it needed to re-evaluate the policy frame for IIoT? The Government has to change in time the policy frame due to very fast development of IIoT. The focused and controlled development model of IIoT has to shift gradually to a new model based on stimulation of private sectors, once the economic spillover gets achieved.

Business leaders and policy makers, both of them, understand economic potential shocks from IIoT. The development of technologies is different from the exploitation of economic potentials offered by technologies. In order to achieve these objectives, it is necessary to establish certain conditions where policy makers would lead their nation to follow right road maps for exploitation of economic potentials offered by IIoT.

According to Purdy M., researcher from Accenture Organization, “the development of technologies is not similar to the exploitation of economic potentials offered by these new technologies and then the starting point should be the level of policies the State has to construct right conditions necessary for exploitation of economic potentials”.

2. Challenges from economic spillover in IIoT and national absorptive capacities for IoT

According to Carlota Perez, professor from London Economic School, "the leading position in IoT does not mean only technologies but necessarily the institutions of constructive nature".

Historic lessons show that for achievement of economic spillover in a sector, every nation has to conduct innovations and, through that, to achieve economic development and social fair. The national absorptive capacities are deciding factors for exploitation of economic potentials from IIoT. This requires changing approaching ways from the only focused efforts for technological development to approaching ways of constructive nature coupled with conditions necessary for turning technological spillover to economic spillover. By other words, the capacities for economic spillover of IIoT at national level depend on the 4 pillars of the national absorptive capacities including: (i) Pillar 1 - General readiness of economy; (ii) Pillar 2 - Taking-off factors; (iii) Pillar 3 -Transfer factors; and (iv) Pillar 4 - Dynamo for innovation and creativity *(Purdy M. and Davarzani L., 2015; Frontier-economics, 2018)*.

Pillar 1 - General readiness of economy - economic factors

The general readiness of economy is the business climate and the total set of resources through which enterprises can carry out business activities. The main factor of economic climate is the well trained human resources, healthily operating financial system, strong and dynamic network of local suppliers and distributors, and, on the top, well, effectively and efficiently administered policies. Together with that, the communication infrastructure - Internet - plays important roles among readiness factors for IIoT. The concrete factors include: (i) Communication infrastructure; (ii) Human resources; (iii) Quality of institutional and managerial frame; (iv) Possibility of access to capital resources; and (v) Openness level of economy.

Pillar 2 -Taking-off factors

Taking-off factors provide supports for turning progressive technologies to useful applications, products and services. With solid technological backgrounds, enterprises in particular and the whole society in general can maximally use new technological advances and then, through that, enhance and scale-up creativity. The concrete factors include: (i) Supports and finances by the Government for R&D sector; (ii) High quality human

resources for STEM talents; (iii) Quality of scientific and research organizations; (iv) Regulations for standards and norms; (v) Urbanization level; and (vi) Extension of middle class (economic growth and insurance of fair distribution of incomes, insurance of growth of general needs of the economy).

For example, when the electrical infrastructure starts being formed and developing, a great serial of inventions such as radio and television get integrated and then help many economies in the world develop and enhance economic spillover effects of electrification. The appearance of a great number of high tech companies, the strong increase of high quality human resources and R&D supports by the State for IIoT are supply-side factors which push up growths in IIoT. Regarding demand-side factors, the urbanization and growth of middle class are also factors which push up demands of use of IIoT. IIoT will develop maximally at the point where the two sides demand and supply meet each other. It is the time the market gets matured enough to make appear needs of use of IoT products and services, and the technological enterprises compete for development of technologies for lower costs and higher quality of products.

Pillar 3 - Transfer factors

Transfer factors are actors offering favourable conditions for technologies to enter deeply into all the socio-economic sectors and, from that, catalyse the changes in business and consumption behaviours, and all the social aspects. These factors do not only include actors of technological nature but, more important, actors offering favourable conditions for transition in organizational and social structures where technologies are being applied.

The main transfer factors are the knowledge transfer and the changes of social norms and business norms to promote application of new technologies. They may be models of organization, practice and ways of governance. The concrete factors include: (i) Official and non-official transfer of knowledge; (ii) Ability of organizations in application of new technologies inside organizations; (iii) Readiness by the society and consumers to pay for new technologies; and (iv) Protection of rights to privacy and security.

For example, the economic spillover of Internet during the last two decades shows the evolution of technologies from supply of application limited in email and sharing soft data files to background of business modes and living ways and sharing by consumers in digital economy.

Pillar 4 - Dynamo for innovation

Dynamo for innovation get available when technology producers can create and develop products in sustainable manner. It is the time when technological background gets mastered strongly, created and developed for application in other fields and multiplied further, and when multiple layers of products and services get produced. The concrete factors include: (i) Startup culture and entrepreneurship; (ii) Makerism activities; (iii) Development of clusters of technological sectors; and (iv) Focused attentions by organizations for needs of clients.

For example, the development of electronic sector leads to formation and development of modern computing machine sectors, and, once combined with communication, further leads to formation and development of Internet and IIoT. The quality of the national research eco-system, the formation of technological clusters and the entrepreneurship culture are factors contributing to the growth of innovations. The trends of makerism activities viewed as self-created culture which is based on breaking-through technologies (such as 3D printing) will be the remarkable specific features of IIoT based economy. Actually, self-manufacturers give significant contributions to the global economy through domestic applications of IIoT and market promotion of these innovations.

3. Measurement of potential impacts from economic spillover of IIoT

For clarification of impacts from National absorptive capacities to economic spillover of IIoT, the research team of Accenture had cooperated with Frontier Economics to build up a model for measurement of direct and indirect impacts of IIoT to GDP growth in 20 developed and developing countries. Two scenarios were developed where the first scenario deals with the evaluation of shocks from IIoT in actually existing conditions and the second scenario deals with the evaluation of shocks from IIoT with additional measures.

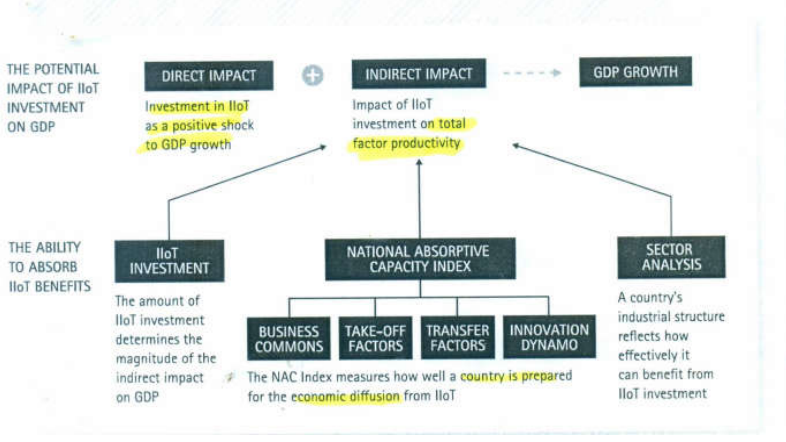
For the first scenario, the research of the model shows that in the present conditions, the investments for IIoT can make certain contributions to GDP growth (average increase by 1% per year for following years) and can come to the value of about USD10.6 billions by 2030 in these 20 countries.

For the second scenario, the research of the model shows that potential economic shocks from IIoT are significantly greater. Through investments for IIoT and the implementation of some additional measures to increase

NAC index, IIoT gives contributions to GDP growth (average increase by 1.5% per year for following years and come to the value of about USD14.2 billion by 2030 (the additionally created value is USD3.6 billion) *(Mark Purdy and Ladan Davarzani, 2015)*. Shocks and the extent of economic spillover of IIoT depend on the strength of the 4 pillars of NAC.

For higher values of NAC related indexes, business leaders and policy makers should act to improve at least one of these 4 pillars of NAC. The selection of actual factors of the pillars depends on contexts and development levels of every country. Figure 1 describes the model and the way for determination (direct and indirect) of investments for IIoT to GDP growth rate.

According to the model for determination of shocks from investments for IIoT to GDP growth rates in Figure 1, the investments for IIoT cause direct shocks to GDP growth rates (average increase by 1% per year for following years) and comes to the value of USD10.6 billion by 2030. In addition to that, *the construction of necessary factors from the 4 pillars of NAC reflects the readiness of the country for economic spillover from IIoT which causes indirect shocks to GDP growth rates (average additional increase by 0.5% per year for following years) and makes additionally the values of USD3.6 billion by 2030.*



Source: Purdy M. and Davarzani L. (2015)

Figure 1. Potential shocks of investments for IIoT to GDP growth

4. Modes of oriented implementation to achieve economic spillover of IIoT

The NAC indexes provide business leaders and policy makers with reasons/factors preventing development of IIoT, and, at the same time, help selecting priorities of investment for sectors in needs of supports. In

addition, there exist 5 modes of oriented implementation to achieve economic spillover of IIoT.

Mode 1 -Focusing on strong advantages of the country

The first question: Is the national economy based on high techs or agriculture? The answer to this question helps business leaders and policy makers to select suitable investment strategies in context of limited resources. For example, during recent years, India has become the world's center of agriculture. Through the "Digital India Initiative", the Indian Government is making efforts for exploitation of these advantages. The "Smart Agriculture Program" helps farmers apply IoT technologies for monitoring the temperature of barley and then get reminded for dangerous high temperature for crops.

Mode 2 - Creating activities of link in the whole national economy

IIoT has potentials to create a new eco-system for solution of existing problems on traditional borders between economic sectors and chains of value. The trends oriented to hybrid production and service sectors help agricultural equipment producers cooperate with fertilizer suppliers and insurance suppliers for creating a suitable system of equipment supplies. Policy makers need to encourage enterprises to have visions over the border of their sectors and to set up cooperation for building new modes/models for production and business activities.

Mode 3 - Recovering ineffective exploitation of resources

In efforts for maximal exploitation of economic spillover of IIoT, many countries found out the shortage of capacities in terms of skills, capitals and technologies. Policy makers have to decide the choice between making itself or buying these capacities. They may build up talents from the available resources of the country. Or, for faster moves, they may adjust immigration policies to attract talents from external sources. Similarly, they also have to settle the problems of shortage of technologies by attracting foreign investments and stimulation for transfer of technologies.

Mode 4 - Linking actors for cooperative connections

For promotion of innovation in IIoT, the Government needs to use networks of concerned parties (such as production sectors, research institutes/universities and NGOs) for sharing ideas and good experiences and then determining scopes of research cooperation. The Government also plays important roles for enhancing cooperation activities between companies in international and regional levels as well as between national

and local levels of SMEs and startups. For example, the initiative by the South Korean Government to build up the creative economy has mobilized local governments and companies to set up innovation centers focused on IIoT capacities. This network also cooperates with SMEs for modernization of operating capacities of these enterprises by using IIoT technologies. The participation and the membership of the network help policy makers design regulations which would not prevent innovative activities.

Mode 5 - Promotion of investment

For promoting business leaders to make investments for IIoT it is necessary to support trials of some demo projects of IIoT application. For example, Singapore makes trials of unmanned vehicles during recent years and encourages enterprises and scientists to try demo projects with large participation of public communities. Such programs help enhance awareness on benefits from IIoT which can create consensus visions on development directions of industrial services, both traditional and emerging. Also, participants need to share experiences of success among the whole community of enterprises to orient them to concrete actions.

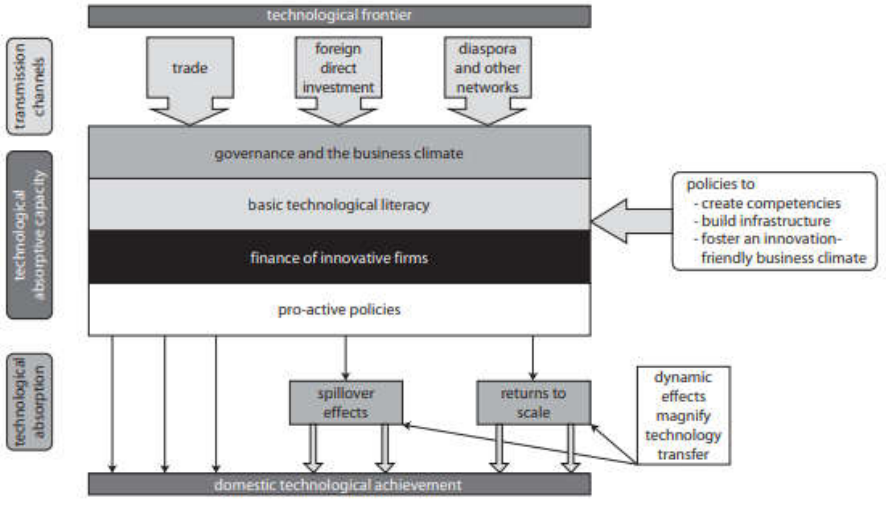
According to Purdy M. And DavarzaniL. In Accenture, "In the countries which wish to get remarkable growths in the digital era, IIoT can be viewed as a game changer". However, without construction of important conditions, these opportunities have no ways to become reality. Countries can start the game by enhancing awareness of importance of pillars in NAC and then exploitation of their potentials for achievement of IIoT based economic growth. Once being equipped with this knowledge, business leaders and policy makers can design the economic system in directions which can help the nation get economic growth and prosperity".

5. Lessons suggested for Vietnam in building the frame of analysis of national absorptive capacities of IoT and some recommendations for policies to enhance national absorptive capacities of IoT

5.1. Analysis frame for national absorptive capacities of IoT of Vietnam

According to a study by World Bank (2010), the national technological absorptive capacities are actors to transform the propagation and application of advanced technologies from external sources into internal technological advances and, through that, to give contributions to socio-economic development. In this process, the sources of import technologies mainly come from trade sectors (importation, purchase of technologies), foreign investments and denizens with rich technological qualifications. These sources of import technologies, through climate of suitable governance

and adequate policies, will be absorbed and transformed to domestic technological advances. Policies and mechanisms to enhance technological capacities, to build up infrastructure and to construct friendly business climate are found in center of institutional environment for enhancement of national technological absorptive capacities.



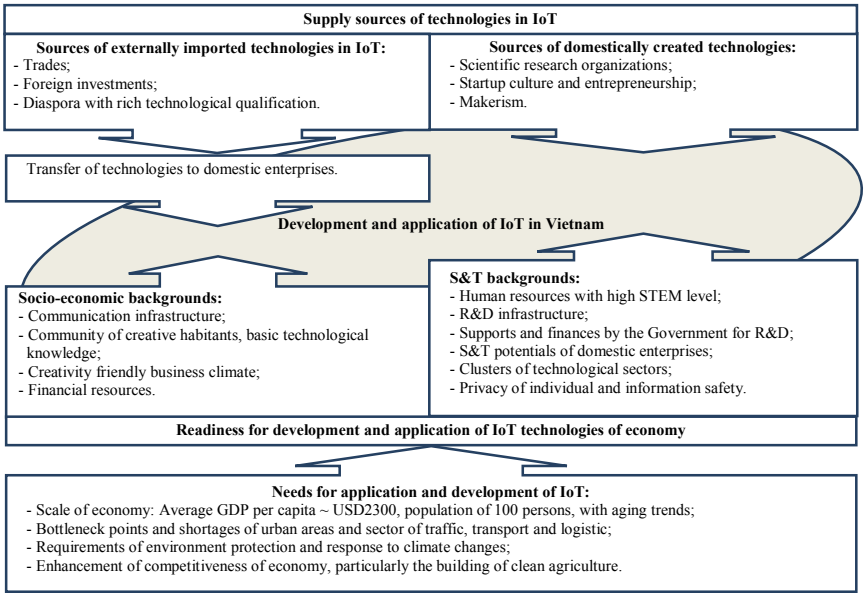
Source: World Bank, 2010

Figure 2. Scheme of the National technological absorptive capacities

Globally, the National technological absorptive capacities are viewed as important components of the National Innovation System (NIS) where the roles of the State include: (i) Supports for innovation activities through suitable encouraging mechanisms; (ii) Removal of barriers towards innovations; (iii) Construction of structures for study of supports for innovations; and (iv) Building communities of creative habitants with certain technological level on basis of adequate education system.

Combining the concepts and models of National technological absorptive capacities, World Bank (2010), 4 pillars for the technological absorptive capacities of IoT by Purdy M. and Davarzani L. (2015) and Frontier-economics (2018) as presented above, the research project team proposes the scheme for the technological absorptive capacities in IoT of Vietnam as follows.

In Fig. 3, we noted the relations between the technological absorptive capacities in IoT of Vietnam (capacities of developing and applying IoT) and the readiness for development and application of IoT technologies offered by the 4 pillars which are reflected through two groups: socio-economic background and R&D background.



Source: Research outcomes of the project team

Figure 3. Scheme proposed for the technological absorptive capacities in IoT of Vietnam

5.2. Some recommendations of initial policies for enhancement of national absorptive capacities of Vietnam[3]

Group 1 of policy measures - For Pillar 1(Global readiness of economy)

1. Naming and positioning IoT: The clear definition of the notions "IoT" and "IoT ecosystem" would focus on some entities with high applicability such as people with citizenship identity card integrated with RFID chip, natural resources/environment, traffic/transport means and cameras. In addition to that, it is necessary to identify clearly their positions and relations between IoT applications and socio-economic development for settlement of present bottleneck points, namely institutions, infrastructure and human resources, and, at the same time, enhancement of technological capacities. The fields and sectors in IoT where Vietnam needs to focus efforts for development and application include smart cities, transport infrastructure and smart logistic, smart agriculture, environment protection and response to climate changes.

[3] These policy recommendations are taken from Chapter 6 "Proposals for orientation of policies and solutions for development of IoT in Vietnam up to 2025", Bach Tan Sinh *et al. "Trends of development and perspectives of application for IoT in Vietnam for the period up to 2025".* Final report of Ministerial level research project.

2. Ensuring legal backgrounds for entities including the insurance of information safety for certain forms of Internet connected "things" (smart phones, monitoring cameras), formation of legal backgrounds of privacy and individual information confidentiality and mechanism for identification/certification of legal aspects of data of Internet connectable entities such as people and enterprises.
3. Building institutional backgrounds for connection of things including connection of data (big data and open data) with terms of duties of organizations in charge of information administration, enterprises, social organizations and people while accessing to and exploiting data at certain levels in conformity to rules for confidentiality, information safety and rights to information confidentiality of individuals and organizations.

Group 2 of policy measures 2- For Pillar 2 (Taking-off factors)

1. Building the National R&D System for IoT. Experiences of China in building of a national R&D system for IoT can be applied for Vietnam. The formation of a national R&D system for IoT of China is results of the 13th 5 year plan, 2016-2020 period. This system includes enterprises such as hub stations and distributors which provide operation and development of IoT systems. Research institutes/universities are focused on research of key technologies and standard setting organizations are responsible for setting up of IoT standards for application over the whole country. Up to now, the IoT based industry of China was shaped and focused in sea coastal regions such as Bohai Bay, Yangtze River Delta, Pearle River, as well as West region and Middle region of China *(Chen Shanzhi, 2014)*.
2. Training human resources for positions of leaders, managers, engineers and technicians in IoT sectors with startup and creative minds. Here the human resources include the ones for hardware and software development and admin management for development of IoT. Some programs are under implementation for training and developing S&T human resources, namely the State budget run project "Training and developing of S&T human resources home and abroad" (Project 2395) and the project for establishment of "National Innovation Center and Human resource network for realization of 4.0 National Strategies".
3. Considering the building of the network dedicated for IoT. For the networking aspects, presently many IoT services can be provided through 2G/3G networks and the network suppliers may not keep priorities for intensive investments to upgrade their networks. However, if the demands of IoT services are expected to get high the network

suppliers may need to consider to build up a network specifically dedicated for IoT. The market of IoT equipment is forecast to be in high demands in close future. Then, infrastructure suppliers are encouraged to orient minds to 4G and 5G and to be ready to offer suitable transmission infrastructure.

Group 3 of policy measures-For Pillar 3 (Transfer factors)

1. Orienting the integration of IoT for needs of the Government and the society to create competencies specifically dedicated for IoT based enterprises in Vietnam. The set up of creative ecosystems in E-Government where the government and users get increasing benefits was tried successfully in Da Nang City. The system offers conditions for shaping the background community of Open E-Government (OEP) with participation of large local enterprises such as VNPT, Hanel DTT and other enterprises in the region. The development of E-Government offers also opportunities of export for Vietnam companies, for example, the USD30 million valued project win by FPT in Bangladesh, development plans by Viettel in Africa and by Hanel DTT in Myanmar.
2. Creating IoT connections between domestic enterprises and overseas enterprises to make Vietnam IoT follow the common standards of the world. This proposal starts from experiences of Malaysia. The long term strategy for IoT development of Malaysia orients to a broad and open room for IoT with 3 objectives: (i) Creating Malaysia IoT with a model to link and to connect associations, enterprises and the Government; (ii) Creating open and creative background in IoT with focuses not only for standards but for frames of standards for different technologies for harmonic and global development of IoT; and (iii) Creating open frames of data for communities in a vision to a system of open public data for strong development of IoT based applications.
3. Consolidating security capacities for the whole IoT system. It is necessary to enhance the awareness and understanding of the roles of safety and security for network information in general and for IoT in particular, and emergency rescue capacities for the national information network. The measures include higher investments for activities of safety and security of network information, higher capacities of the national center for monitoring security of national network space, increase of the number of experts for network security in general and for security of network information in particular through cooperation with network security organizations in Vietnam (WhiteHat Network Security Forum set up and coordinated by BLAV) and international organizations (using hack tools for checking confidentiality level of IoT systems, creating trial tools of attack for identification of cyber security holes).

Group 4 of policy measures - Pillar 4 (Dynamo for innovation and creativity)

1. Building up a common and open background where all the actors can access to the IoT ecosystem. Actually, the ecosystems in Vietnam get separated in a vertical structure and develop as an individual tower. However, there is a global trend to build up a common and open background for accessibility of all developers. This would bring in long term benefits on basis of 3 reasons. *First,* with a common background the system can attract more developers on a global scale while, inversely, a close background surely limits the number of developers. *Second,* a common background can reduce costs for development of numerous individual backgrounds and costs for other sectors. *Third,* a common background can create an easier shift from one industrial sector to another one.
2. Offering supports for development of an open source background for IoT to extend fast IoT services on basis of needs of the Government and the society. The Government defines regulations of supports for startup enterprises through the creation of open sources on basis of hardware, software, open public data and social needs where startup enterprises can create fast flexible and suitable applications to meet social needs. One of the aspects related to public database is the formation of database to replace the identity cards and passports. With the actual growing rate of population by 1 million persons per year (figure by 2017[4]), Vietnam can have a 110 million population by 2030. With a plan to issue the Citizen ID to replace the ID card and passport, Vietnam will be a significant market to get economic advantages thanks to its large scale and reduced costs through provision of "smartized" solutions of Citizen ID coupled with a big and open data system for numerous purposes of use.
3. Supporting SMEs and startups for participation and development of IoT terminal products (sensors, gateways and etc.). The market of IoT equipment has become the target of SMEs and startups. The Government needs to provide the most possible information on global production and consumption markets of sensors for SMEs and startups. The topic of information confidentiality and upgrading of security modules gets increasingly important under new waves of intensive eyes of hackers on IoT equipment targets. Therefore the most attentions should be paid to confidentiality matters from initial stage of development of services to the terminal stage of equipment.

[4] Source: http://danso.org/viet-nam/

6. Conclusions

The technological spillover produces significant shocks to economic development, particularly in relations to investment activities and their outcomes. This result gets viewed not only on economic platform but many other aspects. For example, the investment for IoT in health care sector can bring in limited financial values but bring in great shocks to the whole society and people. Now being in initial stages of development of IoT, many organizations and companies highly active in development of IoT are searching business models suitable for IoT applications. Even with certain economic limitations, the IoT market is experiencing a highly intensive development with huge potentials. IoT, through practical observations, is capable of constructing new production-business forms-models in close future. Studies should be encouraged and supported for development and application of IoT due to its socio-economic impacts.

Actually, Vietnam is facing certain difficulties and challenges, namely: i) Limited awareness of various levels of organizations, enterprises and people on the roles and shocks of IoT to socio-economic development; ii) Lack of national strategies for development and application of IoT in short, middle and long term visions; and iii) Necessity to set up innovation and startup ecosystems in IoT where focuses are made on the roles of the State in construction of supports and push up of economic shocks from IIoT in socio-economic fields, building up of 5G infrastructure of communication network, setting up of a unified standards and higher levels of confidentiality-safety-security of IoT./.

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