Regulatory Environment in Development of National Innovation System: Case Study of Indonesia

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Abstract:- The rank of Global Innovation Index (GII) Indonesia was decreasing from 2007 to 2018. The detail data of GII shows that the regulatory environment – especially quality of regulatory – was not promote the development, the diffusion, and the use of innovation. The research question is "why the regulatory environment of Indonesia was not appropriate to be a framework for development of innovation?". This research aims to identify the basic regulation of innovation and to analyze the basic problem of the regulation to promote innovation. This research employs a research method that aims to generate findings towards understanding. Based on characteristics of the research objectives, the appropriate form of qualitative research is a case study with an interactive model analysis technique. Data were collected through literature and documented studies. The research findings indicate there are four major regulation which closely tied to development of innovation in Indonesia, namely *UU No. 18 Tahun 2002 tentang Sistem Nasional Penelitian, Pengembangan, dan Penerapan Ilmu Pengetahuan dan Teknologi; UU 25 Tahun 2004 tentang Sistem Perencanaan Pembangunan Nasional (SPPN) dan UU No. 17 Tahun 2007 tentang Rencana Pembangunan Jangka Panjang Nasional (RPJPN); UU No. 5 Tahun 2009 tentang Pelayanan Publik, and UU No. 23 Tahun 2014 tentang Pemerintahan Daerah*. The analysis indicate at least there are three basic problems related to innovation policies, which are: (a) less understanding of the innovation perspective and the national innovation system concept, (b) the less coherency of innovation policies in the long term and midterm national planning, and (c) there are no institution – which have the strong legal authority – to conduct the implementation of all the programs and activities of the national innovation system.

Keywords:- Regulatory Environment, Innovation Perspective, National Innovation System.

I. INTRODUCTION

Nowadays the word innovation has become a familiar word to the society. Innovation has become a global phenomenon that is believed - both by academics, practitioners and policy makers - to be a key driver of economic growth, development and better jobs. Innovation is also the key to success that enables companies to compete in the global market, and in the process, innovation is also a solution to the challenges of emerging social and economic conditions, ranging from climate change to resist the deadly diseases. Innovation is a source for improving the quality of everyday life, both in developed and developing countries.

The importance of the role of innovation for development has encouraged Cornell, INSEAD, and WIPO (the World Intellectual Property Organization) to collaborate in developing The Global Innovation Index (GII), an index that assesses the capabilities and success of various countries' innovations since 2007. In the first report, Indonesia was ranked 48th (out of 107 countries assessed), namely under Singapore (ranked 7th), Malaysia (26), and Thailand (34); but still above Vietnam (65), Philippines (66), and Cambodia (95). Meanwhile, three other ASEAN members - Brunei Darussalam, Laos and Myanmar - were not listed in the ranking due to lack of data availability. Ten years later, namely in 2017, Indonesia's position has fallen among ASEAN members, which is ranked 87th (out of 127 countries), only Cambodia (101) is positioned below Indonesia. Except Laos and Myanmar (which are again not recorded due to the unavailability of data). Other ASEAN countries have surpassed Indonesia, namely: Philippines (73), Brunei Darussalam (71), Thailand (51), Vietnam (47), Malaysia (37), and Singapore (7) (see table 1, table 2, figure 1 and figure 2).

Year	Indonesia's GII	Indicators*)						
		1	2	3	4	5	6	7
2007	48 (107)	-	-	-	-	-	-	-
2008-2009	48 (130)	103	23	85	48	62	29	33
2010	72 (132)	93	64	102	75	29	81	81
2011	99 (125)	90	96	81	97	94	94	89
2012	100 (141)	139	91	80	98	94	104	73
2013	85 (142)	138	99	82	99	112	81	57
2014	87 (143)	137	92	83	88	124	93	43
2015	97 (141)	130	87	85	86	124	100	78
2016	88 (128)	122	92	80	62	106	71	85
2017	87 (127)	120	92	81	64	96	70	77
2018	85 (126)	97	94	82	59	89	86	71

Table 1:- Indonesia's Innovation Ranking in Global Innovation Index (GII) for 2007-2018
Source: GII of 2007-2018

Explanation: *)   *Assessment Indicators*
- *Institution*
- *Human Capital & Research*
- *Infrastructure*
- *Market Sophistication*
- *Business Sophistication*
- *Knowledge and Technology Output*
- *Creative Output*

Year	Indonesia's GII	Institutional Rangking	Institutional Sub-Indicator		
			Political Environment	Regulatory Environment	Business Environment
2010	72 (132)	93	96	65	110
2011	99 (125)	90	80	95	92
2012	100 (141)	139	111	139	132
2013	85 (142)	138	103	139	121
2014	87 (143)	137	96	140	123
2015	97 (141)	130	86	138	114
2016	88 (128)	122	74	126	105
2017	87 (127)	120	89	126	79
2018	85 (126)	97	72	125	51

Table 2:- Ranking of Indonesia's Innovation Institution Sub-Indicators in GII 2010-2018
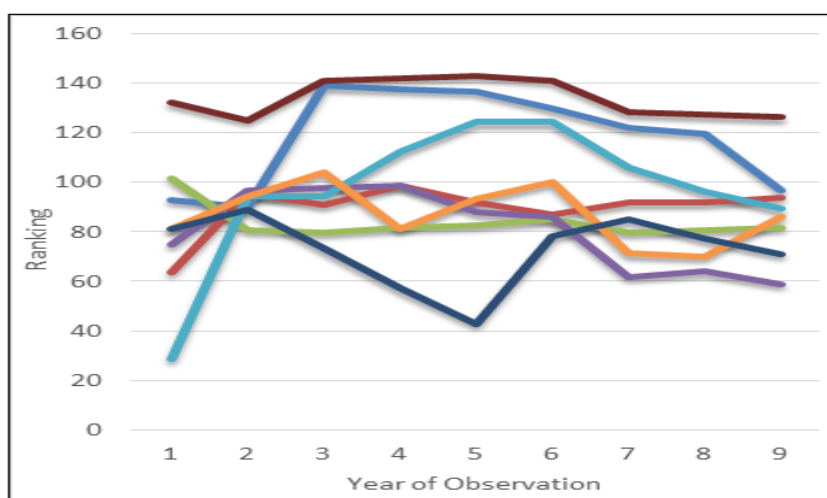Source: GII of 2010-2018

Fig 1:- Ranking of Indonesia's Innovations in the Global Innovation Index 2010-2018
Source: *Global Innovation Index 2010-2018*

Explanation :
- ─┼─ :*Institution*
- ─■─ : *Human Capital & Research*
- ─▲─ : *Infrastructure*
- ─✕─ : *Market Sophistication*
- ─✳─ : *Business Sophistication*
- ─●─ : *Knowledge and Technology Output*
- ─┼─ : *Creative Output*
- ─── : *Number of Countries Assessed*

Responding to the phenomenon of warning the innovation index above, of course many questions can be asked: What is the ranking system? Why is Indonesia's innovation far behind other countries especially the countries in ASEAN? What factors that inhibit innovation in Indonesia? Why that thing could happen? And so forth.

The GII assessment relies on two main components, namely the input components and output components. The input component emphasizes on the environment and infrastructure that sustain the possibility of innovation, and the output component emphasizes and measures the results of the innovation process. Furthermore, this input component is explained into 5 (five) indicators, namely: (1) institutions
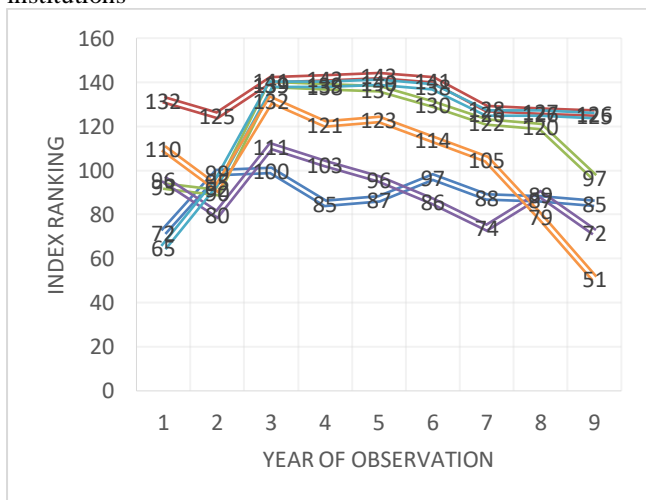

Fig 2:- Ranking of Sub-Indicators Institution of 2010-2018
Source: *Global Innovation Index of 2010-2018*

Explanation :
1. ─◆─ : *Indonesia's Ranking*
2. ─■─ : *Number of GII's Countries*
3. ─▲─ : *Institution*
4. ─✕─ : *Politic Environment*
5. ─✳─ : *Regulatory Environment*

(2) Human capital and research development, (3) infrastructure, (4) market sophistication, and (5) business sophistication. The output component consists of two indicators: (6) knowledge and technology outputs, and (7) creative outputs. The 7 indicators above are further elaborated into sub-indicators totaling 81 sub-indicators. Calculation of index scores is carried out through the sum of the averages of all these sub-indicators.

From the ranking in table 1 above, it can be seen that the indicator value of institutional input is a weak indicator (the bigger the ranking means the position nears the end). This indicator is divided into 3 (three) sub-indicators, namely: (1) political environment, (2) regulatory environment, and (3) business environment. Based on the data in table 2, it can be seen also, that among the three institutional indicators, the regulatory climate sub-indicator is the weakest sub-indicator. The increasingly deteriorating value of the regulatory environment sub-indicator since 2012, has accumulated a push for the ranking of institutional indicators to weaken, although for the other two indicators (political and business environment) shows a relatively improved ranking.

If you look further into the GII assessment procedure, it can be seen that the GII regulatory environmental assessment is referring to aspects that have been developed by the World Bank (2018), which include: (1) regulatory quality, (2) rule of law, and (3) the cost of redundancy dismissal. The regulatory climate sub-indicator describes two indices that aim to capture perceptions of the government's ability to formulate and implement integrated policies in promoting private sector development, and evaluate the extent to which the legal regulations apply.

The phenomenon of weak institutional indicators in the development of innovation in Indonesia has actually been stated by the OECD (the Organization for Economic and Co-Operation Development). The OECD's review in 2013 suggested that the institutions that sustain innovation in Indonesia are "densely populated, labyrinthine, and highly fragmented" (Ambardi, K., 2018: 19). Densely populated means the number of organizations and / or institutions that have the importance of increasing innovation power is very dense or overwhelming. Labyrinthine is meant for the many aisles of decision making with complicated and confusing intersections. The highly fragmented means the poor ability of various institutions to coordinate efficiently and effectively to make regulations, policies, and programs that encourage innovation in Indonesia.

The results of the Indonesia's ranking in GII 2007-2018 and the results of the OECD 2013 review above are certainly strong indications that there are institutional problems - especially regulatory aspects - that are fundamental in developing innovation in Indonesia. In relation to the research that will be carried out, the research question to be answered is: "Why can't the regulatory environment in the development of innovation in Indonesia develop properly?". Based on this research question, the research objectives are:
- Identifying regulations related to the development of innovation in Indonesia;
- Identify fundamental problems regarding regulatory environment/aspects in developing innovation in Indonesia.

II. METHODS

In general, the object of this research is the quality of regulation of innovation in Indonesia. The definition of regulatory quality used by GII is to refer to the definition developed by the World Bank (Worldwide Governance Indicator), which is "the government's ability to formulate and implement integrated innovation policies in promoting the development of private sector innovation". Therefore, specifically, the object of research is "the ability of the Indonesia's government to formulate and implement the integrated policies in promoting the development of private sector innovation". The scope of the study will be limited to the regulation of innovation at the macro scale policy level, namely the quality of regulations in the scope of national policies (Laws, Government Regulations, Ministerial Regulations, etc.) that are directly or indirectly related, but affect development national innovation.

Related to the research question, "why the quality of regulation in Indonesia cannot support the development of good innovation?". Then, to answer this question, of course investigative efforts will be needed on various regulations on innovation in Indonesia, and these efforts can only be done through research qualitative. With the consideration that: (a) the researcher does not involve herself as an innovation policy maker (who is fully involved in policy formulation activities; (b) the research context is not in organizational culture, but rather in observing relationships and interactions - interaction between organizational components and institutions, and (c) research does not give rise to a new or grounded form of initial theory, but rather the emergence of a more fundamental understanding in terms of innovation policy, the chosen research method is a case study method.

As stated by Schramm (1971 in Yin, 2009: 17) that the core - the main tendency - of the case study method is the purpose of explaining a policy or arrangement of policies about: why it was taken, how it was implemented, and what the results were. In addition to that, Yin (2004: 3) also states that the fundamental difference from the case study research method with other qualitative research methods is that when collecting data, case study researchers also carry out data analysis. In other words, in the case study research method, researchers collect and analyze data simultaneously.

For analyzing the data, an interactive analysis model will be used from Miles-Huberman (1992 in Gunawan, 2018: 11), namely through data reduction, data presentation, and conclusion drawing. The sources of data in this study are legislation concerning to innovation, literature, articles, journals, scientific research, and internet pages related to the object of research conducted.

III. RESULTS AND DISCUSSION

A. Regulations related to Innovation Development in Indonesia

The results of the search for macro regulations related to innovation policies that are of a macro nature, indicate that there are 4 (four) main regulatory grouping patterns. The above pattern of grouping is identified based on its character in forming derivative regulations (or operational policies) related to various aspects of innovation development. The four regulatory groups in question can be described as follows:

➢ Law group Number 18 year 2002 about the National System of Research, Development, and the Application of Science and Technology (UU SISNAS p3 IPTEK) (*Kelompok Undang-Undang No. 18 Tahun 2002 tentang Sistem Nasional Penelitian, Pengembangan, dan Penerapan Ilmu Pengetahuan dan Teknologi*), covering regulations:

- Government Regulation Number 35 Year 2007 about the Allocation of Part of the Business Entity's Income to Enhance Engineering, Innovation and Technology Diffusion Capabilities *(Peraturan Pemerintah No. 35 Tahun 2007 tentang Pengalokasian Sebagian Pendapatan Badan Usaha untuk Peningkatan Kemampuan Perekayasaan, Inovasi, dan Difusi Teknologi)*;

- Presidential Regulation Number 32 Year 2010 about the National Innovation Committee, as amended into Presidential Regulation Number 42 Year 2014 about the National Innovation Committee *(Peraturan Presiden No. 32 Tahun 2010 tentang Komite Inovasi Nasional, sebagaimana telah dirubah menjadi Peraturan Presiden No. 42 Tahun 2014 tentang Komite Inovasi Nasional)*;

- Presidential Regulation Number 106 Year 2017 about Science and Technology Areas *(Peraturan Presiden No. 106 Tahun 2017 tentang Kawasan Sains dan Teknologi)*;

- Presidential Regulation Number 38 Year 2018 about the National Research Master Plan for 2017-2045 *(Peraturan Presiden No. 38 Tahun 2018 tentang Rencana Induk Riset Nasional Tahun 2017-2045)*;

- Joint Regulation of the Minister of Research and Technology and Minister of Home Affairs Number 03 Year 2012 and Number 36 Year 2012 about Strengthening the Regional Innovation System *(Peraturan Bersama Menteri Riset dan Teknologi dan Menteri Dalam Negeri No. 03 Tahun 2012 dan No. 36 Tahun 2012 tentang Penguatan Sistem Inovasi Daerah)*;

- Guidelines for Facilitating the Capacity Building of Regional Research and Development Agencies (BPPD) Year 2017 *(Pedoman Fasilitasi Peningkatan Kapasitas Badan Penelitian dan Pengembangan Daerah (BPPD) Provinsi/Kabupaten/Kota Tahun 2017)*.

- Guide to the National Innovation System Research Incentive Program (INSINAS) of Phase II Year 2017, which is stipulated by the Directorate of Industrial Technology Development, Director General of

Research and Development Strengthening, Kemenristek-Dikti *(Panduan Program Insentif Riset Sistem Inovasi Nasional (INSINAS) Gelombang II Tahun 2017, yang ditetapkan oleh Direktorat Pengembangan Teknologi Industri, Dirjen Penguatan Riset dan Pengembangan, Kemenristek-dikti).*

➢ Law Group Number 25 Year 2004 about the National Development Planning System (SPPN Law) and Law Number 17 Year 2007 about the National Long-Term Development Plan (UU RPJPN) *(Kelompok Undang-Undang No. 25 Tahun 2004 tentang Sistem Perencanaan Pembangunan Nasional (UU SPPN) dan Undang-Undang No. 17 Tahun 2007 tentang Rencana Pembangunan Jangka Panjang Nasional (UU RPJPN))*, covering regulations:

- Presidential Regulation Number 5 Year 2010 about the Medium Term Development Plan (RPJMN) for 2004-2009 *(Peraturan Presiden No. 5 Tahun 2010 tentang Rencana Pembangunan Jangka Menengah (RPJMN) Tahun 2004-2009)*;
- Presidential Regulation Number 5 Year 2010 about the RPJMN for 2010-2014 *(Peraturan Presiden No. 5 Tahun 2010 tentang RPJMN 2010-2014)*;
- Presidential Regulation Number 2 Year 2015 about the RPJMN for 2015-2019 *(Peraturan Presiden No. 2 Tahun 2015 tentang RPJMN 2015-2019).*

➢ Law Group Number 5 Year 2009 about Public Services (UU PP) *(Kelompok Undang-Undang No. 5 Tahun 2009 tentang Pelayanan Publik (UU PP))*, the regulations are:

- Presidential Regulation Number 81 Year 2010 about the Grand Design of 2010-2025 Bureaucratic Reform *(Peraturan Presiden No. 81 Tahun 2010 tentang Grand Design Reformasi Birokrasi 2010-2025)*;
- Minister of Apparatus Empowerment Regulation and Bureaucratic Reform Number 16 Year 2015 about the 2015-2025 Bureaucratic Reform Roadmap *(Peraturan Menteri Pendayagunaan Aparatur dan Reformasi Birokrasi No. 16 Tahun 2015 tentang Roadmap Reformasi Birokrasi 2015-2025)*;
- Regulation of the Minister of Administrative Reform and Bureaucratic Reform Number 19 Year 2016 concerning Public Service Innovation Competition in Ministries / Institutions, Regional Government, State-Owned Enterprises (BUMN) and Regional-Owned Enterprises (BUMD) in 2017 *(Peraturan Menteri Pendayagunaan Aparatur Negara dan Reformasi Birokrasi No. 19 Tahun 2016 tentang Kompetisi Inovasi Pelayanan Publik di Lingkungan Kementerian/Lembaga, Pemerintah Daerah, BUMN dan BUMD Tahun 2017)*;
- Regulation of the Minister of Administrative Reform and Bureaucratic Reform Number 3 Year 2018 about Public Service Innovation Competition in Ministries / Institutions, Regional Governments, State-Owned Enterprises (BUMN) and Regional-Owned Enterprises (BUMD) in 2018 *(Peraturan Menteri Pendayagunaan Aparatur Negara dan Reformasi Birokrasi No. 3 Tahun 2018 tentang Kompetisi Inovasi Pelayanan Publik di Lingkungan Kementerian/Lembaga, Pemerintah Daerah, BUMN dan BUMD Tahun 2018)*;
- Financial and financial policies related to Law Number 11 Year 2008 about Information and Electronic Transactions and Government Regulation Number 82 Year 2012 about the Implementation of Systems and Electronic Transactions *(Kebijakan keuangan dan finansial yang terkait dengan Undang-Undang No. 11 Tahun 2008 tentang Informasi dan Transaksi Elektronik dan Peraturan Pemerintah No. 82 Tahun 2012 tentang Penyelenggaraan Sistem dan Transaksi Elektronik)*;
- Regulations of the Head of the State Administration Institution Number 18 Year 2015 about Guidelines for the Implementation of Level II Leadership Education and Training *(Peraturan Kepala LAN No. 18 Tahun 2015 tentang Pedoman Penyelenggaraan Pendidikan dan Pelatihan Kepemimpinan Tingkat II)*;
- Regulations of the Head of the State Administration Institution Number 19 Year 2015 about Guidelines for the Implementation of Level III Leadership Education and Training *(Peraturan Kepala LAN No. 19 Tahun 2015 tentang Pedoman Penyelenggaraan Pendidikan dan Pelatihan Kepemimpinan Tingkat III)*;
- Regulations of the Head of the State Administration Institution Number 20 Year 2015 about Guidelines for Implementing Level IV Leadership Education and Training *(Peraturan Kepala LAN No. 20 Tahun 2015 tentang Pedoman Penyelenggaraan Pendidikan dan Pelatihan Kepemimpinan Tingkat IV)*;
- Regulations of the Head of the State Administration Institution Number 18 Year 2015 about Guidelines for the Implementation of Level II Leadership Education and Training *(Peraturan Kepala LAN No. 18 Tahun 2015 tentang Pedoman Penyelenggaraan Pendidikan dan Pelatihan Kepemimpinan Tingkat II)*;
- Regulations of the Head of the State Administration Institution Number 21 Year 2016 about Guidelines for Implementing Candidates for Civil Cervants (CPNS) Basic Training in Group III *(Peraturan Kepala LAN No. 21 Tahun 2016 tentang Pedoman Penyelenggaraan Pelatihan Dasar CPNS Golongan III)*;
- Regulations of the Head of the State Administration Institution Number 22 of 2016 about Guidelines for the Implementation of Class I & II Candidates for Civil Cervants (CPNS) Training *(Peraturan Kepala LAN No. 22 Tahun 2016 tentang Pedoman Penyelenggaraan Pelatihan CPNS Golongan I & II)*;
- Bank Indonesia Regulation Number 19/12 / PBI / 2017 about the Implementation of Financial Technology *(Peraturan Bank Indonesia No. 19/12/PBI/2017 tentang Penyelenggaraan Teknologi Finansial)*;
- Financial Services Authority Regulation Number 13 /POJK.02/2018 about Digital Financial Innovation (IKD) in the Financial Sector *(Peraturan Otoritas Jasa Keuangan No. 13/POJK.02/2018 tentang Inovasi Keuangan Digital (IKD) di Sektor Keuangan).*

- Law Group Number 23 Year 2014 about Regional Government (UUPD 23/2014) *(Kelompok Undang-Undang No. 23 Tahun 2014 tentang Pemerintahan Daerah (UUPD 23/2014)*, covering regulations:
- Government Regulation Number 38 Year 2017 about Regional Innovation *(Peraturan Pemerintah No. 38 Tahun 2017 tentang Inovasi Daerah);*
- Joint Regulation of the Minister of Research and Technology and Minister of Home Affairs Number 03 Year 2012 and Number 36 Year 2012 about Strengthening the Regional Innovation System *(Peraturan Bersama Menteri Riset dan Teknologi dan Menteri Dalam Negeri No. 03 Tahun 2012 dan No. 36 Tahun 2012 tentang Penguatan Sistem Inovasi Daerah).*

B. Fundamental Issues in the Regulation of Innovation Development in Indonesia

- *Group of Laws Number 18 Year 2002 about the National System of Research, Development and Application of Science and Technology (UU SINAS P3 IPTEK)*

The study of the theoretical aspects reveals that the concept of innovation (initiated by Shumpeter in 1934), can be understood as 'the result of new combinations of knowledge, abilities, and new resources, and is considered as the main source of change from all economic activity, both in countries with a dominance of service and industrial activities, and in the public and private sectors' (Edler and Fagerberg, 2017: 4; von Tunzelmann and Acha, 2004: 407,432; Rubalcaba et. al., 2012: 696). Thus, innovation is different from invention. In short, invention is "a new idea of doing something", while innovation is more about "bringing new ideas into practice". The latest understanding of the notion of innovation was agreed at the Oslo forum (OECD / Eurostat, 2005), where innovation was defined as "the implementation of new or important improvements of products (goods or services / services) or processes, new marketing methods, or new organizational methods on workplace business practices, or external relations ". An understanding of the definition of innovation has led to the existence of two innovation perspectives, namely a narrow perspective that takes account of the discovery side only; and innovation in a broad perspective, which emphasizes on the importance of looking at the entire innovation cycle, from creating new ideas to implementation and dissemination (Edler and Fagerberg, 2017: 4).

Based on a review of the substance of the group Law Number 18/2002 about the National System of Research, Development, and the Application of Science and Technology *(UU Sinas P3 IPTEK)*, it can be stated that the definition of innovation stated in Law Number 18/2002 is relatively different from the latest theoretical developments that exist. Law Number 18/2002 provides the definition of innovation as "research, development and / or engineering activities that aim to develop practical applications of the value and context of new science, or new ways to apply existing science and technology into

products or production processes" (Article 1 point 9). Based on this definition, it can be stated that the innovation of Law Number 18/2002 tends to be interpreted and oriented to "new ideas in doing something" (invention). In fact, as the main source of change in all economic activities, innovation needs to be interpreted as "bringing new ideas into practice, through the whole cycle of innovation, starting from the creation of new ideas, to implementation, to the process of dissemination".

On the other hand, in line with global economic development, the innovation system approach is felt to be increasingly relevant to the needs of the country, and from the point of view of policy makers, the national innovation system will have very high relevance. At the beginning, the emergence of the term 'innovation system' is more expressed in 'national innovation system' term (National System of Innovation - NSI). Freeman (1987: 1) defines a national innovation system as "institutional networks in the public and private sectors, whose activities and interactions initiate, bring in, modify, and disseminate new technologies". In addition to Freeman, Lundvall (1992: 1) provides a definition of a national innovation system as "a complex, dynamic, and social system, which consists of the following elements of relations, which interact in (the process of) the production, distribution and use of new knowledge and economically useful, whether located within or rooted in the borders of a country ". Another theoretist that contributes to the development of the concept of a national innovation system is Edquist (1997). Edquist argues that "innovation processes are influenced by various factors; these factors arise in interactions between institutions and organizational elements which are collectively referred to as innovation systems ". Through his opinion, Edquist (1997: 14) suggests the definition of a national innovation system as "all important factors - economic, social, political, organizational, institutional, and other factors - that influence the development, distribution and use of innovation".

Institutional elements (which according to the term in the national innovation system as "organizations") aimed at National System of Research, Development and Application of Science and Technology Law *(UU SINAS IPTEK)* are only dominated by science and technology-based institutions, which consist of higher education institutions, Research & Development institutions *(LITBANG)*, business entities and supporting institutions [Article 6 paragraph (1)], On the other hand - through a broad perspective on national innovation systems – the theorists (Freeman, 1987; Lundvall, 1992; Patel and Pavitt, 1994; and Edquist: 1997), revealing that elements of the national innovation system include different institutional arrangements, which individually and / or together, contribute to the development and dissemination of new technologies, and provide a framework for the government and its implementation policies, to influence the innovation process. Based on these functions, it can be seen that the function of National System of Research, Development and Application of Science and Technology *(SINAS P3 IPTEK)* is limited to the formation of science

and technology human resources; the growth of the ability to promote science and technology, engineering, innovation and technology diffusion; and the establishment of the climate and support needed for science and technology. Functions that can facilitate the market (Rickne, 2000: 175 and Johnson and Jacobson, 2003: 207) have not been touched by the National System of Research, Development and Application of Science and Technology *(SINAS P3 IPTEK).*

Furthermore, institutional interactions developed by the law of National System of Research, Development and Application of Science and Technology's *(UU SINAS P3 IPTEK)* are limited to 'partnership' (Article 15 paragraph 2), whereas in the context of the national innovation system (OECD, 2002: 15) it is more than partnerships, but also regulates interactions between organizations 'inside the market' and 'outside the market'. The perspective difference between Law Number 18/2002 about National System of Research, Development and Application of Science and Technology *(SINAS P3 IPTEK)* and the perspective of the national innovation system that developed from both theoretical and empirical sides has led to Law Number 18/2002 regarding National System of Research, Development and Application of Science and Technology's *(SINAS P3 IPTEK)* already no longer in line with the times. This weakness is very possible because in 2002, the theory underlying the development of the national innovation system was not so developed. Even so, negligence in improving the policy of Law Number 18/2002 certainly must be immediately corrected through the revision of Law Number 18/2002.

Differences by definition, institutional elements, and forms of interaction between innovative institutions of Law Number 18/2002 and the latest theoretical developments have quite long implications. Why is that? The results of observations of researchers until the time of the study ended, Law Number 18/2002 is still used as a reference (either explicitly or implicitly) in the preparation and implementation of operational policies for the development of innovations, namely among them for Presidential Decree Number 38 Year 2018 about the 2017-2045 National Research Master Plan.

➤ *Group of Laws Number 25 of 2004 about the National Development Planning System (SPPN) and Law Number 17 of 2007 about the National Long Term Development Plan (RPJPN)*

Based on the substance of Law Number 17/2007 about the 2005-2025 National Development Plan, it can be seen that the development of Indonesian innovation is oriented towards the development of a National Innovation System which aims to increase Indonesia's competitiveness in the global economy. The concept of the plan gives an understanding that the orientation of the development of innovation systems that Indonesia wants to develop has a broad perspective, namely to achieve the nation's competitiveness in the global economy, and is not narrowly oriented only to the development and utilization of science and technology alone. This is clearly stated in

the direction of economic development [item (3)] (RPJPN, 2005: 30). The substance of RPJPN has also firmly stated [point (8)] that the development of science and technology in the long term is directed at improving the quality and usefulness of science and technology, with two objectives including: (a) institutional research and development reform; and (b) the development of functional linkages of the innovation system to encourage its institutions as an integral part in the development of its business activities (RPJPN, 2005: 32). The direction and target of the economic sector development has been aligned with the direction of the development of the legal sector and the administration of the state and socio-culture (RPJPN, 2005: 23,25, 26,27).

Based on a search of the direction of the five national development agendas until 2014, it can be stated that the concept of innovation development (which aims to achieve national competitiveness in the global economy) only reaches the level of vision formulation. At the level of the agenda formulation it is no longer visible. As an implication, the formulation of development priority programs to support the improvement of national competitiveness (through the development of national innovation systems) has not been formulated explicitly, thoroughly and integratedly. The meaning is that the development of a national innovation system is still positioned in the interests of science and technology development alone. This was also revealed in the Executive Summary Book *"Menata Perubahan Mewujudkan Indonesia yang Sejahtera, Demokratis dan Berkeadilan: Pencapaian Kinerja Pembangunan KIB I (2004-2009) dan KIB II (2009-2014)"* (Bappenas, 2014: 17-18). In point (68) in the summary book it is revealed that:

"The national innovation capacity building policy in KIB I began with the mandated education implementation of the constitution, namely the fulfillment of the education budget of 20 percent of the National Budget which was started in 2009. In KIB II, higher education was revised with the enactment of Law Number 12 Year 2012 by dividing higher education academic education, vocational education, and professional education. Then various regulations are also stipulated, among others, regulation of intellectual property technology transfer, licensing for foreign researchers, allocation for research & developmental activities in business entities, and high-risk research licensing, regulation of intellectual property technology transfer, licensing for foreign researchers, allocation for research and developmental activities in business entities and high-risk research licensing. To encourage the private sector to conduct research, the Government provides incentives in the form of reducing corporate taxable income for those who contribute research and development activities; exemption from import duty and excise for research equipment ".

*("Kebijakan **pembangunan kapasitas inovasi** nasional pada KIB I dimulai penyelenggaraan pendidikan yang diamanatkan konstusi yaitu pemenuhan anggaran*

pendidikan 20 persen dari APBN yang dimulai pada tahun 2009. Pada KIB II, pendidikan tinggi dibenahi dengan ditetapkannya UU No 12 Tahun 2012 dengan membagi penyelenggaran pendidikan tinggi ke dalam pendidikan akademik, pendidikan vokasi, dan pendidikan profesi. Kemudian berbagai regulasi juga ditetapkan antara lain pengaturan alih teknologi kekayaan intelektual, perizinan bagi peneliti asing, alokasi untuk kegiatan litbang di badan usaha, dan perizinan penelitian berisiko tinggi, pengaturan alih teknologi kekayaan intelektual, perizinan bagi peneliti asing, alokasi untuk kegiatan litbang di badan usaha, dan perizinan penelitian berisiko tinggi. Untuk mendorong swasta melakukan riset, maka Pemerintah memberi insentif dalam bentuk pengurangan pendapatan kena pajak perusahaan bagi yang memberikan sumbangan kegiatan penelitian dan pengembangan; pembebasan bea masuk dan cukai bagi peralatan riset".)

In the 2014-2019 RPJMN, the position of developing innovation policies still prioritizes capacity building on innovation and technology. This is reflected explicitly in the 7th sub-agenda (from 11 priority agendas), namely*" Mendorong Kapasitas Inovasi dan Teknologi".*

In the context of the relationship between planning and the development of a national innovation system, there are interesting lessons from Singapore. The experience of Singapore - which for 50 (fifty) years has successfully developed a national innovation system - provides some interesting lessons to listen to (Lim Chuan Poh, 2016 in GII 2016: 133-139), namely (see figure 3):

- Singapore's national innovation system policy can be divided into the following 3 types of stages, namely: first, mission-oriented innovation policies; second, invention-oriented policies; third, innovation system policies;
- Efforts to develop the national research and national innovation systems are attached to the Singapore National Development Planning system, and implemented in an integrated manner with the development of organizations and institutions.
- Policies and programs are always evaluated based on the latest conditions and situations, and recommendations for evaluation results - always followed up with various programs or unique ways (for example in the involvement of multi-national companies to national companies, both large, medium and small), but it remains consistent with its original goals, namely increasing national competitiveness in the international world.
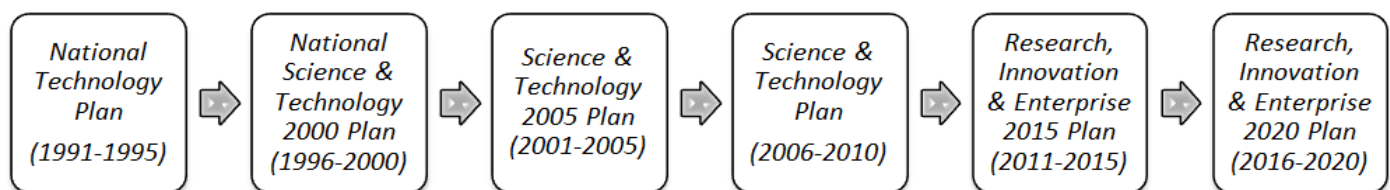

Fig 3:- Singapore Research Innovation Enterprise 2020 Plan
Source: National Research Foundation, RIE 2020 Plan, In The Global Innovation Index 2016: 133-139.

Through the experience of the Singapore, at least 3 important things can be known, namely: First, integrating innovation development planning into national development planning; second, carry out evaluations, and consistently, and follow up on the results of the evaluation; third, adjust the development of organizations and institutions at each phase of innovation development.

➢ *Group of Laws No. 5 of 2009 concerning Public Services (Kelompok Undang-Undang No. 5 Tahun 2009 tentang Pelayanan Publik)*

Based on a review of the substance of the group Law Number 5 Year 2009 about Public Services, it can be stated that Law Number 5/2009 has provided a solid foundation in the development of innovations, especially innovation in the public sector. The mandate of the Law on Public Services *(UU Pelayanan Publik)* - which places the Minister of Administrative Reform and Bureaucratic Reform *(*KEMENPAN-RB*)* - has encouraged the growth of various policies that encourage the growth of the national innovation system, which is based on and originates from the state apparatus sector. This of course, in a way, revises and complements the previous regulations, especially Law Number 18/2002. If the substance regulation outlined in Law Number 18/2002

gives direction and meaning that innovation tends to be produced by the private sector (Article 9 paragraph 1), and the government sector only plays a role in giving mere support (Article 13 paragraph 1; Article 17 paragraph 3; Article 18 paragraph 1; Article 20 paragraph 1; Article 21 paragraph 1; Article 22 paragraph 1; Article 23 paragraph 1, and Article 27 paragraph 1), then Law Number 5/2009 and operational policies produced by KEMENPAN-RB and State Administrative Institution (LAN) give the direction and meaning that innovation is also produced by the public / government sector.

The policy of the Minister of State Apparatus Empowerment and Bureaucratic Reform (KEMENPAN-RB) aimed at fostering public sector / government innovation (through public service innovation competitions) is also reinforced by LAN policies that develop the substance / competency training material for officials (at the leadership and CPNS level) based innovation. Both of these regulations can be categorized as policies that fill the function of production (development), diffusion and at the same time the use of innovation in the public sector. The results of the investigators' observation of various sectoral planning documents (especially national level planning), have indicated that training has provided significant results.

The words innovation have been attached to various plans that have been compiled, not limited to things that are technology-based only, but also to other forms of public sector innovation. The initiation of Indonesia's public innovative initiatives as finalists in the United Nation Public Service Award (UNPSA) (from 2014 until now) can also indicate the same thing. All of this certainly indicates that in the 5 (five) years since the declaration (in 2014), in addition to generating increased understanding of the importance of innovation in the public sector, it also has an impact on increasing the ability to innovate in the public sector. These two forms of improvement have also resulted in "bursts or splashes" of interaction between the public sector and the private sector, in the process of continually implementing innovation.

➢ *Group Law Number 23 Year 2014 about Regional Government (Kelompok Undang-Undang No. 23 Tahun 2014 tentang Pemerintahan Daerah)*

In the context of the "system", it will be very important to understand the main components of the system, namely "organization" and "institution". Likewise with the context of the national innovation system, organizations and institutional innovation are very important to note. Edquist (2009: 187) argues that these two components are often interpreted as overlapping with each other. Edquist argues that in the national innovation system, organizations are "players or actors" (player or actor), while institutions are the composition of general habits, norms, routines, existing practices, rules and conditions - legal provisions governing relationships and interactions between players or actors. Institution can be interpreted as "rules of the game" (rule of the game). The relationship between organizations and institutions is important for the operationalisation of the innovation system. Organizations are influenced and formed very strongly by institutions. Organizations adhere to institutional environments. On the other hand, institutions are embedded and developed in the organization. Edquist (2009: 187) also reveals that there are various relationships between organizations and institutions that have different patterns, including: (a) organizations create institutions that affect other organizations; (b) institutions become the basis for the creation of organizations; and (c) institutions related to other institutions. Or in other words, different institutions can support and strengthen each other, or can also conflict with each other. The form or pattern of connectedness can be done in various different ways with different extensions as well.

Although there is no consensus on the functions or activities included in the national innovation system, it can be identified that there are 3 (three) main functions, namely: Development, diffuse, and the use. Innovation has complex tasks, so it is impossible for us to be able to identify all factors or activities that affect the national innovation system in detail or systematically (Edquist, 2009: 190). The systematic approach to the national innovation system cannot be directly said that the innovation system can be designed or planned. The innovation process is an evolutionary process. Innovation systems develop over time in a largely unplanned manner. Controlling the innovation system centrally is not possible (Edquist, 2009: 191).

Innovation policy instruments can be categorized into instruments that are oriented to availability (supply) and demand-oriented instruments. The instrument of innovation policy is also related to the objectives to be achieved. Some instruments can be related to more than one goal, and some objectives can be handled more than one policy instrument (Edler et.al.,2016: 11). An innovation project or activity is a project that is risky in nature, so avoidance of risk can easily deliver projects to non-innovative results, which in turn will make policies less effective. Experience reveals that there is a tendency for the involvement of many ministries in managing national innovation policies. The large number of actors who have established themselves in shaping innovation policy encourages efforts to align the interests of these actors so that initiatives from different stakeholders can complement each other rather than contradict each other (Edler and Fagerberg, 2017: 17).

Related to the review of the substance of the group Law Number 23 Year 2014 about Regional Government, it can be stated that activities in the innovation process can be likened to programs or activities ("projects") in the government sector which can be relatively "by design" (planned), and not as " creative ideas (which can appear anytime, anywhere, and by anyone), and must be responded to well and quickly ". Various processes that must be passed by the authorities and other stakeholders in innovating [such as the Regional House of Representative (DPRD) plenary session process (Article 388 point (2)); the process of proposing and stipulating Perkada (Article 388 point (3)); the process of obtaining written permission from the leadership of the Regional Apparatus and being an innovation of the Regional Apparatus (Article 388 point (4)); regional innovation reporting process to the Minister of Home Affairs (Article 388 item (7)); the process of selecting institutions related to research and development (Article 388 item (1)); and the process of awarding and / or incentives to individuals or regional apparatus (Article 388 points (11 and 12)); all require different time and procedures. Enforcement of innovation activities such as programs and activities in the government sector has its own risks. This situation is almost similar to the experience of the Australian state in initiating the development of its public innovation (OECD, 2014: 19, 23). Australia's experience shows that Australian civil servants do not understand the concepts and regulations of existing innovations, and interpret existing regulations in conservative ways, namely by being passive, because they are reluctant to take risks in dealing with legal aspects. Risk adverse culture has downplayed the desire (motivation) of public employees to come up with ideas for innovation, as well as reluctance to propose to policy makers to be followed up.

IV. CONCLUSION

The search results for regulations related to innovation development policies in Indonesia provide clues to the existence of 4 (four) main regulatory grouping patterns. The pattern of grouping is identified based on its character in shaping its derivative regulations (or operational policies). The four main regulatory groups in question are: First, group Law Number 18 Year 2002 about the National System of Research, Development and the Application of Science and Technology (UU SINAS P3 IPTEK); Second, group Law Number 25 Year 2004 about the National Development Planning System (UU SPPN) and Law Number 17 Year 2007 about the National Long Term Development Plan (UU RPJPN); Third, group Law Number 5 Year 2009 about Public Services (UU PP); and Fourth, Law Number 23 Year 2014 about Regional Government (UUPD 23/2014).

The results of the analysis of the substance of the four regulatory groups along with derivative regulations (operational policies) conclude that: First, there is no understanding of the perspective of innovation and conception of innovation that will be used in innovation policy in Indonesia; Second, there is no coherence between innovation policies in long-term and medium-term macro planning [as the implications of point (a) above]; and Third, there are no institutions (organizations and institutions) that have the legality of strong authority, which can guard and direct programs along with national innovation system development activities, both covering policies / regulations that focus on development, dissemination, or use.

SUGGESTION

In line with the three conclusions above, this study proposes three suggestions as follows:

➤ *Firstly*, efforts are needed to mobilize understanding among stakeholders in Indonesia regarding the perspective of innovation and the conception of innovation needed by Indonesia. In accordance with the development of the theoretical side and practical side experiences of countries that have succeeded in developing their innovation systems, a broad type of innovation perspective - that is, emphasizing the importance of looking at the whole innovation cycle, from the creation of new ideas, to the deployment - the best choice of perspective form for now. In addition, the concept of a national innovation system is a choice of concept forms that are appropriate for the existing state level. If a broad perspective of innovation and national innovation system concepts are chosen, then an evaluation or revision of the substance of Law Number 18/2002 is needed or a new legal regulation (which is legally strong) is needed, as a basis for formulating and implementing integrated policies in promoting innovative programs.

➤ *Secondly*, it needs to be reevaluated regarding the direction of national development, especially with regard to increasing national economic competitiveness. Considering the national innovation system is a complex, dynamic and social system - where all the factors (ranging from economic, political, organizational, and institutional) have an influence on it; then innovation cannot be placed only as a "field" of development alone, but must be positioned as a separate "mission" and / or a separate "agenda" of development, whose development and development strategies are cross-sectoral and the development success indicators can only be achieved through the integration of programs and activities across sectors / sectors.

➤ *Thirdly*, to accommodate the continuity of functions related to the national innovation system, it will be very important to form an institution that is quite strong in terms of the legality of its authority. The said institution needs to be functioned to guard and direct the implementation of programs along with the development of innovation system activities nationally.

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