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“It should be the way of life to keep the water clean.”

– Lee Kuan Yew

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1. Introduction

Facing challenges like polluted waters, lack of natural water resources, limited space for storing potable water, and furthermore floods and droughts – Singapore has been in a difficult position to provide clean water for its inhabitants.¹ Depending heavily on water imports from Malaysia, Singapore remodeled towards self-sufficiency with the intent to innovate its water management, “turning [their] weakness into strength.”² Recently, it has been making headlines internationally: for example “Singapore gets smart about water” or “Drinking sewage: solving Singapore's water problem.”³ Singapore's national water agency, PUB (Public Utility Board), has received the Stockholm Water Industry Award in 2007 for “a holistic approach to water resources management which made water use sustainable for different sectors of society in a unique and challenging urban island environment.”⁴ Singapore's water management is now regarded as a success story or a prime example for other countries with water security problems or as a “model city for water management”.⁵ Nevertheless, Singapore's ability to secure its potable water is endangered due to external factors such as dry seasons. Its important water resource, the Linggui Reservoir's stock, for example, decreased from 97% in 2012 to 54,5 % in 2015.⁶ On top of climate change and its effects on Singapore's stocks of water, the country is still dependent on Malaysia's water. Notwithstanding, Singapore wants to reach the goal of self-sufficiency by 2061 when water contracts with Malaysia expire.⁷

1 PUB (Public Utility Board) – Singapore's national water agency, “The Singapore Water Story,” *PUB* (last updated on 09.06.2015), under “Water for all,” <http://www.pub.gov.sg/water/Pages/singaporewaterstory.aspx> (accessed: 05.11.2015); S.U.R.E (Sure Understanding Research Evaluate), “Water in Singapore – Cheat Sheet,” *S.U.R.E.* <http://www.nlb.gov.sg/sure/wp-content/uploads/2015/02/cheat-sheet-12Water-in-Singapore-final1.pdf> (accessed: 05.11.2015).

2 Ibid. PUB (09.06.2015).

3 Oliver Balch, “Singapore gets smart about water,” *Guardian* (18.03.2015, 11.30 o'clock GMT), under “Guardian Sustainable Business – Water,” <http://www.theguardian.com/sustainable-business/2015/mar/18/smart-water-solutions-singapore-newater-vertical-farming> (accessed: 05.11.2015); Meera Senthilingam, “Drinking sewage: solving Singapore's water problem,” *CNN* (23.09.2014, 13.12 o'clock GMT), under “Asia – future cities Singapore,” <http://edition.cnn.com/2014/09/23/living/newater-singapore/> (accessed: 05.11.2015).

4 SIWI (Stockholm International Water Institute), “Stockholm Industry Award – Winners 2007,” *SIWI* (2012-2015), under “World Water Week & Prizes,” <http://www.siwi.org/prizes/stockholmindustrywateraward/winners/pub-singapore/> (accessed: 05.11.2015).

5 Cf.: Prakhar Jain, “Addressing Dehli's water supply problems: taking lessons from Singapore's water management experience” (working paper, Global Water Intelligence, New Delhi, India, 2012); Mely Caballero-Anthony and P. K. Hangzo, “Singapore: niche diplomacy through water expertise,” *East Asia Forum – Economics, Politics and Public Policy in East Asia and the Pacific*, 31.01.2013, <http://www.eastasiaforum.org/2013/01/31/singapore-niche-diplomacy-through-water-expertise/> (accessed: 23.03.2015).

6 Feng Zengkun, “Concern over Singapore's water supply from Malaysia: Vivian,” *Straits Times* (published 03.08.2015, 13.15 o'clock SGT; updated 04.08.2015, 8.59 o'clock), under “Singapore,” <http://www.straitstimes.com/uncategorized/singapores-water-supply-from-malaysia-reaches-critical-levels> (accessed: 06.11.2015); Monica Kotwani, “Unprecedented' low levels of water at key Johor reservoir: Vivian Balakrishnan,” *Channel News Asia* (published: 03.08.2015, 13:11; updated: 04.08.2015 17.35 o'clock), under “Singapore,” <http://www.channelnewsasia.com/news/singapore/unprecedented-low-levels/2025108.html> (accessed: 06.11.2015).

7 Cf.: PUB (09.06.2015); Zengkun (2015).

Singapore's neighbor Indonesia is likewise affected by weather conditions and climate change. However, the water situation in Indonesia seems to be quite distinct from Singapore's current position. At first glance Indonesia does not seem to be a water scarce country: about 6% of the world's water resources are allocated in Indonesia and approximately two trillion cubic meters of internal natural renewable water resources are available yearly, which is circa 8000 cubic meters per inhabitant.⁸ Nevertheless, Indonesia has a total area of 1,904,569 km² and is thus the largest archipelago world wide.⁹ With this size the problem of equal distribution of water is unavoidable, since regions are inhabited in a unbalanced manner, and resource availability is not equal due to the diversity of the islands.¹⁰ For instance, the most populated island, Java, accommodates 60% of the entire population, yet merely 10% of Indonesia's water is available on Java.¹¹ Consequently, access to water in Indonesia is critical – even more so since water is mostly not safe to drink. In 2015 Indonesia was able to provide 87% of its population with improved drinking water sources, according to UNICEF and WHO (World Health Organization).¹² In spite of that, circa 29% of the population in rural areas and 13% in urban areas still practice open defecation.¹³ Fecal contamination of soil and water decreases availability of safe water and allows waterborne diseases to spread.¹⁴ In strong contrast to Singapore, Indonesia is known as “home [...] of world's dirtiest rivers, polluted by decades of domestic and industrial waste.”¹⁵ Indonesia's water issue becomes even more intriguing if we consider the discrepancy of availability and increasing demand for water as its population grows and its industries expand.¹⁶ The American strategic forecasting publisher Stratfor advocates that Indonesia's economic success will depend on its water management and correlating policies.¹⁷ However, public health and social stability are at stake if the water situation in Indonesia does not improve since the percentage of diseases and early life loss are high and public

8 Stratfor, “Indonesia's Disjointed Islands Make Water Scarcity a Problem,” *Stratfor* (29.12.2014, 10.15 o'clock GMT), under “Analysis,” <https://www.stratfor.com/analysis/indonesias-disjointed-islands-make-water-scarcity-problem> (accessed: 09.11.2015); Nila Ardhianie, “Coping with water scarcity in Indonesia,” *Jakarta Post* (25.03.2015; 8.29 o'clock), under “News,” <http://www.thejakartapost.com/news/2015/03/25/coping-with-water-scarcity-indonesia.html> (accessed: 09.11.2015).

9 World Fact Book, “Indonesia,” *CIA (Central Intelligence Agency)*, under “East & Southeast Asia,” <https://www.cia.gov/library/publications/the-world-factbook/geos/id.html> (accessed: 09.11.2015).

10 Cf.: Stratfor (29.12.2014); Nila Ardhianie.

11 Ibid.

12 UNICEF and WHO (World Health Organization), “On Sanitation and Drinking Water – 2015 Update and MDG Assessment,” *UNICEF & WHO*, (2015), http://www.wssinfo.org/fileadmin/user_upload/resources/JMP-Update-report-2015_English.pdf (accessed: 09.11.2015).

13 Ibid.

14 Cf.: UNICEF Indonesia, “Issues Briefs 2012 – Water, sanitation & hygiene,” *UNICEF*, (2012), http://www.unicef.org/indonesia/A8-_E_Issue_Brief_Water_Sanitation_REV.pdf (accessed: 09.11.2015).

15 Al Jazeera, “Indonesia's Water Woes – The country's rivers are polluted and clogged by decades of urbanization and poor planning,” *Al Jazeera*, (05.08.2010 14.37 o'clock GMT), under “Environment,” <http://www.aljazeera.com/programmes/101east/2010/08/20108510341761814.html> (accessed: 23.03.2015).

16 Cf.: Nila Ardhianie.

17 Cf.: Stratfor (29.12.2014).

unrest occur.¹⁸

Scanning throughout news, articles, and governmental statements it appears that both countries seek a sustainable future in regard to their water availability. However, the key disparity feature between Singapore's and Indonesia's respective water situations is water management. According to UN-Water, water management can mean a) managing the resource, b) managing water services, or c) managing the trade-offs needed to balance supply and demand.¹⁹ In literature we can find suggestion and experts advising to address water crisis or its management through “cross-sectoral, holistic planning and policies” and working with a range of stakeholders such as “national government agencies and private-sector partners, from small businesses to banks and large companies” in order to achieve sustainable water conditions in a country.²⁰

This paper seeks to gain a holistic picture of the two country's water system. This implies that we want to understand the individual perspective, the rules and norms in these particular countries, and also see the overall dynamics of each water system. Political, social-cultural and economic spheres are components, which determine our society. Hence, we will focus on these for the content. In order to understand each country's approach in dealing with its water issue and whether the course of process for its future is sustainable, we will examine the *modus operandi* for sustainability oriented activities in these spheres. Such activities can also be described as *sustainability driven entrepreneurship* (SDE). The concept of SDE will help us to examine the areas of economic, political and social-cultural areas on two different levels: the meso and micro level. In Chapter 3, Definitions, we will explore this subject in further depth.

1.1. Research Question

We approach our investigation through the following question: What are the differences between Singapore's and Indonesia's sustainability driven entrepreneurship within the field of water management?

In order to answer the research question several sub-questions arise:

- What are the traits of sustainability driven entrepreneurship?

18 Water and Sanitation Program, “Economic Impacts of Sanitation in Indonesia,” *World Bank* (Jakarta: 2008), https://www.wsp.org/sites/wsp.org/files/publications/esi_indonesia.pdf (accessed: 13.11.2015); Antara/JG, “Bloody Clashes in Indonesia's Maluku Claim Another Life,” *Jakarta Globe* (08.03 2012), under “Archive,” <http://thejakartaglobe.beritasatu.com/archive/bloody-clashes-in-indonesias-maluku-claim-another-life/503346/> (accessed: 31.07.2015).

19 UN-Water, “Water Resource Management,” *UN-Water*, (last update: 07.10.2014), under “Topics,” <http://www.unwater.org/topics/water-resources-management/en/> (accessed: 09.11.2015).

20 Nila Ardhianie; USAID, “Safe Water, Sanitation Reaching Indonesia's Urban Poor,” *USAID*, (March/April, 2014; last update: 16.09.2015), under “Frontlines – Water & Neglected Tropical Diseases,” <https://www.usaid.gov/news-information/frontlines/water-neglected-tropical-diseases/safe-water-sanitation-reaching> (accessed: 09.11.2015).

- What are the characteristics of the economic entrepreneurship of Indonesia and Singapore?
- What are the characteristics of the political entrepreneurship of Indonesia and Singapore?
- What are the characteristics of the social-cultural entrepreneurship of Indonesia and Singapore?
- Can the presented types of entrepreneurship of Indonesia and Singapore be seen as sustainable?

By answering the questions above, we will build up a comprehensive picture of how Indonesia and Singapore differ within the field of water management.

1.2. Relevance

For each country we can find research in the field of water management as we will learn in the next chapter. However, comparison of Indonesia's and Singapore's water management approaches in the form of an academic paper is non-existent – at least in English. With this work we will fill this research gap. Further, we will understand how Singapore was able to change its water situation from one where rivers were “open sewers” to one with a clean, green city with a worldwide reputation for water management – all within less than 50 years.²¹ The analysis of Singapore represent possible course of actions for cities of small-sized developed countries, while the analysis of Indonesia stands for large-sized developing countries. Additionally, we will be able to unravel whether Indonesia has the possibility to learn from Singapore's example. We will take a look at water management on the meso and the micro level by using a new mainstream theory, the evolutionary theory of economics, and examine the matter through the perspective of sustainability driven entrepreneurship (SDE). SDE embraces a holistic view on the matter, as is later discussed in Chapter 3.2. Hence, we will examine the interconnectedness of the economic, political and social-cultural spheres through the viewpoint of SDE.

The structure of this MA-thesis is as follows. In the next chapter, State of the Art, we will investigated the academic field in order to distinguish this research from what is already available. Secondly, we will define and amplify our understanding of terms significant for the chosen theory of evolutionary economics and for the continuation of our work. Subsequently, we will dive into the theory of evolutionary economics, the different levels of micro, meso & macro, and incorporate those into the context of SDE. In the analysis we use a methodology, ascribed to our theoretical

21 Cf.: Asit K. Biswas, “Book Review – Clean, Green and Blue: Singapore’s Journey Towards Environmental Sustainability,” by Yong Soon Tan, with Lee Tung Jean & Karen Tan, Singapore: Institute of Southeastern Asian Studies (2009), *International Journal of Water Resources Development*, Vol. 25, No. 1 (March 2009), pp.: 185–187.

approach by Dopfer and Potts, to examine each country on two levels in regard to three different types of entrepreneurship as we will define them beforehand. In conclusion, we will summarize the research findings and answer our research question regarding, the distinctions between Singapore's and Indonesia's water management. In this last chapter we will also reflect on the limitations of this thesis. Closing the topic, we will inspect the implications of this thesis and its findings.

2. State of the Art

After water was identified as a key factor of various sectoral development such as economic, political, agricultural, social-cultural and industrial, academia searched for a rather holistic approach to manage and solve water issues world wide. One most recognized method is the Integrated Water Resource Management (IWRM). This approach is defined as “a process which promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.”²² Officially recognized by the UN in 1992 in Rio de Janeiro under Agenda 21 after 50 years, the IWRM approach gained acceptance worldwide.²³ An approach which is regarded as “the only sustainable solution.”²⁴ Main emphasis of the theory is institutions and governance structure. More specifically, IWRM is build on three pillars:

1. In order to establish a sustainable water resource development as well as management, an *institutional framework* muss be provided,
2. through which an *enabling environment* of policies, strategies and legislation can be applied.
3. For their operations institutions will need also adequate *management instruments*.²⁵

The government plays a vital role as Jønych-Clausen describes it. With 15 years of experience in IWRM Jønych-Clausen, one main advocate of IWRM approach, expresses how IWRM process depends on the participating country. According to him, for poor countries the prior need is to meet the Millennium Development Goals (MDG) first, while richer countries have to continue to focus on environmental maintenance and restoration.²⁶ Consequently, the IWRM approach is applicable in

22 Torkil Jønych-Clausen, “...Integrated Water Resources Management (IWRM) and Water Efficiency Plans by 2005” *Why, What and How?* (Stockholm: Global Water Partnership, 2004), pp.: 14 et seqq.

23 United Nations (UN), *United Nations Conference on Environment & Development Rio de Janeiro, Brazil, 3 to 14 June 1992, Agenda 21*, <https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf> (accessed: 16.11.2015).

24 Bruce Durham, Stephanie Rinck-Pfeifferb and Dawn Guendertc, “Integrated Water Resource Management — through reuse and aquifer recharge,” *Desalination* Vol. 152, No. 1–3 (10.02.2003), p.: 333.

25 Jønych-Clausen, p.: 16.

26 Ibid. p.: 6.

every country since it is a political process.²⁷ Scholars such as Hering and Ingold point out that “normative value placed on integration per se” is the main obstacle of IWRM success.²⁸ Further, Hering and Ingold indicate that IWRM is case specific, problem driven and should be restricted to water sector, while taking cross-sectoral stakeholder into account. Despite the fact that Hering and Ingold support the IWRM approach, they apprise that IWRM can be seen as a “recipe for paralysis” due to “desire to do too much at one time.”²⁹

Critics of IWRM argue that IWRM does not live up to what it is promising – a mere “normative ideal,” which has not worked so far.³⁰ Other opponents such as Jeffrey and Gearey claim IWRM is not detailed enough and is about costly reforms of governance and institutions, which transitional and transformational costs are unknown.³¹ This argument makes IWRM seem like a high risk approach. Jeffrey and Geary dispute IWRM holistic characteristics as it fails to take ecological and evolutionary ramifications into account. Giordano and Shah take it even further and declare “IWRM [...] can cause more harm than good.”³² Seeing IWRM's upsurge, they argue that it became a “brand” and an “end in itself,” which suppresses alternative thinking on water management.³³ They are concerned with the reforms being a step backward and counterproductive as the aim becomes to execute IWRM instead of solving a particular water problem.³⁴ Hence, IWRM would not serve improving water management if the problem does not have priority. Giordano and Shah present other solutions of water problems, which hitherto were effective and do not relate to IWRM. However, IWRM is only one approach of water management.

Concerning water management and sustainability, Ooi criticizes that specifically in East Asia it is difficult to find research of cross-country comparison, which would help to identify development processes of each country – those might be used as “good” examples for concepts of environmental sustainability.³⁵ Ooi's stance expresses the need for pluralistic viewpoints on sustainability and water management. Söderbaum specifically points out, that pluralism in academia would foster participation of individuals as “potential or actual policy-makers” – those would be the

27 Ibid. p.: 15.

28 Janet G. Hering and Karin M. Ingold, “Water Resources Management: What Should Be Integrated?” *Science* Vol. 336, no. 6086 (08.06.2012), pp. 1234. DOI: 10.1126/science.1218230 (accessed: 16.11.2015).

29 Ibid. p.: 1235.

30 Cf.: Jeremy J. Schmidt, “Integrating Water Management in the Anthropocene,” *Society & Natural Resources* Vol. 26 No. 1 (2013), pp.: 105-112.

31 Cf.: Paul Jeffrey and Mary Gearey, “Integrated water resources management: lost on the road from ambition to realisation?” *Water Science & Technology* Vol. 53, no.1 (2006), pp.: 4 et seqq.

32 Tushaar Shah, “IWRM: Apply with care,” *International Water Management Institute (IWMI)*, (24.01.2014), under “Highlights,” <http://www.iwmi.cgiar.org/2014/01/iwrm-apply-with-care/> (accessed: 16.11.2015).

33 Mark Giordano and Tushaar Shah, “From IWRM back to integrated water resources management,” *International Journal of Water Resources Development* Vol. 30, No. 3 (2014), pp.: 365 et seqq.

34 Ibid.

35 Giok Ling Ooi, *Sustainability and Cities – Concept and Assessment*, (Singapore: World Scientific, 2005).

key factor whether a society succeeds or fails to develop towards sustainability.³⁶ Although public participation is difficult to evaluate, researcher like de Garis et al. suggest to involve the public in the process of public-policy in order to facilitate positive development in regard to water resource issues.³⁷ According to Hommes et al., public engagement is feasible through water conversations, which can occur due to different perspectives of stakeholders, their interaction and communication with each other.³⁸ Consequently, an environment is required, which enables such conversation and participations.

With regard to Singapore's water management we can find numerous research. An established scholar is Cecilia Tortajada, who has more than 20 years experience in water management and related fields. Although she is not explicitly an advocate of the IWRM approach, she focuses on sustainable water management as well as governmental and institutional roles.³⁹ In the case of Singapore, Tortajada, together with her colleague Joshi, examines legal and regulatory instruments as well as inter-institutional coordination, concluding that Singapore's water issue and its management enjoys significant importance on the national agenda due to political will, policy-making and longterm planning.⁴⁰ Tortajada and Joshi took their investigation further and explored how public involvement and policy play together. They mainly observe a political environment that facilitates policy-making of holistic character and even its implementation.⁴¹ Singapore's particular tactic for water demand is to emphasize “valuing water,” which results in responsible use of water and realistic (not subsidized) water prices.⁴² In fact Singapore's government stimulates the feeling of

36 Peter Söderbaum and Cecilia Tortajada, “Perspectives for water management within the context of sustainable development,” *Water International* Vol. 36, No. 7 (November 2011), p.: 825.

37 Y. de Garis, N. Lutt and Andrew Tagg, “Stakeholder Involvement in Water-Resource Planning,” *Water and Environment* Vol. 17, No.1 (March 2003), pp.: 54-58.

38 Saskia Hommes, Joanne Vinke-de Kruijf, Henriëtte S Otter and Geiske Bouma, “Knowledge and perceptions in participatory policy processes: lessons from the delta-region in the Netherlands,” *Water Resource Management* Vol. 23, No. 8 (June 2009), pp.: 1641–1663; For in depth reading: Nikoleta Jones, Konstantinos Evangelinos, Petros Gaganis and Eugenia Polyzou, “Citizens’ Perceptions on Water Conservation Policies and the Role of Social Capital,” *Water Resource Management* Vol. 25, No. 2 (January 2011), pp.: 509–522; Don Lenihan, “Rethinking the Public Policy Process – A Public Engagement Framework,” *Public Policy Forum* (May 2009), <http://www.ppforum.ca/sites/default/files/FRAMEWORK%20PAPER%20.pdf> (accessed: 23.11.2015).

39 For in further reading: cf.: Cecilia Tortajada, “Water infrastructure as an essential element for human development,” *International Journal of Water Resources Development*, Vol. 30, No. 1, (2014), pp.: 1–13; Cecilia Tortajada, Yugal Kishore Joshi and Asit K. Biswas, *The Singapore Water Story, Sustainable Development in an Urban City State*, London and New York: Routledge (2013); Asit K. Biswas and Cecilia Tortajada, eds, *Appraising Sustainable Development. Water Management and Environmental Challenges*, New Delhi: Oxford University Press (2005).

40 Cecilia Tortajada and Yugal Kishore Joshi, “Water quality management in Singapore: the role of institutions, laws and regulations,” *Hydrological Sciences Journal* Vol. 59 No. 9, (20.08.2014), p.: 1763. DOI: 10.1080/02626667.2014.942664 (accessed: 20.11.2015).

41 Cf.: Cecilia Tortajada and Yugal Kishore Joshi, “Water Demand Management in Singapore: Involving the Public,” *Water Resources Management*, Vol. 27, No.8 (June 2013), p.: 2743.

42 Ibid.

ownership over water as well as a “personal relationship” with water.⁴³ Tortajada and Joshi discover that Singapore relies on “soft” programs such as public education and feedback from the public rather than on “hard” programs such as policy-making in sector of laws and financial regulations.⁴⁴

Similarly to Tortajada, Ivy Ong Bee Luan attempts to analyze Singapore with a holistic view. Luan is also not an explicit IWRM advocate, but instead focuses on political (legal and regulatory) as well as on institutional and on technical aspects of her analytical framework.⁴⁵ However, Luan does not merely analyze each sector but manages to correlate and illustrate in detail how “[...] legislations and a good institutional framework must go hand in hand [...]”⁴⁶ Luan first elaborates on how Singapore's physical infrastructure plays a role in public and private planning, and on how responsible agencies interact and integrate in order to diminish inter-sectoral conflict, as well as on how the coordination between agencies has been simplified but not reduced in its requirements.⁴⁷ Further, she dives into legal aspects of ownership in regard to water, and how regulations and strict penalties apply to them. Furthermore, she examines which institutions are responsible for implementation and execution of political decision. She gives an overview of public education, water-pricing, research & development (R&D), and supply and demand management – this also includes which institution or department is responsible.

An important contributor to Singapore's academic representation is Asit K. Biswas. In like manner to the above-mentioned researchers, he stands for a holistic approach towards water management. With Joshi and Tortajada, he explores the human and environmental characteristics of Singapore's water purification.⁴⁸ Nonetheless, he particularly emphasizes on the political vision and political will of Singapore, which he considers as crucial elements of a solid foundation for sustainable development.⁴⁹ Other feature are pragmatic policies, long-term planning and forward looking strategies.⁵⁰ Biswas praises Singapore's Prime Minister (PM) and his insight that “[...] it is much more expensive for a society to live in a polluted environment compared to a clean one.”⁵¹ Moreover, Biswas considers Singapore's example as a flagship for scholars such as Thomas F. Dixon and Peter Gleick, who believe water scarcity would result in war.⁵² Implicitly, Biswas

43 Ibid.

44 Ibid. pp.: 2743 et seqq.

45 Cf.: Ivy Ong Bee Luan, “Singapore Water Management Policies and Practices,” *Water Resources Development* Vol. 26, No. 1, (March 2010), pp.: 65–80.

46 Ibid. p.:74.

47 Ibid. pp.: 69.et seqq.

48 For further reading see: Yugal Kishore Joshi and Cecilia Tortajada and Asit K. Biswas, “Cleaning of the Singapore River and Kallang Basin in Singapore: Human and Environmental Dimensions,” *AMBIO* Vol. 41, No. 7, (November 2012), pp.: 777-781.

49 Ibid. p.: 780 et seqq.

50 Ibid.

51 Ibid. p.:781.

52 Cf.: Biswas (2009). For further reading on water wars: Thomas F. Homer-Dixon, *Environment, Scarcity and*

advocates for the opposite academic camp such as Tanja Elligsen, Daniel Deudney, and Aaron T. Wolf, which argues that water is cause for cooperation, innovation and development.⁵³

Notwithstanding, Singapore itself eagerly publishes data, statistics and other information regarding its water management. One particular book written by Yong Soon Tan, Singapore's Secretary for National Climate Change, is one of the most cited works on the topic of Singapore and water management. In a objective and detailed manner Yon Soon Tan describes a coherent vision of Singapore's political leaders and their public support.⁵⁴ Further, he illustrates how aspects of management and of technological and institutional innovation were essential to the state's planning process. Similarly to Biswas and Tortajada, Yong Soon Tan makes it clear that working with the people renders feasible every solution envisioned by the government.

Concerning Indonesia's water resource management, we can find several researchers investigating different aspects. Fulazzaky for instance is one of the most cited academics in English literature when it comes to Indonesia water management. He is also an advocate of the IWRM approach. In his most recent work, "Challenges of Integrated Water Resources Management in Indonesia," he explains Indonesia's environmental and water managing problems in detail.⁵⁵ According to Fulazzaky, the IWRM process is necessary in order to achieve sustainable development and along with it a participatory paradigm change is required.⁵⁶ He further claims that IWRM is approachable after Law No.7/2004 became effective and the so called River Basin Integrated Water Resources Management Plan (RBIWRMP) would be the exercising tool for it.⁵⁷ Fulazzaky describes different IWRM projects in Indonesia but also admits that those projects have not been fulfilled or accomplished yet for various reasons. This would be more proof for the critics of IWRM. According to Fulazzaky, "standard operating procedures" would be necessary for a successful implementation of IWRM.⁵⁸

Violence, (Princeton: Princeton University Press, 1999); Heather Cooley, Juliet Christian-Smith, Peter H. Gleick, Lucy Allen, and Michael Cohen, *Understanding and Reducing the Risks of Climate Change for Transboundary Waters*, (Oakland: Pacific Institute, 2009).

53 For in depth reading please see: Aaron T. Wolf, Annika Kramer, Alexander Carius, and Geoffrey D. Dabelko, "Water can be a pathway to peace, not war," *Navigating Peace* No.1, (July 2006), pp.: 1-6; Daniel Deudney, "The Case Against Linking Environmental Degradation and National Security," *Millennium* (1990), pp.: 461-476; Wenche Hauge and Tanja Elligsen, "Beyond Environmental Scarcity: Causal Pathways to Conflict," *Journal of Peace Research*, Vol. 35, No. 3 Special Issue on Environmental Conflict (May 1998), pp.: 299-317.

54 Cf.: Yong Soon Tan, Lee Tung Jean and Karen Tan, *Clean, Green and Blue – Singapore's Journey Towards Environmental and Water Sustainability*, (Singapore: Institute of South East Asian Studies, 2009).

55 Mohamad Ali Fulazzaky, "Challenges of Integrated Water Resources Management in Indonesia," *Water* Vol. 6, No.7, (2014), pp.: 2000-2020.

56 Cf.: *ibid.* pp.: 2001 et seqq.

57 Cf.: *ibid.* pp.: 2013 et seqq.

58 Fulazzaky (2014), pp.: 2016.

Together with Gany, Fulazzaky also explores the environmental problems of sludge and soil erosion. Their proposal for how to manage this problem resembles the IWRM approach. However, they point out a significant difficulty – namely that the erosion and sludge problem has not been “internalized” in the society.⁵⁹ Through a simulation model, Bronswijk, a specialist in soil science, confirms Fulazzaky's and Gany's call for sustainable development and management of sludge as the soil's condition would be critical if no change in Indonesia's approach were to happen.⁶⁰ Additionally, Budisantoso argues that irrigation policy in Indonesia should also be of participatory nature. He further highlights the fact that the farmers, who are usually categorized as poor, need to be eased from the “irrigation management burden.”⁶¹

As far as inter-institutional connections are concerned, Akil and Fulazzaky examine Indonesia's data information management since they regard ICT as a significant asset for IWRM implementation. According to them, exchange of data information and communication among institutions contribute to an enhanced outcome of water management.⁶²

Wijanto Hadipuro scrutinizes more in depth Indonesia's legal framework in further detail, as he proclaims that “Indonesia is at the crossroads” with its water resource policy and needs to determine whether it should commercialize water or consider it as a public resource.⁶³ Similarly to Budisantoso, he highlights the delicate situation of the poor, who will suffer even more if Indonesia steps towards commercialization of water – and according to Hadipuro, Indonesia currently does so.⁶⁴ If Indonesia wants to treat water as a public service it also needs to make sure that every one can access water and thus it would require a strong political commitment.⁶⁵ Commercialization would entail adopting suitable rules, norms and customs.⁶⁶

Furthermore, Hadipuro uses examples of other countries to see if Indonesia can learn a lesson from those. However, the results are that neither Chile in regard to commercial water rights nor England and Wales in regard to the creation of pseudo competition for water pose as applicable

59 Mohamad Ali Fulazzaky and Abdul Hafied Abdul Gany, “Challenges of soil erosion and sludge management for sustainable development in Indonesia,” *Journal of Environmental Management* Vol. 9, No. 8 (June 2009), p.: 2392.

60 J.J.B. Bronswijk et al. “Evaluation of water management strategies for acid sulphate soils using a simulation model: A case study in Indonesia,” *Agricultural Water Management* Vol. 27, No. 2 (June 1995), pp.: 125–142.

61 Soeprapto Budisantoso, “Participatory Irrigation Policy under the Indonesian Water Resource Law,” (The 4th Asian Regional Conference & 10th International Seminar on Participatory Irrigation Management, Tehran-Iran, May 2-5, 2007).

62 Mohamad Ali Fulazzaky and Hilman Akil, “Data and Information Management for Capacity Building of the Water Resources Sector in Indonesia,” *Water Resources Management* Vol. 23, No. 6, (April 2009), pp.: 1055-1066.

63 Wijanto Hadipuro, “Indonesia’s Water Supply Regulatory Framework: Between Commercialisation and Public Service?” *Water Alternatives* Vol. 3, No. 3 (2010), p.: 475.

64 Cf.: *ibid.* p.: 489.

65 *Ibid.* pp.:479 et seqq; David Hall and Emanuele Lobina, *Water as a Public Service*, (London: Public Service International, 2006).

66 Karen Bakker, “Archipelagos and networks: urbanization and water privatization in the South,” *Geographical Journal* Vol. 169, No. 4 (December 2003), pp.: 328–341.

examples for Indonesia due to various obstacles.⁶⁷ Certainly, we can find more countries as examples, such as Australia or the Netherlands. Erick Hansnata proposes to establish a single agency, just as Australia did – one, which involves all interest groups and has the authority to intervene.⁶⁸ Bart Teeuwen, an independent water governance advisor from the Netherlands, who also assisted in implementing government regulation in Indonesia between 2002 and 2010, focuses on governance of water. In his work he points out that Indonesia's case is distinct and thus solutions or methods from other countries cannot simply be imposed.⁶⁹ He sets value on distribution of authority, communication, and the legislation process itself.⁷⁰ Notwithstanding, he is one of few who draws attention to the fact that law No. 7/2004, which Fulazzaky praises as a good step towards sustainability, might actually not be consistent with the constitution.⁷¹

Hadipuro also draws attention to another problem of Indonesia's water management: exploitation of groundwater. This situation probably results from its low price rate and favorable quality condition, according to Stephen Foster.⁷² Backed by experts such as Burke & Moench, and Palma, Hadipuro urges that Indonesia adopt regulations and legislation in order to control and protect groundwater as common property resource.⁷³

Similar to Singapore, Indonesia or its government employees authored publications. For instance, Azan, director of the Indonesian Ministry for National Development Planning, writes about the paradigm change in water management in Indonesia and its implication.⁷⁴ He compliments the achievement of several goals. However, it is not mentioned how they were accomplished or how goals will be realized in the future. The government of Indonesia officially states in a publication for the 3rd Water Forum in 2003 that IWRM is a suitable method for Indonesia and will be implemented.⁷⁵ Furthermore, Indonesia will maintain and foster its water

67 Cf.: *ibid.*

68 Erick Hansnata, "Water management in Indonesia: lessons from Australia," *East Asia Forum*, (01.06.2013), <http://www.eastasiaforum.org/2013/06/01/water-management-in-indonesia-lessons-from-australia/> (accessed: 01.12.2015).

69 Bart Teeuwen, *Review Technical Assistance Modernization Indonesian Water Resources Legislation*, (Den Haag: Water Governance Centre, 2011b); Bart Teeuwen, "Modernization of Indonesian Water Legislation – Lessons Learned with the Dutch Assistance in the Legislation Process," *Water Governance* Vol. 3 (2011a), p.: 33-39; For in depth reading on water governance: Herman Havekes et al. *Building Blocks for Good Water Governance* (The Hague: Water Governance Centre, 2013).

70 Cf.: *ibid.* pp.: 22 et seqq.

71 Cf.: *ibid.*

72 Cf.: Stephen S.D. Foster, "The interdependence of Groundwater and Urbanisation in Rapidly Developing Cities," *Urban Water* Vol. 3 (2001), pp.: 185-192.

73 Hadipuro, p.: 487; For further reading on ground water management: Jacob. J. Burke and Marcus Moench, *Groundwater and society: resources, tensions and opportunities: themes in groundwater management for the twenty-first century* (New York: United Nations 2000); Catarina Roseta-Palma, "Joint Quantity/Quality Management of Groundwater," *Environmental and Resource Economics* Vol. 26, No. 1 (September 2003), pp.: 89-106.

74 Mohammed Donny Azdan, "Overview of Indonesia Water System and Policies" (paper presented at the workshop Sustainable Water Management for Agriculture, Jakarta December 13, 2011).

75 Indonesia, "Water Resources Management Towards Enhancement of Effective Water Governance in Indonesia."

partnerships, which promote IWRM such as the Global Water Partnership. Indonesia is thus in alignment with the work of Fulazzaky et al. Nonetheless, we cannot find detailed explanation or plans for how Indonesia will implement IWRM.

Considering Fulazzaky's observation, that IWRM has been made possible in Indonesia because of Law No. 07/2004, current development causes us to question whether some literature above would be still relevant for us – in view of the fact that a court's decision in February 2015 declared Law No. 07/2004 to be null and void. This endangers all projects and regulations taken since 2004, according to Al'Afghani.⁷⁶ Due to the law's invalidation, the course of development for IWRM might face obstacles or at least uncertainties. Hence, focusing on IWRM might be misleading and insufficient. Even though the approach is recognized worldwide, the focal point of research for Singapore's and Indonesia's water management lies currently on political decisions, on legislative processes or on environment conditions rather than on observing IWRM on a country case basis.

We, on the other hand, aim to go beyond the IWRM and beyond merely examining political decisions. Our approach is to scan the water system situation of both countries through the lens of an evolutionary economic theory and to compare those afterwards. The already covered areas in literature such as political decisions and legislation will be dealt within this work as well. However, we attempt to dive more into the realm of the participation, individual perspectives and sustainable development of Indonesia and Singapore, as Ooi, Söderbaum and Garis et al. suggest it.

3. Theoretical Structure

In the world of economics we can find two main theorems with distinct concerns of analysis: classical and neoclassical theory of economics. In 1776 Adam Smith's *The Wealth of Nations* marked the beginning of classical economics.⁷⁷ Others like John Stuart Mill and David Ricardo contributed to shape the idea of classical economy. It is characterized by the “invisible hand” of the free market, which complies to a natural equilibrium – a self-regulated economy. Neoclassical Economics, on the other hand, has its roots in the 19th century. Authors such as William Stanley Jevons, Carl Menger and Léon Walras are the fathers of thought of this theory.⁷⁸ Through the theory

prepared for For the 3rd World Water Forum Kyoto – Japan, March 2003, *World Water Council*, (2003).

76 Mohamad Moya Al'Afghani, “Court decision brings water governance reforms to a halt (Part 1 of 2),” *Jakarta Post* (Monday, 09.03.2015, 6.38 o'clock), under “Opinion,” <http://www.thejakartapost.com/news/2015/03/09/court-decision-brings-water-governance-reforms-a-halt-part-1-2.html> (accessed: 01.12.2015).

77 Adam Smith, *An Inquiry to the Nature and Cause of the Wealth of Nations*, ed. Sálvio Marcelo Soares. (MetaLibri Digital Library, 29.05.2007), http://www.ibiblio.org/ml/libri/s/SmithA_WealthNations_p.pdf (accessed: 11.08.2015).

78 For further understanding please read: William Stanley Jevons, “Theory of Political Economy,” (1871) in *The*

of neoclassical economics and its emphasis on the individual, the concept of *homo oeconomicus* arose. The most distinctive characteristics of those two different approaches are listed in Table 1.⁷⁹ In general, classical economics has a long run view of the economy due to its focus on the dynamics of aggregations of values such as rent, wages, and profit. Therefore the laws of economy are seen objectively. Neoclassical economics, on the other hand, has a short term equilibrium as it focuses on how individual behavior influences the market. In neoclassical economics societal constructs, technology and markets are exogenously.⁸⁰

Table 1: Classical vs. Neoclassical Economic Theory⁸¹

Characteristic	Classical Economics	Neoclassical Economics
Equilibrium	long term equilibrium	short term equilibrium
Method	holism (changes in the system explained by systematic relational patterns of its parts); excludes individual's decisions	individualism (changes in the system are consequences of aggregated individuals' choices & actions); excludes other decision makers such as institutions
Entities of Observation	classes, institutions, technology	individual, company
Focus of Analysis	aggregated flow of value (rent, wages, profit) between social classes (land owners, workers, capitalists) → social structure	aggregated effects of individual behavior (wants/needs & action) → market
Value of a Good	equals production costs, equal rate of profit & conditions through the whole economic system,	is utility of agent
Explanatory Variables (technology, institutions, populations)	endogenous; structure of those are the framework for economic activity	exogenous
Laws of Economy	objective	subjective
Roll of History	historical in order to explain arise of capitalist, institutions etc.	ahistorical, due to focus on individual

Another economic theorem, which is rather recently considered as mainstream theory,

World of Mathematics Vol. 2, Part IV, ed. James R. Newman, pp.: 1217-1237, (New York: Simon & Schuster, 1956); Carl Menger, *Principles of Economics*, (1871) trans. James Dingwall and Bert Hoselitz, (Auburn, Ala: Institute for Humane Studies, Ludwig von Mises Institute, reprinted 2007), https://mises.org/sites/default/files/Principles%20of%20Economics_5.pdf (accessed: 13.08.2015); Léon Walras, *The Elements of Pure Economics or the Theory of Social Wealth*, trans. William Jaffe, London/New York: Routledge, reprinted 2010).

79 Note: Illustration 4 does not comprise all of the theories' attributes as it is not a focus point and would go beyond the scope of this thesis.

80 Dopfer and Potts, (2008), pp.: 19.

81 Composed by author; sources: Adam Smith, *An Inquiry to the Nature and Cause of the Wealth of Nations*, ed. Sálvio Marcelo Soares. (MetaLibri Digital Library, 29.05.2007), http://www.ibiblio.org/ml/libri/s/SmithA_WealthNations_p.pdf (accessed: 11.08.2015); Dopfer and Potts, (2008), pp.: 17 et seqq; Heinz D. Kurz and Neri Salvadori, "Classical' vs. 'Neoclassical' Theories of Value and Distribution and the Long-period Method," in *General Equilibrium. Problems and Prospects*, ed. Frank Hahn and Fabio Petri (London: Routledge, 2002, pp.: 221 et seqq.); John Peters, John Elliot and Stephen Cullenberg, "Economic Transition as a Crisis of Vision: Classical vs. Neoclassical Theories of General Equilibrium," *Eastern Economic Journal* Vol. 28, No. 2 (Spring 2002), pp.: 217-240.

recognizes traits of classical and neoclassical theory and goes beyond those traits.⁸² The so called evolutionary theory of economics has been investigated by several scholars with altering focus levels. Foster as well as van den Bergh draw attention to the complexity of economics, which consists of interconnected structures on divers levels.⁸³ Others like Nelson and Winter looked into entrepreneurship from the perspective of evolutionary economics framework – similar the more recent work of Grebel, Pyka and Hanusch.⁸⁴ The latest research by Dopfer and Potts within this field concerns the development of economy and environment as co-evolutionary process fueled by entrepreneurial activity.⁸⁵ In their book, *The General Theory of Economic Evolution*, Dopfer and Potts make clear what the evolutionary theory extracted from neoclassical and classical theory, and due to this fact evolutionary economic theory is more holistic in its approach.⁸⁶ Henceforth, the term evolutionary theory or evolutionary economics will be used in regard of Dopfer's and Potts' understanding.

The illustration above shows us the neatly split focuses of observation between classical and neoclassical economics. A crucial insight for us is not that one perspective is right or wrong but rather neither of those analyze the overall notion of economics. While classical economics sees the economy as a whole, neoclassical economics focuses on the individual. Consequently, each approach lacks the insight of the other one's research findings. Evolutionary theory takes lessons from each theory and expands the focal point of analysis. From classical economics we understand the need to maintain the long-run perspective in order to see the economy with its dynamics as a whole. Thus, economy is described as a complex system. The variables of analysis are seen as endogenous dynamical process which follow the purpose to foster the “wealth of nation” (growth of generic value or wealth).⁸⁷ Evolutionary economics looks at both aspects. And finds the middle way by analyzing both individual and the institutions. The essential learnings from neoclassic Dopfer and Potts consider to be the emphasis on the individual choice and action, since these traits contribute to change. Consequently, incentives as well as actions of individual are of overriding

82 Daniel Friedman, “Evolutionary Economics Goes Mainstream: A Review of The Theory of Learning in Games,” *Journal of Evolutionary Economics* No. 8, (1998), pp.: 423-432.

83 Cf.: John Foster, “From simplistic to complex systems in economics,” *Cambridge Journal of Economics* Vol. 29, No. 6, (November 2005), pp.: 873-892; Jeroen C.J.M. van den Bergh and Giorgos Kallis, “Evolutionary Policy,” *Max Plank Institute of Economics*, working paper No. 0902, pp.: 1-42.

84 Cf.: Richard R. Nelson and Sidney G. Winter, *An Evolutionary Theory of Economic Change*, Harvard University Press: Cambridge, Massachusetts, and London, (1982); Thomas Grebel, Andreas Pyka and Horst Hanusch, “An Evolutionary Approach to the Theory of Entrepreneurship,” *Industry and Innovation* Vol. 10, No. 4, (2003), pp.: 493-514.

85 Cf.: Potts, Foster and Straton, (2010).

86 Kurt Dopfer and Jason Potts, *The General Theory of Economic Evolution*, (New York: Routledge, 2008), pp.: 17-21.

87 Cf.: Peters, Elliot and Cullenberg, (2002), pp.: 221 et seqq; Kurt Dopfer and Jason Potts, *The General Theory of Economic Evolution*, (New York: Routledge, 2008), p.: 20.

importance for the overall analysis.⁸⁸ Generally, evolutionary economics seeks to combine those two viewpoints, goes beyond them and thus views economy as a whole and in its details such as individual needs and desires. Therefore, we will adhere to Dopfer's and Potts' co-evolutionary theory for this research.

3.1. Co-Evolutionary Model of Entrepreneurship

Before we go into detail on Dopfer's and Potts' framework of three levels: meso, macro and micro, we need to grasp their notion of entrepreneurship. Potts et al. divide entrepreneurial activity into four types of responses from which four types of entrepreneurship originate. The table below illustrates the characteristic of these types as well as corresponding examples. Potts et al. elaborate on each type to certain extent.

Table 2: Types of Entrepreneurship according to Potts et al.⁸⁹

Class	Mode	Mechanism	Example	Incentive
Socio-cultural	changed beliefs, preferences or values	cultural imitation, signalling	new "green" lifestyles	intrinsic, social signalling
Political	new laws, or resource transfers	law, force	carbon taxes	reputation, votes
Technical	scientific discoveries, inventions, new production techniques, new machines	science, education, training, academic scholarship	solar PV cells, Darwin's <i>Origin of the Species</i> , splitting the atom	scientific or artistic reputation, selling patents or copyrights
Economic	new business models, commodities or services	market, consumer choice	creating commercially viable large scale solar power stations, "greening" of the economy	profit, market shares

One type of entrepreneurial response can be social-cultural; this typically refers to a person who encourages institutional or cultural establishment through new thinking models, undertaking or management.⁹⁰ The agent can be active or influential in distinct domains such as corporations, NGOs, the fashion industry or simply by being a celebrity. Change can occur spontaneously, via education or through media and result in change of beliefs, preferences or values of other individuals.⁹¹ The motivation for a social entrepreneur is intrinsic, thus the type of profit is rent-seeking rather than profit-seeking. According to other scholars such as J. Gregory Dees, social entrepreneur's activities deal inter alia with social value creation, while Mair and Marti imply that social entrepreneurship is about "identifying and exploiting innovative solutions to social

⁸⁸ Ibid.: Dopfer and Potts, (2008), pp.: 17-21.

⁸⁹ Source: Potts, Foster and Straton, (2010), p.: 17; Table created by author.

⁹⁰ Cf.: Potts, Foster and Straton, (2010), p.: 18.

⁹¹ Ibid. p.: 17.

problems.”⁹² Overall, we can deduce that social entrepreneurs operate on a level where financial gain is not the principal goal.⁹³ In literature we can find another subtype, namely community entrepreneurship. This concept stems from Ana María Paredo. Profit is seen as an instrument in order to elevate the community out of poverty through the combined forces of stakeholders, who address social, ecological or cultural problems.⁹⁴ Potts' et al. interpretation of social-cultural entrepreneur is almost in alignment with our definition above, except that Potts' entrepreneur does not necessarily seek to find a solution for a social problem. For instance, if somebody decides to change his diet due to environmental effects of industrial livestock farming, he or she does not necessarily work towards a solution. However, his/her action contributes to a common change of behavior and therefore to a possible solution. Motivation of this entrepreneurship type is of intrinsic nature and by sharing his/her thoughts on the topic or agent's behavior other individuals will be stimulated to deal with this topic as well.

Political entrepreneurship comes into effect when social-cultural norms are established, that call for a solution of an environmental problem. Potts regards politicians or law makers as such political entrepreneurs.⁹⁵ They operate through financial or regulatory tools that enable changes in form of restriction or opportunities for other types of entrepreneur such as the economic or technical type. In this sense political entrepreneurship is significant for the creation of a certain environment for other entrepreneurs. Laws, treaties and agreements are considered as possible outcomes of political entrepreneurship.⁹⁶ In literature, institutional entrepreneurship was significantly shaped by Paul Joseph DiMaggio's work. He established the notion of institutional isomorphism. Moreover, his hypothesis is that both public and private organization strive for homogenization.⁹⁷ That is expressed through practices, routines and performance measurements. As von Gabian summarizes in his work, institutional entrepreneurs “[...] are interested in modifying, transforming and/or creating new institutional structures.”⁹⁸ Once more researchers indicate that the environment and

92 Cf.: J. Gregory Dees, “The Meaning of 'Social Entrepreneurship',” *Kauffman Center for Entrepreneurial Leadership* (paper for Social Entrepreneurship Funders Working Group, 6 ppl, 31.10.1998), pp.: 6 et seqq; Johanna Mair and Ignasi Marti, “Social Entrepreneurship Research: A Source of Explanation, Prediction, and Delight,” *Journal of Business* Vol. 41 (2006), pp.: 37 et seqq.

93 Cf.: Lutz E. Schlage, “Stakeholder Identification in Sustainability Entrepreneurship – The Role of Managerial and Organisational Cognition,” *Greener Management International* No. 55, (2009), p.: 16.

94 Cf.: Ana M. Paredo, “Towards a Theory of Community Based Enterprise,” *Academy of Management Review* Vol. 31, No. 2 (2006), pp.: 309-328.

95 Ibid. p.: 18.

96 Ibid.

97 Cf.: Paul J. DiMaggio, “Interest and agency in institutional theory,” in *Institutional patterns and organizations: Culture and environment*, ed. Lynne G. Zucker, (Cambridge: Ballinger, 1988), pp.: 4 et seqq. For further in depth reading: Paul J. DiMaggio and Walter W. Powell, “Institutional Isomorphism and Collective Rationality in Organizational Fields,” *American Sociological Review* Vol. 48, (April 1983), pp.: 147-160.

98 von Gabian. p.: 69.

circumstances are crucial for institutional entrepreneurship to rise.⁹⁹ It is important to note that in literature political entrepreneurship is responsible for institutional change and is thus often used synonymously to institutional entrepreneurship.¹⁰⁰ Notably, Potts' definition is more restrictive. However, since DiMaggio's is at the same time too broad for our analysis we will continue on the base of Potts' definition. Below, we will use political and institutional entrepreneurship synonymously.

Technological entrepreneurship is the third type of entrepreneurship and affects scientists, technologists and engineers.¹⁰¹ Those groups are typically responsible for new techniques or development of new kind of machinery. Examples for this would be the discovery of how to split an atom or the technology of solar plants or the production of smart phones. Potts implies that governments can/should encourage this type of entrepreneur through education and/or R&D, as citizens can profit from such inventions and development. According to Schumpeter, the entrepreneur is rather the reason for economic development and initiator of a process which he later called "creative destruction."¹⁰² As a consequence of "creative destruction" of an innovation in the sense of Schumpeter, those entrepreneur's motivation is either to have a patent or be at least the first one to introduce such innovation.¹⁰³ Elon Musk, for instance, could have patented the technology of the electric car Tesla and so secure the technology for his company. However, as he decided not to do so, it became a public good. Instead of turning the technological advantage into a monopoly position, it can now be used by other scientists and engineers.¹⁰⁴

The most commonly known type of entrepreneurship is economic entrepreneurship. This kind of agent seeks profit by creating value in form of services, products, new business models or technology.¹⁰⁵ Steve Job's presentation of the iPhone, for instance, opened a new market and destroyed other branches at the same time. Apple was able to secure its position as leading technological innovator and bring a product to the market which led to changes on various levels – from social to corporate behavior. Needless to say that technical entrepreneurship and economic

99 Cf.: Floortje Alkemade et al. "Towards a micro-level explanation of sustainability transition: entrepreneurial strategies," (working paper No. 11.01, Copernicus Institute of Sustainable Development Utrecht University, 2011), p.: 19.

100 Cf.: Magnus Henrekson and Tino Sanandaji, "Institutional Entrepreneurship: An Introduction," *Research Institute of Industrial Economics*, IFN working paper No. 853, (31.10.2011); Christian Hederer, "Political entrepreneurship and institutional change: an evolutionary perspective," (paper prepared for EAEPE conference, Porto, November 2007).

101 Ibid. pp.: 18-19.

102 Cf.: Robert F. Hébert and Albert N. Link, "In Search of the Meaning of Entrepreneurship," *Small Business Economics* Vol. 1, No. 1 (1989), pp.: 41 et seqq.

103 Ibid. p.: 18.

104 Elon Musk, "All Our Patent Are Belong To You," *Tesla Motors* (12.06.2014), under Blog <https://www.teslamotors.com/blog/all-our-patent-are-belong-you> (accessed: 23.02.2016).

105 Ibid. p.: 19.

entrepreneurship are closely intertwined. The literature identifies this entrepreneurship as being concerned with high-technology or technologically based companies.¹⁰⁶ However, it is also seen that dynamics of technical entrepreneurs are intertwined with political and economic entrepreneurship. As private companies usually do not have the capacity to invest in R&D, a country's government closes those financing gaps.¹⁰⁷ In regard to this type of entrepreneurship, Potts' definition overlaps with the main literature in terms of its public good component and profit seeking of technological companies as they also invest their own capital into innovation and development.¹⁰⁸

Another type of entrepreneurship, which is broadly covered in literature, but is not considered by Potts, is environmental entrepreneurship. Eco-entrepreneurship, also known as environmental entrepreneurship, enviropreneurship, ecological entrepreneurship or ecopreneurship. Although its interchangeability is debateable we can generally agree that the environment is of fundamental concern and that the outcome of eco-entrepreneurship is ecological value creation.¹⁰⁹ Products or services will be manifested accordingly. However, an economic entrepreneur can be also concerned with social effects or technical development or all together, as we can see with the example of Elon Musk and Tesla Motors. Even though the car is categorized as a luxury car, it is still affordable and thus creates a great impact on society. For its third Tesla model, the company aims to sell the car for 35.000 USD or less in order to enter the mass market and start an electronic car evolution.¹¹⁰ In addition, the care does not use any fuel, saves resources and has no emissions.

To summarize, these four kinds of entrepreneurship are overlapping and not always easy to distinguish. They are closely intertwined and affect one another. What Pott et al. do not mention are the traits of entrepreneurship, which are represented in the main literature. We can generally limit the scope down to four characteristics:

1. Equilibrating vs. Disequilibrating

Israel Meir Kirzner and Joseph Alois Schumpeter are two well known opponents in regard to

106 Arnold C. Cooper, "Technological entrepreneurship: what do we know?" *R&D Management* Vol. 3, No. 2, (February 1973), pp.: 59 et seqq; Dylan Jones-Evens, "Technical Entrepreneurship, Strategy and Experience," *International Small Business Journal* Vol. 14, (April 1994), pp.: 15 et seqq.

107 Jason Potts, John Foster and Anna Straton, "An entrepreneurial model of economic and environmental co-evolution," Working Paper from CSIRO (Common Wealth Scientific and Industrial Research Organisation) workshop, Canberra, June 2009, pp.: 18 et seqq.

108 C.f.: Cooper, pp.: 59 et seqq.

109 Lorrain Uhlener Hendrickson and Dale B. Tuttle, "Dynamic Management of the Environmental Enterprise: a qualitative analysis," *Journal of Organizational Change Management* Vol. 4, No. 4 (1997), pp.: 363 et seqq.; Lutz E. Schlange, "Stakeholder Identification in Sustainability Entrepreneurship: The Role of Marginal and Organisational Cognition," *Greener Management International* No. 13 (January 2009), pp.: 16 et seqq.

110 Shawn Price, "New Tesla Model 3 will sell for \$35,000 or less," *United Press International (UPI)*, (12.02.2016, 4.55 o'clock) under "Business News," http://www.upi.com/Business_News/2016/02/12/New-Tesla-Model-3-will-sell-for-35000-or-less/8521455267181/ (accessed: 24.02.2016).

the perception of an entrepreneur. Kirzner, an Austrian school economist, understood an entrepreneur as an agent who would see market insufficiencies as opportunities to make profit. “The entrepreneur is the equilibrating force whose activity responds to the existing tensions and provides those corrections [...]”¹¹¹ Hence, the market would go back to equilibrium due to the entrepreneur's deed. Schumpeter, on the other hand, sees the entrepreneur as an innovator (not inventor) in economic development, someone who employs “[...] existing resources in a different way, in doing new things with them, irrespective of whether those resources increase or not.”¹¹²

2. Innovative & Disruptive

The disequilibrating entrepreneurs have thus the attribute to be innovative and disruptive. The innovation comes in form of a creative process, which becomes apparent when: a) a new or improved good is introduced; b) a new method of production is introduced; c) a new market is opened; d) a new source of supply is used; or e) business management processes are reorganized.¹¹³

3. Interrelation with Environment

Bruyat and Julien elaborate further on the aspects of an entrepreneur. They see one as “a human being capable of creating, learning and influencing the environment.”¹¹⁴ They state that an entrepreneur's environmental context should be examined since he/she could create not only economic value but also social and cultural value.¹¹⁵ This is significant for our understanding of sustainability driven entrepreneurship.

4. Discovery vs. Creation

In literature we generally can find two main perceptions of entrepreneurship: the entrepreneurial discovery view, and the entrepreneurial creation view.¹¹⁶ The discovery theory has its intellectual roots in the Austrian school, of which Kirzner is an example. According to this theory, entrepreneurs are individuals who are particularly alert and thus can take advantage of objective opportunities under conditions of risk.¹¹⁷ Change and development are due to exogenous factors, which move the entrepreneur to action.

111 Israel Meir Kirzner, *Competition and Entrepreneurship*, (University of Chicago: University Chicago Press, 1978), p.: 127.

112 Joseph Alois Schumpeter, *The Theory of Economic Development – An Inquiry to Profits, Capital, Credit, Interest and the Business Cycle*, trans. Redvers Opie, (World: Harvard University Press, 1934), p.: 63.

113 Cf.: Michael Pender, “Technological Regimes and the Variety of Innovation Behaviour: Creating integrated taxonomies of firms and sectors,” *Research Policy* Vol. 39, No. 3 (April 2010), pp.: 323-334.

114 Christian Bruyat and Pierre-André Julien, “Defining the Field of Research in Entrepreneurship,” *Journal of Business Venturing* Vol. 16, No. 2 (2001), p.: 165.

115 Cf.: von Gabain, p.: 56.

116 Ibid. p.: 60.

117 Sharon A. Alvarez and Jay B. Barney, “Discovery and Creation: Alternative Theories of Entrepreneurial Action,” *Strategic Entrepreneurship Journal* Vol 1. No. 1, (November 2007), pp.:12 et seqq.

The entrepreneurial creation view derives from evolutionary realism and social constructivism, which have roots in evolutionary theory (Schumpeter) and social creation theory. It portrays an entrepreneur as an individual who creates opportunities through an emergent search process – a constant learning and adapting of assumption and hypothesis (evolutionary path-dependent manner).¹¹⁸ Hence, this process is of endogenous nature. At the same time, this process also creates an entrepreneur. An entrepreneur is not different ex ante but changes and emerges within the process of creating opportunities.

3.2. Sustainability Driven Entrepreneurship

A rather new aspect of entrepreneurship is sustainability driven entrepreneurship (SDE), which is applied for this paper's framework. But before we dive into SDE, we first clarify the concept of sustainability.

Sustainability

Sustainability as a term itself was established for the first time in the 18th century in Germany. In order to achieve a maximum of longterm usage of the forest within ecological terms, *Nachhaltigkeit* (German for sustainability) was the key word for forest management.¹¹⁹ Another well know contributor to the thought of sustainable development is Thomas Malthus. In his work, *Essay on the Principle of Population*, he discusses how the non-exponential growth of resources will constrict the exponential growth of the human population.¹²⁰ With the development of neoclassical economic theory in the 18th and 19th century the topic of resource constrains was not paid attention to and the observation of interrelation between environment and economy was pushed into the background.¹²¹

Nonetheless, academics, such as Paul and Anne Ehrlich, Garret Hardin or Elinor Ostrom have preserved the idea of sustainable development by conducting research that emphasized environmental awareness on the level of civil society, politics as well as academia.¹²² Building on John Stuart Mill, Herman Daly pointed out the limited resource capacity of the earth which cannot

¹¹⁸ Cf.: *ibid.*

¹¹⁹ Armin Grunwald und Jürgen Kopfmüller, *Nachhaltigkeit*, (Frankfurt/Main: Campus Verlag, 2006), pp.: 14 et seqq.

¹²⁰ Thomas Malthus, *Essay on the Principle of Population*, (London: J. Johnson, 1798).

¹²¹ Cf.: Joshua von Gabain, "Entrepreneurship for Sustainable Development – An Exploration of Theoretical Approaches", (Diploma thesis, Vienna University of Economics and Business, 2012), p. 9.

¹²² *Ibid.*; For further in-depth reading: Paul R. Ehrlich, *The Population Bomb*, (New York: Ballantine Books, 1968); Garret Hardin, "The Tragedy of the Commons," *Science* Vol. 162 No. 3859 (13.12.1968), pp.: 1243-1248, DOI: 10.1126 (accessed: 19.04.2015); Elinor Ostrom, *Governing the Commons – The evolution of institutions for collective action*, (New York & Cambridge: Cambridge University Press, 1990).

sustain with steady increasing growth of emissions.¹²³ Sustainable development could only be achieved through a “development without growth,” which meant to increase physical scale (growth) of material while operating on “higher production efficiency”.¹²⁴ It was not until 1987 when the World Commission on Environment and Development (WCED) defined in the “The Brundtland Report” and the term *sustainable development* gained currency.¹²⁵

“In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations.”¹²⁶

Weak & Strong Sustainability

Deriving from the debate on sustainable development, we will explain the economic discourse and its entrepreneurial activity in order to understand the sustainability driven entrepreneurship. How sustainable development is interpreted is divided by two main viewpoints in the field of economics: an anthropocentric and ecocentric view.¹²⁷ The outcomes of these two approaches are distinct and thus entail contrasting results – such as in policy making.

One approach is *weak sustainability*, which is given “when all forms of capital are more or less substitutes for one another.”¹²⁸ This, however, underlies the presumptions routed in the neoclassical economic theory: 1. People have rational preferences among outcomes. 2. Individuals maximize utility and firms maximize profits. 3. People and firms act independently on the basis of full and relevant information.¹²⁹ Turner et al. conclude accordingly: “we can pass on less environment so long as we offset this loss by increasing the stock of roads and machinery, or other man-made capital.”¹³⁰

This view has been criticized and opposed by many other academics within the field of

¹²³Ibid. p.: 11.

¹²⁴Herman Edward Daly, *Beyond Growth – the economics of sustainable development*, (Boston: Beacon Press, 1996), pp.: 69 et seqq.

¹²⁵Cf.: World Commission on Environment and Development (WCED), *Our Common Future*, (Oxford University Press, 1987).

¹²⁶Ibid. p.: 27.

¹²⁷Cf.: von Gabain, p.: 21.

¹²⁸OECD, “Weak Sustainability,” *OECD* (created on 06.07.2005), under “Glossary of Statistical Terms,” <https://stats.oecd.org/glossary/detail.asp?ID=6611> (accessed: 25.04.2015).

¹²⁹E. Roy, Weintraub, “Neoclassical Economics,” *Library of Economics and Liberty*, under “The Concise Encyclopedia of Economics, edition. 1.” <http://www.econlib.org/library/Enc1/NeoclassicalEconomics.html> (accessed: 25.04.2015).

¹³⁰R. Kerry Turner, David Pearce and Ian Bateman, *Environmental Economics – An elementary introduction*, (Baltimore: The Johns Hopkins University Press, 1993), p.: 56.

economics, such as Nikolas Georgescu-Roegen with *The Entropy Law and the Economic Process*, Herman Daly with *Steady-State Economics* as well as Kenneth Boulding with *The Economics of the Coming Spaceship Earth*.¹³¹ The idea is that concepts of thermodynamics should be applied when looking at the production process. Consequently, waste production is as essential as other production forms such as goods or services.¹³² It is understood that natural capital must be contained at least at a constant and evenly enhanced over time.¹³³ Advocates of *strong sustainability* argue that not all forms of capital can substitute one another, since it would imply that a double amount of built roads can replace the function of a rainforest. Splash & Carter conclude that some parameters or entities “may be measurable and non-comparable, some may be comparable and not measurable, while others may be neither measurable nor comparable.”¹³⁴ These are the conflicts of value between individual, social and environmental as Goergescu-Roegen explored them.¹³⁵

Although the subject matter of *weak & strong sustainability* can be further discussed in depth, a rough description of two opposing views above provides enough of an indication of economic or political behavior for our purposes here.

Sustainability Models

In correlation to the two contrasting concepts there are two main models of sustainable development: *three sector model* and *nested model*. Both models operate with environment, economy and society as their components. However, their arrangement and functionality differs. We can see in the first illustration below the *three pillar model* or *triple bottom line* as it is known in business in regard to CSR (Corporate Social Responsibility). The three categories are supposed to be balanced in order to achieve sustainability (red triangle).¹³⁶ The components being separate makes the analysis of each component “straightforward” and rather of simplistic nature.¹³⁷ Moreover, Giddings et al. point out the constraints of this model. Due to the separateness different

131Nicholaus Georgescu-Roegen, *The Entropy Law and the Economic Process*, (Cambridge/London: Harvard University Press, 1971); Herman E. Daly, *Steady-State Economics*, (Washington D.C.: Island Press, 1991); Kenneth Ewart Boulding, “The economics of the coming Spaceship Earth,” in *Environmental Quality in a Growing Economy: Essays from the Sixth RFF Forum*, ed. H. Jarrett, (Baltimore: John Hopkins University Press 1966), pp.: 3-14.

132Cf.: von Gabain, pp.: 24 et seqq.

133Cf. Daly.

134Cf.: Clive L. Spash and Claudia Carter, eds., *Environmental Valuation in Europe: Findings from the Concerted Action*, (Cambridge Research for Environment, 2001).

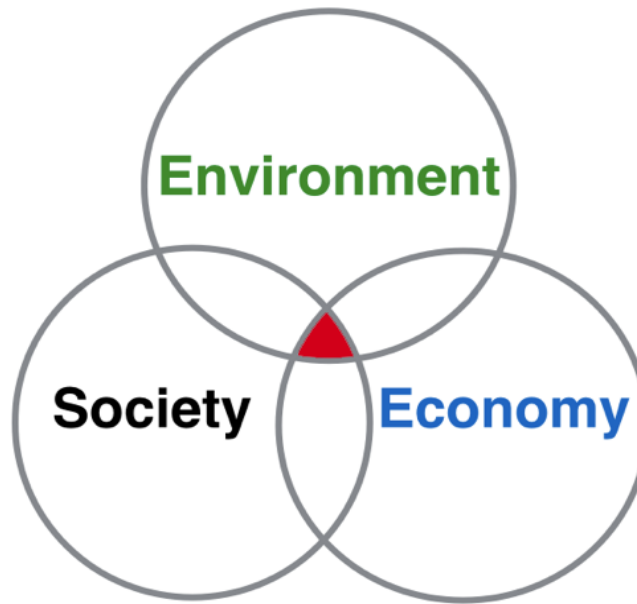
135Cf. von Gabain, p.: 27.

136Cf.: Bob Giddings, Bill Hopwood and Geoff O'Brien, “Environment, Economy and Society: fitting them together into sustainable development,” *Sustainable Development* Vol. 10, (2002), pp. 188. et seqq. DOI: 10.1002/sd.199 (accessed: 01.05.2015).

137Ibid. p.: 189.

priorities might be given. Furthermore, the separation indicates an autonomy of the three, which leads to the deduction that trades-off can be made – this is in compliance with *weak sustainability*.¹³⁸

Illustration 1: Three-Pillar Model of Sustainability¹³⁹



Building on the perspective of *strong sustainability*, the *nested model* describes the environment as a framework that allows society and economy to format and exist, while the economy is embedded into the society – as we can see in the illustration below. All areas are interdependent as our human activity occurs in all spheres: political, economic or societal.¹⁴⁰ Concurrently, the three components are intertwined but not necessary interdependent. For example, while society cannot exist without environment, environment can exist without society. Nevertheless, society influences the environment. Sustainable development can, thereby, be achieved through “integration of different actions and sectors, taking a holistic view and overcoming barriers between disciplines.”¹⁴¹

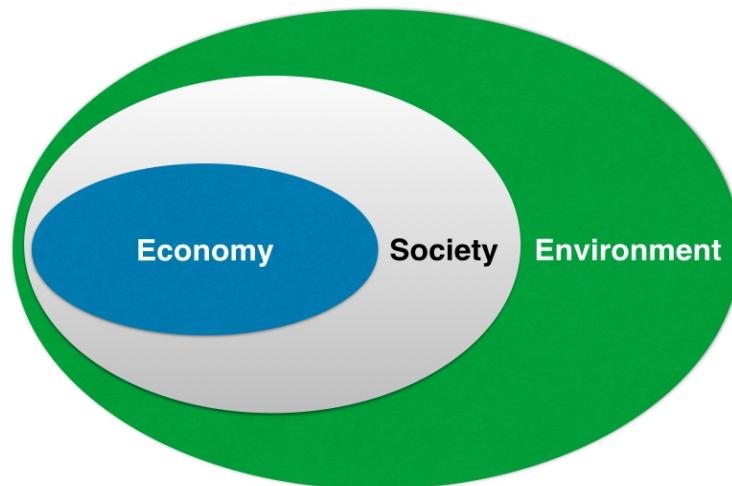
¹³⁸Ibid.

¹³⁹Created by author.

¹⁴⁰Cf.: Giddings et al., p.: 191.

¹⁴¹ Ibid.

Illustration 2: Nested Model of Sustainability¹⁴²



In this chapter we have learned the concept of sustainability, two main approaches of interpreting and two models towards sustainability. Since weak sustainability has been associated with “greenwashing” – the attempt to achieve a “green image” via marketing and PR – strong sustainability appears to have a rather profound approach due to its holistic character as Giddings describes it. Hence, we will mainly work with strong sustainability as the basis for further theoretical thinking, such as the co-evolutionary theory.

Sustainability Driven Entrepreneurship

Although all mentioned types above tangent sustainability they seem only to tap one or few dimensions. It is arguable whether sustainability driven entrepreneurship is a combination of these types as Schlange observes in his research.¹⁴³ Sustainability driven entrepreneurs would then need to incorporate ecological, social, institutional and community aspects into their venture in order to be a sustainable entrepreneur.¹⁴⁴ Similar, Young's and Tilley's definition suggest that a sustainability driven entrepreneur is someone who “holistically integrates the goals of economic, social and environmental entrepreneurship into an organization that is sustainable in its goal and sustainable in its form of wealth generation.”¹⁴⁵ Thus, a sustainability driven entrepreneur would be in the red

¹⁴² Created by author.

¹⁴³ Cf.: Schlange, pp.: 19 et seqq. Note: Schlange uses economically driven entrepreneurship instead of institutional entrepreneurship as it is in our case. I purposely left out the economic aspect since it is integrated into all four other types. Certainly, the economic aspect is rather of secondary importance to the other types. However, they all depend on economic success in order to sustain.

¹⁴⁴ Note: in literature researcher mainly speak of 3 types.

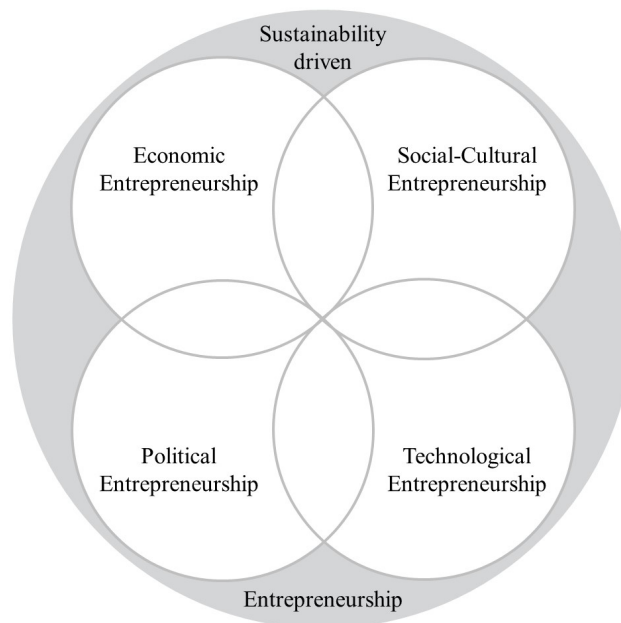
¹⁴⁵ Fiona Tilley and William Young, “Sustainability Entrepreneurs - Could they be the True Wealth Generators of the Future?” *Greener Management International* No. 55. (2009), pp.: 88 et seqq.; For further reading of their theory read: William Young and Fiona Tilley, “Can Business Move Beyond Efficiency? The Shift towards Effectiveness and Equity in the Corporate Sustainability Debate,” *Business Strategy and the Environment* Vol. 15, No. 6 (2006),

triangle similar to illustration 1.

Shepherd and Patzelt further mention aspects of gain and future products: “sustainable entrepreneurship is focused on the preservation of nature, life support, and community in the pursuit of perceived opportunities to bring into existence future products, processes, and services for gain, where gain is broadly construed to include economic and non-economic gains to individuals, the economy, and society.”¹⁴⁶

However, Schlange suggests that sustainability driven entrepreneurs see their ventures as a “integral part of a larger societal context in which they are able to contribute to the improvement of life conditions in the most general sense.”¹⁴⁷ In illustration 3, the four entrepreneurship types are embedded into sustainability driven entrepreneurship. Consequently, this implies that it is not necessary to address all of the four types in order to be a sustainability driven entrepreneur. Further, he defines activities of those entrepreneurs as actions which are built on “the principal of meeting the needs of present stakeholders without compromising the ability to meet the needs of future stakeholders.”¹⁴⁸ This implies that the different types can intersect, but not necessary need to do so.

Illustration 3: Concept of Integration¹⁴⁹



pp.: 402-415.

146 Dean A. Shepherd and Holger Patzelt, “The New Field of Sustainable Entrepreneurship: Studying Entrepreneurial Action Linking ‘What Is To Be Sustained’ With ‘What Is To Be Developed’,” *Entrepreneurship Theory and Practice* Vol. 35, No. 1 (2011), p.: 142.

147 Ibid. p.: 22.

148 Schlange, p.: 22.

149 Created by author.

Since the first concept of sustainability driven entrepreneurship is merely a combination of all four types it would consequently exclude entities which would, for example, embody two types of entrepreneurship but would lack elements of the other types. Accordingly, a political/institutional entrepreneur who fails to engage environmental elements in his behavior but includes the economic and social component, would still not be considered as a sustainability driven entrepreneur. Whereas, the definition of Schlange does allow us to include those entrepreneurs. These entrepreneurs are as well important for the analysis, since they play a roll in shaping societies. Consequently, we follow Schlange's definition.

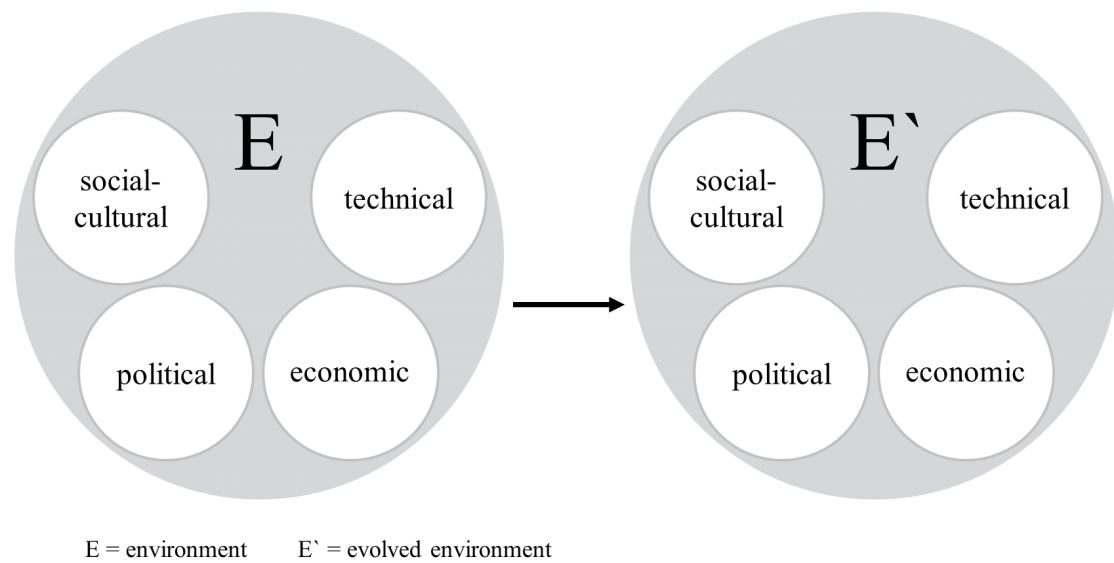
3.3. Co-Evolution

On the base of SD,E Potts' et al. corresponding system entrepreneurs (political system, economic system, etc.) co-evolve all together with the ecological system.¹⁵⁰ In illustration 4 shows Potts' concept of environmental evolution in coherence to the four types of entrepreneurship. Corresponding to the idea of the nested model that the environment is influenced by society and economy, Potts's hypothesis is that the environment evolves due to influence of political, social-cultural, technical and/or economic system. However, alternation in environment results in adaptation or adjustment in the other systems as well.¹⁵¹

150 Ibid. p.: 12. Note: Henceforth, co-evolutionary theory and evolutionary theory will be used synonymously since we comply with Dopfer's and Potts' concept of an evolutionary theory with co-evolutionary features.

151 Cf.: *ibid.* p.: 13 et seqq.

Illustration 4: Environmental Evolution¹⁵²



This co-evolution is described by different trajectories at the meso, macro and micro level. In their work *The General Theory of Economic Evolution* Dopfer and Potts describe these three levels in detail. Notwithstanding the fact that in their book the object of analysis is the economic system, we can use the framework for any other system of our societal construct. Thus, in our case we use the framework of meso, macro and micro and incorporate the four types of SDE as defined by Potts, in the field of water management in Indonesia and Singapore.

3.4. Coherency of Micro, Meso & Macro Level

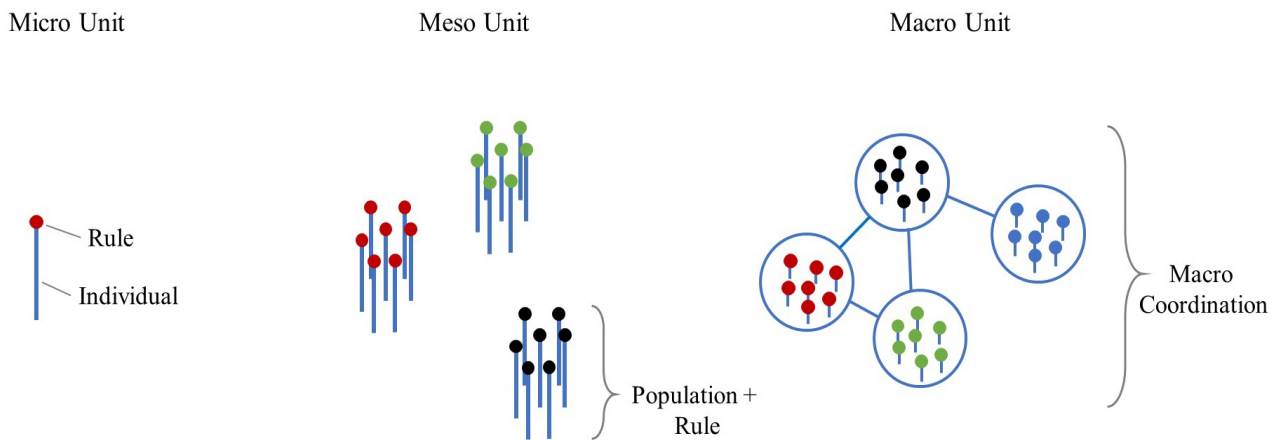
Unlike conventional economic theories, Dopfer and Potts use three levels in order to explain the dynamics of a societal system. The smallest component is the micro unit, which consists of an agent and a rule. Dopfer defines a rule as a “schema which allows operations.”¹⁵³ He divides a system's composition into a generic level of rules and operant level on which production, transaction and consumption occur as action upon a rule. A rule on generic level could be for instance to drink only safe water. On operant level this would entail selling bottled water (production), change process in cleaning water (transaction) or buy bottled water (consumption) for instance. As we can see in illustration 5, the next bigger component is a meso unit, which is composed of micro units and its associated rule forming a population. On the macro level, however,

¹⁵² Created by author; Source: Potts et al. (2010).

¹⁵³ Kurt Dopfer, “The economic agent as rule maker and rule user: Homo Sapientia Oeconomicus,” *Journal of Evolutionary Economics*, Vol. 14, (2004), p: 179.

those meso units are coordinated as a “generic order.”¹⁵⁴

Illustration 5: Micro-Meso-Macro Model



Conventionally, macro is considered as the sum of micro. According to Dopfer and Potts, those theories fail to explain why the markets or industries are established on the macro level the way they are or why change occurs.¹⁵⁵ Dopfer and Potts split the connection of micro, meso and macro in two methodological features, in which the meso level is the crucial connective key. On the one side we have the methodological individualism assigned to micro-meso relation and on the other side we have the methodological “populationism” assigned to meso-macro relation.¹⁵⁶ In order to get a deeper understanding, let's take a look at the three levels individually.

Micro Level

An individual is either a “rule maker” or a “rule user,” and as the agent acts upon a rule he/she realizes the created value of a rule – for example rent or profit.¹⁵⁷ Since Dopfer and Potts put the agent as key element of the fuel which drives the evolution of a system, they confirm the neoclassical principle of methodological individualism.¹⁵⁸ In contrast to neoclassical theory and its static rules of a rational thinking individual, indicated by the concept of *homo oeconomicus*, rules can change in evolutionary theory. Thus, micro units are flexible in evolutionary sense and even more, individuals have a “system of rules.”¹⁵⁹ However, the difference between the neoclassical rational agent and evolutionary theory's individual is the representative characteristic of neoclassical

¹⁵⁴ Dopfer and Potts, p.: 22.

¹⁵⁵ Ibid.

¹⁵⁶ Cf.: ibid.

¹⁵⁷ Ibid. p.: 21.

¹⁵⁸ Ibid.

¹⁵⁹ Ibid.

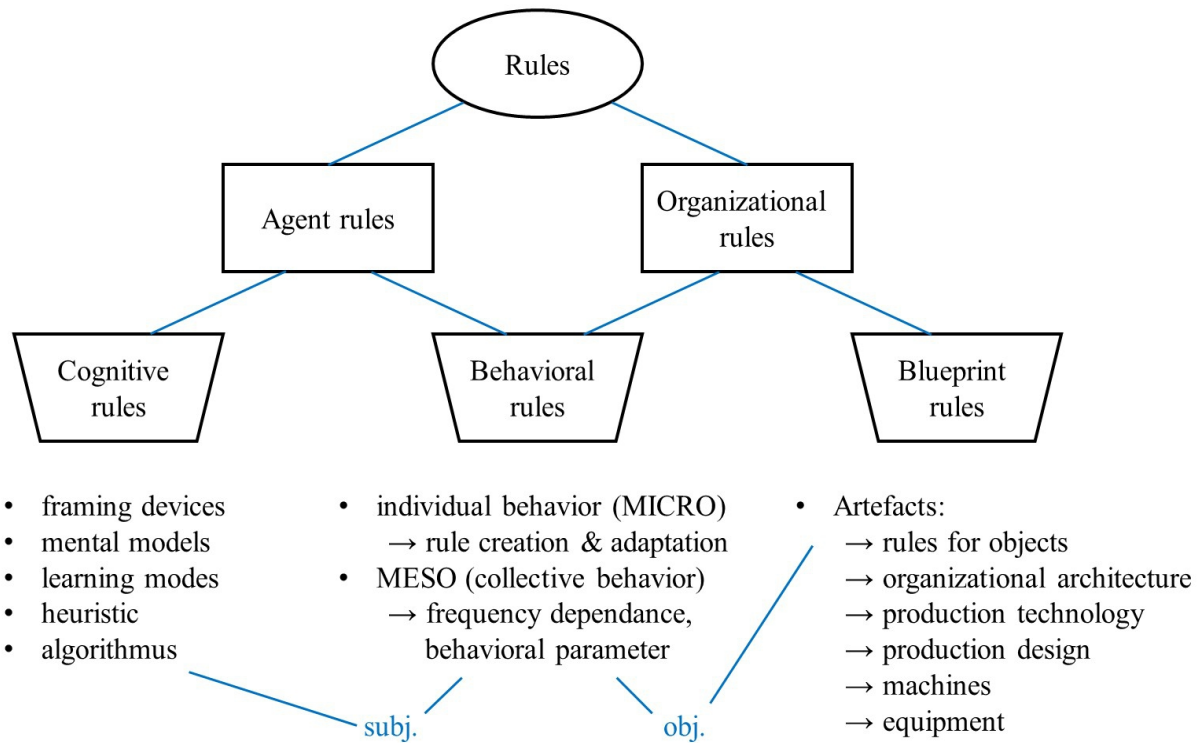
individual, who's *modus operandi* is applying accumulated knowledge to exogenous factors in a rational manner. Evolutionary theory focuses on the variety of agents, which contribute to a dynamic change of a system on the micro level by operationalizing knowledge via rules. Dopfer also provides a taxonomy of rules, shown in illustration 6 below. Rules can be split into agent rules and organizational rules. While agent rules can be cognitive or behavioral rules, organizational rules can be behavioral or blueprint rules.¹⁶⁰ Cognitive rules such as mental models and thought process are not connected to external factors, whereas behavioral rules of an individual are the product of cognitive rules and external circumstances. Since measuring learning models or algorithms would go beyond the scope of this thesis, we focus on the product of cognitive rule and environmental factors. These rules construct internal structure of agents and are the so called subject rules. Rules which coordinate social organization of numerous agents or which coordinate technical organization such as allocation of resources are called objective rules. Those are responsible for the external structure.¹⁶¹ As we can see in the illustration below, this could be a behavioral or blueprint rule. Thus, they can be understood as organizational rules. Those are relevant to all levels throughout a societal system, since individuals apply those on the markets and companies for their productive operations.¹⁶²

160 Created by author by means of Dopfer's template in Dopfer (2004), p.: 181.

161 Cf.: Kurt Dopfer, John Foster and Jason Potts, "Mirco-meso-macro," *Journal of Evolutionary Economics* Vol.14 (2004), p.: 263; *ibid.* pp.: 104 et seqq.

162 Cf.: Dopfer (2004), p.: 181.

Illustration 6: Taxonomy of Rules¹⁶³



The trajectory on the micro level, starts with *origination* of an idea by acting upon it and realizing and making it to a rule (cognitive). This new rule then needs to fit into the overall environment, which happens via other individuals through transmission of rule knowledge. This next stage is called *adaptation*. Individual internalize the new way of conduct and thought (behavioral). Afterwards the rule is normalized by a group of agents and its surrounding environment, which Dopfer and Potts refer to as population of a rule.¹⁶⁴ The process of a rule's set of actualization through various carriers in form of a population is called *retention* (blueprint), which leads to the next level of analysis – the meso level.

Meso Level

While micro level is concerned about the carrier, meso level focuses on the evolution of carrier population by studying the population of a rule in order to detect change. An example for such carrier population would be a group of agents who only buy bottled water, with the rule only to buy safe water. However, a rule population can reveal itself in three different varieties. A rule for instance can be paraphrased – indicating a *rule variety*. Hence, our rule mentioned before could be reworded into to buy only high quality water. *Carrier variety* would imply internal or external setting of the rule. In our case, it would depend if the carrier is a vendor or buyer of water. The third

¹⁶³ Created by author by means of Dopfer's template in Dopfer (2004), p.: 181.

¹⁶⁴ Cf.: *ibid.* p.: 104.

option is the *operational variety*, which implies the question of how the clean water is “produced” or collected or even how the pricing for clean water would be in our example. Regardless of what variety might be indicated, the rule stays clear. Consequently, it is not the purpose to identify and distinguish the different varieties in this thesis, but we should bear in mind, that those varieties exist. However, they lead to the same conclusion – the same rule.

Nevertheless, entrepreneurs play a vital role in emergence of a rule. Corresponding to the definition in chapter 3, Dopfer and Potts recognize the entrepreneurial contribution to evolutionary dynamics via discovering opportunities to innovate technology, or creating and organizing rules in order to facilitate certain thinking and behavior.¹⁶⁵ Whereupon, the rule nexus of subjective and objective rules co-emerge. In evolutionary economics, an industry stands for a population of a rule complex, while the market is seen as a population and it identifies the notion a rule system unto itself as it is a mechanism for coordinating rules.¹⁶⁶ Therefore, a market rule can also be seen as a meso entity. It becomes clear that, the rules are always actualized by the population on the meso level.

Since Dopfer and Potts regard meso trajectory as “the basic process of economic evolution,” the process of those rule populations becomes the crucial point for explanation of a system's dynamics.¹⁶⁷ The difference between micro and meso level trajectories is the micro trajectory. It starts with a rule invention, while the meso trajectory starts with a rule innovation. Thus, *origination* on the meso level signifies to expand an idea to a market or the public instead of recognizing that idea, as it is the case on the micro level.¹⁶⁸ *Adaptation* in meso conveys a spread of a rule in the population pool via a “trial and error process” of entrepreneurs, which signals a rather turbulent time for entrepreneurs. A crucial criteria for rule adoption is its ability to fit into the existing structure. The last stage of meso trajectory is *retention*, which occurs through replication and stabilization of rule population and its structure.

Velocity and scale of a rule population is also significant in order to describe a change in a system. For instance the rate of the internet usage spread can be compared to the rate of microwave usage, from which we can deduct that establishment of internet usage was faster and had a rather wide rule population from its origination. Thus, this meso unit enabled a structural change of the system in form of opening new markets such as online commerce. Similarly, it demanded legislation and law enforcement to adopt to the changing conditions of the overall environment.

165 Cf.: Dopfer and Potts, (2008), p.: 47.

166 Ibid.

167 Ibid. p.: 21.

168 Dopfer and Potts, (2008), p.: 46.

Overall, meso units, together with micro units as their base, are the essential elements of a systems' order change.

Macro Level

The meso trajectory is an essential basis for analyzing a system on the macro level. Dopfer and Pott construct their macro framework on two main questions: “How are the parts of the whole coordinated?” and “How does it change?”¹⁶⁹ Hence, the authors distinguish between *macro equilibrium*, which occurs on the surface structure, and *macro order*, which is settled on the deep structure level. The generic equilibrium on macro level is achieved when all carrier populations fit together and also into their environment. For instance, a population of legislators needs to coordinate with the population of technologists. The surface level constitutes the assets of a system and is measurable in numbers. Macro order is attained when the actual rules logically fit together, signifying a proper coordination between rules. On this deep structure level we can only assess qualitatively.

As we can see in table 3 Dopfer and Potts also differentiate between subjective and objective structure, which is merely the continuation of objective and subjective rules on the macro level. However on the level of macro, we incorporate the notion of entrepreneurship of Potts et al. In essence, political and social-cultural entrepreneurship have non-material rules, and thus, are associated with understanding and behavioral rules (subjective structure). Economic and technical entrepreneurship, on the other hand, are connected to material rules. Therefore, those two types of entrepreneurship are assigned to the objective structure.

Consequently, macro equilibrium as well as macro order assemble the general macro coordination.¹⁷⁰ Important to note, is the self-organizational nature of macro level processes, namely emergence and adaptation of meso units. Corresponding to our definition, entrepreneurship on this level is disequilibrating as well, since those processes are continues. Nonetheless, in this thesis we will concentrate merely on meso and micro, since it would go beyond the scope of this thesis to include the macro level. The exemplification of macro has been done the interest of accuracy.

169 Ibid. p.: 61.

170 Ibid. p.: 62.

Table 3: Macro Generic Coordination¹⁷¹

	Subjective Structure (non material)	Objective Structure (material)
Surface Level (equilibrium)	cognitive & behavioural rules: 1.political entrepreneurship 2.social-cultural entrepreneurship (constitutes assets of the system)	organizational & technical rules: 3.economic entrepreneurship 4.technical entrepreneurship (constitutes assets of the system)
Deep Level (order)	cognitive & behavioural rules fit together? 1.political entrepreneurship 2.social-cultural entrepreneurship (logic)	organizational & technical rules fit together? 3.economic entrepreneurship 4.technical entrepreneurship (logic)

The main feature of evolutionary economics is the constant developmental process. A system's fuel is the trajectory on each level. Analogous to micro and meso level, macro level has a three-stage trajectory. At first a cluster with realization of connection between rules emerges. Dopfer and Pott call it “de-coordination,” since the existing order is not updated due to new meso units.¹⁷² In the second stage, the existing order is being “re-coordinated” in form of self-organization via feedback and coordination of populations. The last stage of the co-evolutionary process is retention and stabilization of the cluster, which Dopfer and Potts call “coordination” of a new order.¹⁷³ Table 4 shows all stages of trajectory on different levels – the overall trajectories of a co-evolutionary process in a system.

Table 4: Trajectory of Micro, Meso and Macro¹⁷⁴

LEVEL	TRAJECTORY		
	Emergence	Adoption	Retention
Micro	new rule	by other agents	by groups of agents → rule stability & formation of population
Meso	new population	by other populations	by several populations → adoption frequency & forming a cluster
Macro	new cluster of population	co-evolution between populations via self-organization	replication of population clusters → forming a new coordination of a whole system (order + equilibrium)

171 Created by author by means of Dopfer and Potts (2008) and Potts et al. (2010).

172 Cf.: Dopfer and Potts, (2008), pp.: 67 et seqq.

173 Ibid. pp.: 71 et seqq.

174 Created by author by means of Dopfer and Potts (2008).

4. Methodology

The methodology of this thesis is based on the work of John Foster's and Jason Potts "A micro-meso-macro perspective on the methodology of evolutionary economics" – a methodology tailored for Dopfer and Potts co-evolutionary economics approach.¹⁷⁵ Merely a few adjustments and modifications will be made in order to give this work a more in depth structure and clear criteria for comparison. This chapter is structured in the same order as we will continue to use in the analysis. Since the meso level is continuously regarded as the analytical core by Dopfer and Potts, we start analyzing the meso level and conclude with the micro level.¹⁷⁶ Two case studies, using co-evolutionary approach, and the suggested method have been conducted by Foster in 1992 and Foster and Wild in 1999, before methodology of evolutionary economics was published.¹⁷⁷ Both investigated the financial sphere of economics. The study from 1992 focused on monetary magnitudes in Great Britain and the one from 1999 explored fiscal modeling in context of meso rule changes (changes of regulations).¹⁷⁸ The two studies used their results (meso rules) from historical study to integrate those in the macro analysis. However, behavior on the micro level was not observed. This thesis special feature is the focus on the meso and the micro level. Furthermore, the methodology will be applied on Asian countries for the first time.

4.1. Meso Level

Foster and Potts propose to examine the meso level by examining the history over a specific time period in order to recognize rules which show a "value-generating" connection between different types of entrepreneurship.¹⁷⁹ "Value-generation" signifies any type of contribution to the system. However, the contribution can also be of destructive nature. For example, if a law forbids private corporations to be active in the field of water management. Once again Schumpeter's notion of the destructive creative entrepreneur takes effect at this point.

For this work we narrow down the time frame from 1965 till 2015, which gives us a time span of 50 years to analyze various developments in different spheres of entrepreneurship. We also

175 Cf.: John Foster and Jason Potts, "A micro-meso-macro perspective on the methodology of evolutionary economics: integrating history, simulation and econometrics," (Discussion Paper No. 343, School of Economics, University of Queensland, Australia, January 2007).

176 Cf.: Dopfer and Potts, (2008), pp.: 21 et seqq.

177 Foster and Potts (2007), pp.: 12 et seqq.

178 For more in depth reading: John Foster, "The Determination of Sterling M3, 1963-88: An Evolutionary Macroeconomic Approach," *Economic Journal*, Vol. 102, No. 412 (May 1992), pp.: 481-496; John Foster and Philipp Wild, "Econometric modelling in the presence of evolutionary change," *Cambridge Journal of Econometrics* Vol. 23, No. 6, (1999), pp.: 749-770.

179 Foster and Potts (2007). p.: 11.

see the essential dynamics of change and development. For Singapore, we will examine the implementation of water infrastructure, the cleaning of the Singapore River as well as the failing water negotiations with Malaysia, which can be seen as the starting point of Singapore's turn concerning water management. Indonesia, on the other side, undergoes important legislative change in 1965 – its first abrupt political change in recent history. A back and forth between centralization and decentralization has influenced the current situation of Indonesian water management.

In the first step we take is a rough overview of the 50 year history time frame, in order to identify indicators for more in depth research on certain events. This profound examination takes place in form of the following categories: 1. *case studies*, 2. *laws*, 3. *tacit norms & conventions*.¹⁸⁰ Foster and Potts also identify *heterogeneity* and *stability* as two separate category. However, for this thesis we will integrate them as an additional feature to observe if those characteristics become evident.¹⁸¹ These categories do not stand for themselves but are rather interconnected like the different types of entrepreneurship.

As a second step we dive into the subcategories. Within the first category *case study* we examine economic and technical entrepreneurship together, specifically companies or relevant industries in order to amplify historical indentation. For this work, we take no more than two case studies for each country. Critical for the selection of the case study is the relevance on a historical sequential impact. The case study is not to be perceived as representative but prototypical, through which we point out evident rules. By the means of the following criteria for the case studies we will be able to extract the core meso rules for economic/technical entrepreneurship for each country:

1. Governmental requirements: Do specifications on the part of the government exist towards the venture/company? If so, what are they?
2. Funding and financial latitude: Where does the funding of the venture/company come from? Is it self-financed or is it dependent on governmental funds or subsidies? What is the financial latitude of the venture? Can it handle its own profits? Does it have any restrictions or other duties or dues towards the government?
3. Power of decision: Who or what entity has the power of decision? Is the company subject to directives from the government? Are there any limitations to the decision power?
4. Sustainability characteristics: Are the overall activities of the venture/company fulfilling the features of sustainability as previously defined? (Longterm perspective, integrating social needs, economically sustainable)?

¹⁸⁰ Ibid.

¹⁸¹ Ibid. pp.: 11-13.

After examination of the two case studies of each country, the table below will assist to provide an overview for us. Moreover, we will be able to compare the two country's meso core rules in this regard in our concluding remarks.

Table 5: Criteria for Case Study¹⁸²

Category	Singapore		Indonesia	
Governmental Requirements	Yes/No:	Specification:	Yes/No:	Specification:
Funding and Financial Latitude	Origin of funding:	Financial Restriction:	Origin of funding:	Financial Restriction:
Power of Decision (PoD) & Ownership Rights (OR)	Who obtains PoD & OR:	Limitations:	Who obtains PoD & OR:	Limitations:
Sustainability Characteristics	environmental needs:	integrating social needs:	longterm perspective:	integrating social needs:
	economically sustainable:		economically sustainable	

In the third category we analyze the legal side by investigating political entrepreneurship via laws and competencies along with institutions in regard to water management. Concretely, we first look at the overall legal structure for water management and how it changed over the past fifty years. Eventually we scan for patterns to identify rules. Our criteria for the legal component are the following:

1. Allocation of competency: What institutions are involved in water management? What are their competencies? Are they crossing into other sectors such as judicature or executive?
2. Transparency and overlapping of responsibilities: Is it clear which agency is responsible for what? Or is there an overlap of responsibilities?
3. Interagency collaboration: Do agencies collaborate in regard to water? Or is there a competitive component between the entities in charge?
4. Logic composition of legislature: Are new enacted laws and regulation based on previous ones? Do they specify the foregoing act? Or do they discontinue preceding legislation?

By answering these questions we reveal the pattern of political entrepreneurship according to Potts et al. The table below will provide an overview of each country's features in this aspect in a simplified manner.

¹⁸² Created by the author.

Table 6: Criteria for Legal Sector¹⁸³

Category	Singapore		Indonesia	
Allocation of Competencies	Competencies of agencies:	Crossing sectors:	Competencies of agencies:	Crossing sectors:
Transparency and Overlapping of Responsibilities	Clear responsibilities:	Overlapping responsibilities:	Clear responsibilities:	Overlapping responsibilities:
Interagency collaboration	Collaboration:	Competition:	Collaboration:	Competition:
Logic coherence of legislature	Coherence:	Discontinuity:	Coherence:	Discontinuity:

The fourth and last corner stone are the *tacit norms & conventions*, which deals with the social-cultural entrepreneurship. In this category, we want to investigate how population's norms and conventions are affected. Subject of study are NGOs, campaigns via variety of media and other activities of groups or entities. The following are the criteria for the social-cultural component:

1. Activities & campaigns: Are there any activities in regard to water such as demonstrations or clean-ups? Are there any major campaigns concerning water, for instance a promotion of the norm "Save water"?
2. Nature of Content: What effect do those activities and campaigns have? Do they intend to change consumption behavior? Or are they concretely influencing people's opinions?
3. Media & form of activities: What are the media channels or other forms of communications, that are used to reach other members of society?
4. Origin of campaigns: Who is behind those campaigns – the government, the private sector, or even foreign agents?

Once more a table will give us the needed overview for a final comparison and a comprehensive pattern of social-cultural entrepreneurship.

¹⁸³ Created by the author.

Table 7: Criteria for Norms & Convention¹⁸⁴

Category	Singapore		Indonesia	
Activities & Campaigns	Activities:	Campaigns:	Activities:	Campaigns:
Nature of Content	Change of behavior:	Change of opinion:	Change of behavior:	Change of opinion:
Media & Form	Channels of Communication:		Collaboration:	
Origin of campaigns	Sector:	Foreign:	Sector:	Foreign:

By understanding heterogeneity within this level, we can also point out which meso units are stable. This is the case when such meso units have been prevalent through out the investigated time period. As a result we use an *core meso configuration*, a quasi summary of meso rule impression. Ultimately, we attempt to assign rules their state of trajectory (origination, adaptation, retention) or even detect their velocity of diffusion.

4.2. Micro Level

For the micro level Forster et al. suggest to perform a simulation in order to inspect whether the identified meso rules are in use and whether individuals apply those in order to “generate new value” in regard to water.¹⁸⁵ Furthermore, the motivation of agent's behavior needs to be determined since change in micro units dynamics can ultimately result in change in a change of a systems' dynamics. However, the simulation method is a very broad and complex method as it involves a justification of parameters used in calibration formula and an estimation of a simulation period, which is based on presumptions of value growing in a stable way.¹⁸⁶ Due to the difficulty and its extent, using simulation as a method would exceed the scope of this work. Especially, if we consider that other researchers use the simulation as their only method for their work.

Therefore, we will approach the analysis of the micro level through qualitative research in form of semi-structured interviews. The goal of these interviews is, on the one side, to pinpoint the findings of meso and macro, and on the other side, to get an insight within micro units. This particularly means that at first we want to understand rules and behavior of agents as they outline the relationship towards water. In a cyclic manner, the motivation for action emerges from this, and continues in further decisions describing a new relationship towards water. By studying the relationship we see where possibilities for the future which may arise when it comes to the development of different rules. Hence, these are the five things we want to find out in the

¹⁸⁴ Created by author.

¹⁸⁵ Foster and and Potts (2007). p.: 19.

¹⁸⁶ Ibid.

interviews: usage of rules, behavior, relationship to water, motivation, and possibilities for the future.

Qualitative research can be addressed via various distinct methods. One of them is qualitative interviewing, which takes place on the micro level as it examines “small-scale-aspects” of societal life.¹⁸⁷ For our interviews we will use Alan Bryman's instructions for applying the grounded theory, which is rather similar to an inductive approach, in order to create concepts out of the data..¹⁸⁸ Corresponding to Foster and Potts request for heterogeneous ways of value creation and Dopfer and Potts implicit statement that evolution can only happen in an environment of diversity, qualitative research is concerned with variation and seeks to uncover variations on the individual level.¹⁸⁹ Since qualitative research takes history and events into account, unintended results can unfold and thus change the course of research.¹⁹⁰ In qualitative interviewing the focus lies on the interviewee's perspective, while the interviewer functions as an epistemological interpret, who seeks to understand the reality through examination of respondent's world.¹⁹¹ Concretely, the point of view (POV) of the interviewee is substantial since it gives us a genuinely different perspective than we can ever assume from the outside and even display crucial points for research orientation. Bryman points out that if the structure of the interview is kept at minimum we would gain access to people's worldview.¹⁹² Another important aspect of qualitative interview is the inclusion of context such as events and environment of respondent, which results in a better understanding of behavior, values and beliefs.¹⁹³ The recognition of historical phenomena is corresponding with Foster's et al. and Dopfer's & Pott's demand for the analysis. As Bryman puts it: “You must participate in the mind of another human to acquire social knowledge.”¹⁹⁴ Thus, we question also the meaning and implication of actions.

The qualitative semi-structured interview allows us further academic freedom, such as flexibility with the interview schedule. The questions do not need to be asked in the same order, but much of the same wording needs to be used for every interviewee.¹⁹⁵ Furthermore, the interviewer can adjust his/her question according to interviewee's responses. This permits to not only variation of question's order but also to ask further questions if respondent gives significant or unusual

187 Alan Bryman, *Social Research Methods*, 4th edition, (New York: Oxford Press, 2012), p.: 408.

188 Cf. Alan Bryman, *Social Research Methods*, 4th edition, (New York: Oxford Press, 2012), pp.: 381 et seqq.

189 Cf. Foster et al (2007), pp.: 19 et seqq.; Dopfer and Potts (2008); Bryman (2012).

190 Cf. Bryman (2012), pp.: 408 et seqq.

191 Cf.: *ibid.*

192 Cf.: *ibid.* p.: 404.

193 Cf.: *ibid.* pp.: 399 et seqq.

194 *Ibid.*

195 Cf.: *ibid.* p.: 471.

information about unknown aspects.¹⁹⁶ Therefore, going off topic might be reasonable if we want to find out what is significant to the respondent. In order to achieve this flexibility, the questions need to be rather general and open instead of suggesting answers as it happens often in a quantitative form of interviews. This format permits the respondent to use his/her own mode of expression providing a realistic insight into micro-level. Through qualitative interviewing we can gain data which we use to underline or even oppose previous findings in the meso level, and we use it to draw concepts of micro level.

Critics imply that qualitative interviewing is time consuming since answers need to be post-coded, themes for coding selected and afterwards a second scan of transcriptions/answers is required. Further, qualitative interviews might be too subjective, it is difficult to replicate and the researcher might just pick results on personal motivation.¹⁹⁷ For our interview we narrow down focus of interest through meso core constellation. Furthermore, to avoid generalization of the micro level we particularly point out that the conducted interviews give us insight into micro-level but they do not represent the whole micro level. Validity is given through “the cogency of the theoretical reasoning,” and theoretical saturation.¹⁹⁸ The latter is accomplished by coding data and ensuring that it fits the overall concept and whether the collected data illuminates that concept sufficiently.

The interviewee for this thesis are chosen via sampling of context with prospect of heterogeneity. We apply stratified purposive sampling, which signifies the chosen individuals meet certain criteria and are in subgroups of interest.¹⁹⁹ Concretely, this manifests into first criteria of the respondent being either from Indonesia or Singapore and secondly being active in either social-cultural area, political or economic. As for the sample size, there are various opinions for 1-2 interviewees for an intensive interview to 350 participants.²⁰⁰ We orient ourselves on Crough and McKenzie who suggest that small sample size is preferable due to its “deep and fine detailed” data.²⁰¹ Hence, we plan to have six interviewees, three from Singapore and three from Indonesia who fulfill the requirements from above. The interviews are conducted and recorded via online communication tools.

The questions will be into four main topics: 1. Perception of political entrepreneurship, 2.

196 Cf.: *ibid.* p.: 212.

197 Cf.: *ibid.* pp.: 405 et seqq.

198 *Ibid.* p.: 421; J. Clyde Mitchell, “Case and Situation Analysis,” *Sociological Review*, Vol. 31 No. 2 (May 1983), p.: 207.

199 Bryman (2012), pp.: 415 et seqq.

200 *Ibid.*

201 Mira Crough and Heather McKenzie, “The logic of small samples in interview-based qualitative research,” *Social Science Information*, Vol. 45 No. 4. (December 2006), pp.: 492 et seqq.

perception of social-cultural activities, and 3. perception of economic entrepreneurship. Ultimately, we try to grasp the thoughts the particular country's water situation. Through questions on these topics a picture of individual perception can be taken into account.

After the interview itself we scan for indicators, which are non-quantifiable concepts teased out via questions during the interview. Such indicators can be behavior, actions, events, values, beliefs, formal or informal roles, relationship, emotion and places.²⁰² Afterwards these indicators will be coded. Corresponding to Bryman we will use *selective coding*, meaning that we will have a core category (relationship towards water) and all other categories will relate to it.²⁰³ Philipp Mayring provides a three-step creation of a coding guide. In the first step we create categories for text components, secondly we provide typical examples for a each category and in a final step we define clear coding rules in order to limit problems of category selection.²⁰⁴ The benefit of this selective gradual coding is the systematic guided approach.²⁰⁵ As we can extract concepts from coding we categorize them in a more abstract manner in order to see properties. This helps us to identify and fit the micro level into the overall bigger picture of water management system in Singapore and Indonesia.

202 Bryman (2012), p.: 479.

203 Ibid. p.: 569.

204 Philipp Mayring, *Einführung in die qualitative Sozialforschung – eine Anleitung zum qualitativen Denken*, 5th edition (Weinheim and Basel: Beltz Verlag, 2002). pp.: 118 et seqq.

205 Ibid. p.: 114.

5. Analysis

The analysis is structured in the same order as the chapter of methodology above. The different types of entrepreneurship are connected and might even overlap. Hence, we will first analyze Singapore and then Indonesia on each level. Afterwards we will compare the core results of each country to each other.

5.1. Meso Level

5.1.1. History of Singapore

In August 1965 Singapore gained independence from Malaysia and was forced to sustain itself also in terms of water. However, there were no natural aquifers or groundwater. With 719 km² and a high rate of population growth the city-state's ability for rain catchment was limited to provide sufficient water for its inhabitants.²⁰⁶ At that time and up till the seventies, Singapore was at the state of an developing country: "Poverty, economic uncertainty, and a living environment defined by night soil buckets, polluted rivers, water rationing, unhygienic street hawkers, and smoking emitting/effluent discharging industries [...] were a reality faced by many Singaporeans."²⁰⁷ In the sixties Singapore arose to an industrial country with an annual GDP growth-rate above 9% and industrial production over 20% growth.²⁰⁸ Furthermore, by 1969 Singapore established itself as one of the busiest ports worldwide, while contractions for factories increased and an almost zero rate unemployment was reached.²⁰⁹ In order to grow and to deal with the challenges it was facing, Singapore had to rely on its financial sector, since it has no natural resource and a small agricultural sector. Water scarcity was not the only problem which diminished the quality of life. The possibility of economic growth without harming the environment was and still is the additional challenge. Former Prime Minister (PM), Lee Kuan Yew, who was in office from 1959 to 1990, emphasized the priority of water and insisted on long term plans and proper infrastructure at all costs – even when Singapore did not have had the means for it.²¹⁰ "[Water] dominated every other policy. Every other policy had to bend at the knees for water survival," as PM Lee retrospectively describes the importance of water.²¹¹ Singapore's government stressed that a clean-up of Singapore's environment

206 Ivy Ong Bee Luan, (2010), p.: 66.

207 Yong Soon Tan et al. (2009), p.: 4.

208 Yugal Kishore Joshi, Cecilia Tortajada and Asit K. Biswas. "Cleaning of the Singapore River and Kallang Basin in Singapore: Economic, Social and Environmental Dimensions," *International Journal of Water Resources Development* Vol. 28, No. 4, (December 2012), p.: 650.

209 Cf.: *ibid.*

210 Cf.: Yong Soon Tan et al. (2009), p.: xxiii.

211 Quoted in Lee Kuan Yew, Singapore International Water Week (June 2008), quoted in Yong Soon Tan et al. (2009), p.: xxiii.

was essential for its survival and its growth.²¹² By the end of the sixties Singapore made the first steps towards a long-term project which would change Singapore's face forever – the clean-up of its waterways.

The clean-up

The PM aimed to control land-based pollutants and clean all Singapore's river banks, as he appealed to drainage-engineers from the Public Work Department and water-engineers from the PUB, in order to find a solution for Singapore's rivers in the beginning of 1969.²¹³ The ministries and governmental departments were in a close feedback-loop and the PM himself was committed because all reports, all urgencies and every progress was reported directly to PM Lee.²¹⁴ The five main polluters were identified as 1. street hawker, 2. riverine activities, 3. vegetable wholesale activities, 4. unsewered premises, and 5. pig and duck farms.²¹⁵ A proper work process was required in order to achieve the goal clean rivers and and aquatic life. The actions were divided into four phases: 1. cleaning and dredging of the waterway, 2. phasing out of polluting activities, 3. removal and/or relocation of farms, hawkers and improper workshops, and 4. development of sustainable infrastructure, factories, housing and food centers for those affected by relocation.²¹⁶

The dimensions of the clean-up for Singapore's government were mainly strict law enforcement, educating the public, investing in infrastructural improvements, and public cleansing.²¹⁷ Other authors also add the political will as a key reason why Singapore succeeded with its clean-up.²¹⁸ In 1969 the new strict Environmental Health Act came into effect. Not only did environmental health become a concern of the Public Health Division – the same authority as for public cleansing and other environment concerning establishments – but this act also entailed

212 Cf.: Tan Yong Soon et al. (2009), p.: 51.

213 National Archives, Prime Minister's memorandum to Wong Chooi Sen, PWD 223/53, Vol. V, p. 100A, 26 March, Singapore (1969a), cited in Yugal Kishore Joshi, Cecilia Tortajada and Asit K. Biswas. "Cleaning of the Singapore River and Kallang Basin in Singapore: Economic, Social and Environmental Dimensions." *International Journal of Water Resources Development* Vol. 28, No. 4, (December 2012), pp.: 647-658.

214 National Archives, Lionel de Rosario's letter, PWD/223/53, Vol. IV, p. 167, 10 October, Singapore (1969b), cited in Yugal Kishore Joshi, Cecilia Tortajada and Asit K. Biswas. "Cleaning of the Singapore River and Kallang Basin in Singapore: Economic, Social and Environmental Dimensions." *International Journal of Water Resources Development* Vol. 28, No. 4, (December 2012), pp.: 647-658; National Archives, Various communications and interim reports, available in File No. PWD/223/53, Vol. IV, (1969c) cited in Yugal Kishore Joshi, Cecilia Tortajada and Asit K. Biswas. "Cleaning of the Singapore River and Kallang Basin in Singapore: Economic, Social and Environmental Dimensions." *International Journal of Water Resources Development* Vol. 28, No. 4, (December 2012), pp.: 647-658.

215 Chou Loke Ming, "The cleaning of Singapore River and the Kallang Basin: approaches, methods, investments and benefits," *Ocean & Coastal Management*, Vol. 38, No. 2, (1 April 1998), p.: 136.

216 Ibid. p.: 137.

217 Tan Yong Soon et al. (2009), p.: 51.

218 Cf.: Yugal et al. (December 2012); Ivy Ong Bee Luan (2010); Cecilia Tortajada, "Water Management in Singapore," *Water Resource Development*, Vol. 22, No. 2 (June 2006), pp.: 227–240.

rigorous penalties and prosecution of polluters.²¹⁹ The consequence of this law was an increase of writ rate from 11.632 in 1971 to 18.622 in 1972.²²⁰ Further, health inspections on markets and street hawkers rose within two years (1969-1971) from 8.543 to 14.641, while housing inspection in regard to public health rose from 1.537 to 29.536 between 1970 and 1971.²²¹ The results were better sanitation, improved living conditions and reduction of the dengue fever by 90%.²²²

In 1968 the first environmental campaign was initiated. With the slogan “Keep Singapore Clean” the government instructed from mass media to public establishments to print and broadcast the message to the general public.²²³ The government used the “carrot and stick” by rewarding through competitions for the cleanest office, displaying publicly polluters and handing out fines to such in the campaign “Keep Singapore Clean.”²²⁴ As Tan Yong Soon describes, “[...] the public [was] subjected to a publicity blitz on such a massive scale.”²²⁵ Yet other campaigns, activities and measurements were undertaken in the following years. For instance the “Clean and Green Week” or the “10 liter challenge,” which we will discuss later in this analysis.

As a consequence the decision was made to resettle hawkers, to relocate industries and to phase out polluting behavior in order to be able to sustain clean water in Singapore. By 1969 the first businesses like street hawkers, boatbuilders and firewood dealers were relocated away from the waterways.²²⁶ The government needed to invest into new infrastructure such as housing, business establishments, sewage system for new buildings and compensation, which was offered to private persons and businesses for resettlement or for their property.²²⁷ This process took longer than anticipated in the beginning, because the government tried to avoid bad publicity and any resistance from the people.²²⁸ The other part of Singapore's clean-up was the physical clean-up and the change of the physical water infrastructure. In illustration 7 and 8 we can see the difference between before

219 National Archives, Various communications and interim reports, available in File No. PWD/223/53, Vol. IV, (1969c) cited in Yugal Kishore Joshi, Cecilia Tortajada and Asit K. Biswas. “Cleaning of the Singapore River and Kallang Basin in Singapore: Economic, Social and Environmental Dimensions.” *International Journal of Water Resources Development* Vol. 28, No. 4, (December 2012), pp.: 647-658; Jamie Han and Lim Tin Seng, “The Environmental Public Health Act and a clean and green city,” *National Library Board (NLB)*, under “Politics and Government,” http://eresources.nlb.gov.sg/infopedia/articles/SIP_2014-05-12_133754.html (accessed: 01.03.2016).

220 Han and Lim.

221 Ibid.

222 Ibid.

223 Tan Yong Soon et al. (2009), pp.: 259 et seqq.

224 Ibid. p.: 260.

225 Ibid. p.: 259.

226 Yugal et al. (December 2012), p.: 652.

227 Cf.: Yugal et al. (December 2012), pp.: 654 et seqq.;

228 National Archives (D&M)/PWD's letters to Supdt. Hawker Branch, Ministry of Health, PWD (D&M)/ 450/6, No. 223/53, Vol. V, pp. 112 and 118, 14 April and 25 May, Singapore (1971b), cited in Yugal Kishore Joshi, Cecilia Tortajada and Asit K. Biswas. “Cleaning of the Singapore River and Kallang Basin in Singapore: Economic, Social and Environmental Dimensions.” *International Journal of Water Resources Development* Vol. 28, No. 4, (December 2012), pp.: 647-658; Yugal et al. (December 2012), p.: 652.

and after the clean up.

Illustration 7: Singapore River before Clean-up (1960s)²²⁹



²²⁹ Sources: Constance Singam, "Singapore River," Living Life @ 70 Blog, entry posted 04.03.2013, <http://connie.sg/2013/03/singapore-river/> (accessed: 11.04.2016); Memories of Singapore, "Singapore in the '60s," shot by Angela Mack, p. 15. http://www.singas.co.uk/HTML/singapore_in_the_sixties_15.html (accessed: 11.04.2016).

Illustration 8: Singapore River after Clean-up (2005)²³⁰



Within the opening of the Upper Pierce Reservoir on the 27th of February 1977 the PM Lee announced: “In ten years, let us have fishing in the Singapore River and fishing in the Kallang River. It can be done.”²³¹ This day marked officially the beginning of Singapore's cleaning operations. Those lasted till 1986. By 1977 most of the preparations were finished. The basins and the mouths of it were, nonetheless, difficult to master due to 46.187 squatters still living in unsanitary conditions by the river – many of them were even practicing open defecation.²³² The identified sources of pollution, such as the duck and pig farmers, needed to “vanish from the cityscape.”²³³ Hence, the actual cleaning activities would continue until the goal of aquatic life was achieved and the clean-up project was finished. For this accomplishment various industries and government agencies were involved. Table 4 depicts all the ministries, agencies and their responsibility in the cleaning of Singapore River and Kallang Basin.

230 Formulax-commons [pseud.], “File:Singapore river 04.jpg,” *Wikimedia Commons*, https://commons.wikimedia.org/wiki/File:Singapore_river_04.jpg (accessed: 11.04.2016).

231 Tan Yong Soon et al. (2009), p.: 69.

232 Cf.: Chou (1998), p.: 136.

233 Stephen Dobbs, “Urban Redevelopment and the Forced Eviction of Lighters from the Singapore River,” *Singapore Journal of Tropical Geography*, Vol. 23, No. 3, (November 2002), pp.: 307 et seqq.

Table 8: Involved Government Entities in the Clean-up²³⁴

Ministry	Agency	Responsibility
Environment	Sewerage Department	Extension and provision of sewerage facilities
	Drainage Department	Physical improvement of rivers
	Environmental Health Department	Management of health hazards, refuse collection, cleaning of streets and drains, pest control
	Hawkers Department	Residing street hawkers
National Department	Primary Production Department	Phasing out pig/duck farms
	Parks and Recreation Department	Physical improvement of river banks
	Housing and Development Board	Squatter clearance
	Urban Redevelopment Authority	Redevelopment of rundown urban areas
Trade and Industry	Jurong Town Corporation	Residing industries
Communications	Port of Singapore Authority	Residing riverine activities
Law	Land Office	Land acquisition, allocation, tenancy agreements

The interaction and collaboration between agencies started already with an immediate approval of the Finance Ministry to the Ministry's of Environment proposal of means for the clean-up project.²³⁵ The agencies collaborated on activities such as the removal of abandoned boats and logs – in this case the Port Singapore Authority and the Ministry of Environment. The total amount of investment is estimated about 200 million S\$ up to 300 million S\$.²³⁶ Nonetheless, these numbers are not as straightforward as they seem, since the resettlement compensations are not included. Due to the prolonged resettlement, the government spent ten times more than it was estimated in the beginning of the clean-up project. Despite of that, Singapore is a lesson for other governments, because, PM Lee put it, “[...] it is much more expensive to live for a society in a polluted environment than in a clean one.”²³⁷

The purgation had also other spillover effects on waste management. For instance, Semakau landfill was built, which is also known as the “Eden of Garbage.”²³⁸ Semakau is an offshore landfill. Due to a particular operation it is smell-free. Therefore, it provides a growing biodiversity and it facilitates leisure activities such as sport fishing or birdwatching.²³⁹ The National Recycling

234 Created by author according to Chou (1998), p.: 135.

235 Joan Hon, *Tidal Fortunes: A Story of Change, the Singapore River and Kallang Basin*, (Singapore: Landmark Book, 1990), p.: 41.

236 Cf. Chou (1998), p.: 141; Tan Yong Soon et al. (2009), p.: 73 et seqq.

237 Yugal et al. (November 2012), p.: 781.

238 New Scientist, “Island of trash or the 'Garbage of Eden'?” *New Scientist* (Feature 11.04.2007), under “Events,” <https://www.newscientist.com/article/mg19425991-600-island-of-trash-or-the-garbage-of-eden/> (accessed: 04.03.2016).

239 Tan Yong Soon (2009), p.: 17.

Program and waste minimization are other beneficial side effects; for instance: the recycled waste rate is about 54%, and a less-packing agreement was signed with the food and beverage industry.²⁴⁰ Furthermore, Marina Reservoir was only able to come to life because the clean-up project. This reservoir is a “three-in-one project,” as it serves as water storage, flood control, and lifestyle attraction.²⁴¹

Failed Negotiations with Malaysia

Besides local reservoirs, Singapore's main source for water were imports from the Johor river in Malaysia. This supply was based on the so-called Tebrau and Scudai Rivers Water Agreement in 1961 and the Johor River Water Agreement in 1962.²⁴² The 1961 agreement was valid until 2011. Singapore, however, did not prolong this contract. The Johor River Water Agreement is effective until 2061 and allows Singapore to withdraw 1,14 million cubic meters of water per day with an exclusive right of full access.²⁴³ Singapore paid about three cents per 3,79 m³ and a basic rate for buildings on Malaysia's ground.²⁴⁴ However, Singapore sells the treated water to Malaysia in return at about 50 cents per 3,79 m³. The price for water of both agreements were the same and were fixed for 25 years. It was not until the year 2000 that Malaysia demanded new prices.²⁴⁵ In 1990 another agreement was signed – valid until 2061. Initially, the city council signed the first agreements. The last one, however, was signed by the PUB. With the same pricing Singapore was then able to build the dam Sungei Linggiu and extract more water than initially agreed in the contract from 1962 (1,14 million m³ per day).²⁴⁶ Nonetheless, Singapore always has had to bear the maintenance, operation and construction costs.²⁴⁷ By the end of the 90s and the beginning of 2000, the relationship and the perspective of both countries shifted to a rather negative outlook due to the unsuccessful price negotiations for water.²⁴⁸

Singapore's political relation to Malaysia depended partially on these water agreements. However, this relationship was not evenly balanced since Malaysia used water as a tool for political

240 Ibid. pp.: 110 et seqq.

241 Ibid. p.: 215.

242 Ibid.; Valerie Chew, “Singapore-Malaysia water agreements,” *National Library Board Singapore*, (09.06.2009) under “Politics and Government,” http://eresources.nlb.gov.sg/infopedia/articles/SIP_1533_2009-06-23.html (accessed: 23.02.2016).

243 Chew (2009).

244 Ibid.

245 New Strait Times, “WATER: The Singapore-Malaysia Dispute – THE FACTS,” *Singapore Window* (Kuala Lumpur, 21.07.2003), <http://www.singapore-window.org/sw03/030721ns.htm> (accessed: 07.03.2016).

246 Cf.: Chew (2009).

247 Cf.: ibid.

248 Cf.: Cecilia Tortajada and Kimberly Pobre, “The Singapore-Malaysia water relationship: an analysis of the media perspectives.” *Hydrological Science Journal*, Vol. 54, No. 4, (December 2011), pp.: 601 et seqq.

pressure. According to Lee Kuan Yew, it was the comment of the Malaysian PM Tunku Abdul Rahman in August of 1965, which determined Singapore's decision to aim for water self-sufficiency: “If Singapore's foreign policy is prejudicial to Malaysia's interests, we could always bring pressure to bear on them by threatening to turn off the water in Johor.”²⁴⁹

New Era

The unbalanced political relationship and the failed negotiations with Malaysia contributed to Singapore's development of the so-called “Four National Taps” strategy. With the goal not to rely on Malaysia's water import by 2061, Singapore diversified its supply for water and invested along the way into R&D as well as new technology. The first “tap” are local water catchments, which are divided into two types of catchment systems. The first method is to harvest storm water via a complex of drains, canals and rivers. This water then flows into one of the nation's reservoirs. The second method is water collection through the actual reservoirs. They make up about twothird of Singapore's landmass.²⁵⁰ In the illustration below we can see all 48 waterways and their catchments.

Illustration 9: Singapore's 48 Waterways and Their Catchments²⁵¹



249 Lee Kuan Yew, *The Singapore Story – Memoirs of Lee Kuan Yew*, (Singapore: Singapore Press Holdings, 1998); Ivy Ong Bee Luan, (2010), p.: 67.

250 PUB (Public Utility Board), Singapore's national water agency. “Local Catchment Water,” *PUB* (last update: 11.03.2015), under “Water for all,” <http://www.pub.gov.sg/water/Pages/LocalCatchment.aspx> (accessed: 07.03.2016).

251 Ibid.

The second “tab” is the imported water from Malaysia. Since the first agreement already expired in 2011, the Johor River Water Agreement and the 1990 contract are currently the only ones intact until 2061. Singapore plans to be self-sufficient by that time. Hence, the Johor “tab” will be presumably only in use until 2061. NEWater is the third “tab,” and it accounts for about 30% of Singapore's water demand. NEWater signifies treated used water, which is reclaimed through a series of technological processes such as ultra-violet disinfection.²⁵² Currently, four NEWater plants are operating: Bedok (2003), Kranji (2003), Ulu Pandan (2007) and Changi (2010). Singapore's government seeks to triple NEWater's capacity in order to achieve a coverage of 55% of Singapore's future water needs.²⁵³ Only two years after the first NEWater plant was built, a new “tap” was introduced in 2005 – desalination. The used technology for desalination is called reverse osmosis (RO). The same RO technology is part of the NEWater production process. Currently, Singapore has two desalination plants: SingSpring with a capacity of 136.000 m³/day and Tuaspring with a capacity of about 300.000 m³/day and a third one is currently being planned.²⁵⁴ Although desalination covers about 25% of Singapore's current water needs, the plants operate at about 70% of their capacity.²⁵⁵ PUB, however, is keen to maintain the coverage of 25% also in the future.²⁵⁶ The whole desalination project is a so-called public-private partnership (PPP). The PUB decided to give contracts to two companies via a *design-build-own* contract (DBOO) and a *engineer-procurement-construction* contract (EPC), which will in turn supply water to the PUB.²⁵⁷ In total the desalination project cost about 200 million S\$.²⁵⁸ The PUB is a contract provider. At the same time PUB indirectly guarantees that the designed product (water) will be used. Nevertheless, the project is fully executed as a private business project. Several private banks are involved in the project's financing, such as DBS Bank, KBC Bank, ING Bank and Standard Chartered Bank.²⁵⁹ The desalination project is one of the most cost-intensive projects so far. Nevertheless, PUB has even more water projects. In total, there are 269 of which 63 are currently still in progress.²⁶⁰ The PUB

252 PUB (Public Utility Board), Singapore's national water agency. “NEWater,” *PUB*, (last update: 05.11.2015), under “Water for all,” <http://www.pub.gov.sg/water/newater/Pages/default.aspx> (accessed: 08.03.2016).

253 Ibid.

254 Tom Freyberg, “Singapore to Build Third Desalination Plant,” *Water World*, (13.03.2015), <http://www.waterworld.com/articles/2015/03/singapore-to-build-third-desalination-plant.html> (accessed: 09.03.2015).

255 Ibid.; PUB (Public Utility Board), Singapore's national water agency. “PUB and Hyflux officially open Singapore's second and largest desalination project,” *PUB*, (18.09.2013; last update: 23.11.2015), under “Press Releases,” <http://www.pub.gov.sg/mpublications/Pages/PressReleases.aspx?ItemId=383> (accessed: 09.03.2016).

256 PUB (Public Utility Board), Singapore's national water agency. “Desalinated Water,” *PUB*, (15.09.2015), under “Water for all,” <http://www.pub.gov.sg/water/Pages/DesalinatedWater.aspx> (accessed: 09.03.2015).

257 Ibid.; Water-Technology, “Tuas Seawater Desalination Plant – Singapore,” *Kable*, <http://www.water-technology.net/projects/tuas-seawater-desalination/> (accessed: 09.03.2016).

258 Ibid.

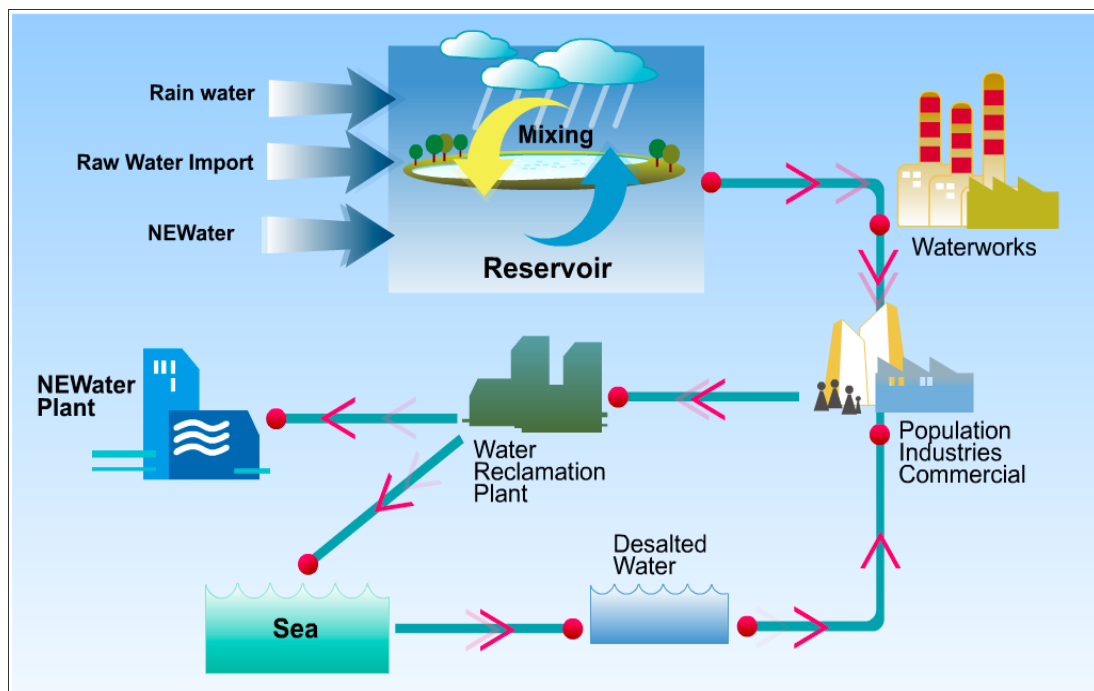
259 Ibid.

260 PUB (Public Utility Board), Singapore's national water agency. “Key R&D Projects,” *PUB* (22.04.2013), under “Research & Development,” http://www.pub.gov.sg/research/key_projects/Pages/default.aspx (accessed: 09.03.2016).

itself invested 210 million S\$ into innovative projects since 2002, and even established an innovation platform called “Singapore INnovation Gateway for Water” (SINGwater).²⁶¹ It works as a hub for funds, research proposals and project prototyping.

In illustration 8 we see the full water cycle of Singapore. Rain water and imported raw water from Malaysia are collected in local reservoirs and treated by waterworks before it is provided to the population, industries and commercial sectors. Used water is collected afterwards, while part of it will be further directed and treated at NEWater plants, before the water is induced into reservoirs and starting a new cycle. The other part of treated water is directed into the sea. Seawater is desalinated before it is provided to the population, industries and commercial actors. In addition, Singapore has worldwide the lowest water loss rate (non-revenue water) of 5%.²⁶²

Illustration 10: Singapore's Water Cycle²⁶³



Indicators for further investigation

In the review of Singapore's history of water management we can find several indicators, which serve us for our analysis. In this case study, one of the inklings is that the government invests a substantial amount of money to technology and innovation. Furthermore, the government's agency

16.03.2016).

261 Ibid.; PUB (Public Utility Board), Singapore's national water agency. “Singapore INnovation Gateway for Water (SINGwater)” PUB (2012), <https://pubwaterresearch.com.sg> (accessed: 16.03.2016).

262 PUB (Public Utility Board), Singapore's national water agency. “Unaccounted for Water,” PUB (2012), <https://www.pub.gov.sg/watersupply/unaccountedforwater> (accessed: 28.06.2016).

263 PUB (Public Utility Board), Singapore's national water agency. “Indirect Potable Use in Singapore,” <http://www.pub.gov.sg/water/newater/plansfornewater/PublishingImages/ipu.swf> (accessed: 10.04.2016).

PUB instructs private companies to design, build and maintain facilities of desalination plants. Hence, the PUB is involved as an “employer.” The financial burden of a project, however, lies on the chosen private business. Considering that 80% (158,5 million S\$) of the desalination project were financed through debt facility, the financial means accumulation through private companies appears to be a high risk of conduct. It is similar to a private person using 80% of credit card without knowing if he/she will be able to pay the debt. On the other hand, the PUB also operates as a business itself, due to the product distribution of NEWater. Thus, the PUB sets the pricing of NEWater. For the case studies we will inspect the two cases of desalination and NEWater in aspects to technology and economic features.

As for the analysis of the legal perspective, the coordination of various agencies during the clean-up suggest a network of governmental agency and divided responsibilities, functions and authority. Moreover, the rigorous law enforcement and complimentary legislation, that were apparent during the clean-up, indicate a responsive legislative branch with close relationships to executive actors. Therefore, we will take a closer look on the legal structure and the allocation of rights and duties in chapter 5.1.3.

The third meso analysis point are tacit norms and conventions. As we have seen in the history chapter, the government sought to implement sustainability from the start. It invested into transforming public opinion and its behavior through media and publicity. Those campaigns were backed up through law enforcement. For this subsection we will take as close look at the involvement of NGO's and governmental involvement of a strategic-change machinery.

5.1.2. Case Study – Singapore

For the case study we will take a) the NEWater project and b) the desalination project. For each case study we attempt to apply the meso trajectory by first examine the emergence of the product/venture, afterwards its adaptation and ultimately its retention on the market. Subsequently, we summarize evident rules conveyed in the case studies.

Singapore Case Study 1: NEWater

The initial idea to convert waste water into drinking water was manifested in 1974 when the PUB constructed a “pilot plant.” However, due to the high costs involved the required technology, such as the membranes, had not matured yet. It was not until 1998 when this vision reentered via

the *Singapore Reclamation Study*, also later known as the *NEWater study*, which was organized by the PUB and the Ministry of Environment and Water Resources (MEWR).²⁶⁴ After this study confirmed that NEWater would be a considerable new source of water, a first NEWater plant was built in 2000. The two Bedok and Kranji NEWater plants were officially opened in 2003; followed by Ulu Pandan in 2007 and Changi in 2010.²⁶⁵ As a result, the PUB decided to invest in “unconventional sources” and established SINGwater in 2002.²⁶⁶

The technology behind NEWater is a four stage process, which starts with a conventional wastewater treatment. In the second step bacteria, solids and protozoa are removed via micro-filtration (MF). Subsequently, the water undergoes RO in order to suspend smaller chemicals, drugs and other bacteria as well as dissolved salts. The last stage is ultra-violet (UV) disinfection of water, leaving the water at its final state.²⁶⁷ The quality of NEWater excels the requirements of WHO.

The ownership of the first three plants Bedok, Kranji and Seletar, differs from the last two Ulu Pandan and Changi.²⁶⁸ Since the former had been under a Design-Bid-Build contract (DBB), the facilities were owned, maintained and operated by the PUB.²⁶⁹ Seletar was built under a Design and Build Scheme (DB). For those plants, the PUB used imported technologies to gather information and learn more about those techniques. The latter ones were already contracted under DBOO – 20 years with Keppel Intergrated Engineering for Ulu Pandan and 25 years with Sembcorp Utilities for Changi. These particulars were not by coincidence. According to Chew et al., the government pursued a concrete strategy of co-evolutionary processes in order to become known as a *Hydrohub*.²⁷⁰

The strategy to become a *Hydrohub* is composed of four stages. In the first stage Singapore imported technology for MF, RO and UV disinfection from established foreign companies ranging from South Korea, Japan, USA and Germany to Canada, France and the Netherlands.²⁷¹ Singapore used these imports to its advantage by studying the critical technology elements. The second step was to transform the learnings into the development of its own domestic technology. As a consequence Singapore would become a leading expert on water treatment technology. An Institute

264 PUB (Public Utility Board), Singapore's national water agency. “NEWater.” *PUB* (last update: 05.11.2015)

265 Ibid.

266 Ibid.

267 PUB (Public Utility Board), Singapore's national water agency. “NEWater Technology,” *PUB* (last update: 10.03.2015), under “NEWater,” <http://www.pub.gov.sg/water/newater/newatertech/Pages/default.aspx> (accessed: 27.03.2016).

268 Note: Opened in 2004, the Seletar plant is now closed.

269 Michele Y.C. Chew, Chihiro Watanabe and Yuji Tou, “The challenges in Singapore NEWater development: Co-evolutionary development for innovation and industry evolution,” *Technology in Society*, Vol. 33, No. 3-4, August-November 2011), p.: 205.

270 Cf.: *ibid.* pp.: 203 et seqq.

271 Cf.: *ibid.*

of Water Policy (IWP) was established in June 2008. This institute offered projects and opportunities for coming generations to connect, innovate, develop and be trained for responsible positions in politics and economics.²⁷² Such an environment and the domestic development in water technology, paired with inter-agency collaboration of PUB, Economic Development Board and Environment and Water Development Council (EWI) has attracted many expert and companies to settle their R&D centers in Singapore.²⁷³ An additional amplifier are scholarships for PhD students in this field as well as R&D funds for projects. Furthermore, Singapore initiated an annual conference called Singapore International Water Week (SIWW) increasing its scope to a global level.²⁷⁴ The change from learning to creating indigenous technology can be marked by the construction of Ulu Pandan in 2007. It was the first NEWater plant, which was constructed in terms of DBOO with the Singaporean company Keppel Integrated Engineering. Henceforth, Singaporean companies provided technology and services for the construction and maintenance of NEWater plants. The next phase of Singapore's strategy was to increase export, which all three major provider Keppel, Sembcorp and Hyflux were able to achieve. Hyflux for example exports Kristal® membrane into Dubai, Namibia, China, the Netherlands and already has offices in Saudi Arabia, Algeria, India and China.²⁷⁵ Sembcorp exports into 15 countries worldwide such as Panama, China, Chile, South Africa and the United Kingdom and owns over 70 facilities scattered over the globe.²⁷⁶ Keppel, as well, is among the world leaders in its field, with major developments such as in the United Kingdom, Qatar, Poland, Brazil and the United States.²⁷⁷ The last and continuing step is the co-evolutionary acclimatization. This goes in hand with the export acceleration. It implies joint learning from export activities such as on-site projects and facilities as well as tapping into the knowledge pool of international experts.

The progress in innovation and technological development has its effects on the pricing of NEWater. The price elasticity of NEWater and conventional water is increasing and thus the price of NEWater is decreasing over time, which can be associated with the import of technology and domestic R&D.²⁷⁸ Currently, the PUB charges 1.22 S\$ per m³ for NEWater, while conventional

272 Cf.: *idid.* pp.: 204 et seqq.

273 Cf.: *ibid.*

274 *Ibid.* p.: 205.

275 Hyflux, "Sustainable Solutions For A Better Future," *Hyflux*, Annual Report 2014, p.: 15, <http://investors.hyflux.com/misc/ar2014/ar2014.pdf> (accessed: 30.03.2016).

276 Sembcorp, "Building the Future – A Global Company," *Sembcorp*, Annual Report 2015, p.: 18, <http://www.sembcorp.com/en/src/downloads/Sembcorp%20Industries%20AR%202015.pdf> (accessed: 30.03.2016).

277 Keppel Corporation Limited, "Operating and Financial Review," *Keppel Corporation Limited*, Report to Shareholders 2015, pp.: 43 et seqq. http://www.keppcorp.com/annualreport2015/PDF/downloads/KCL_AR2015_Operating_Financial_Review.pdf (accessed: 30.03.2016).

278 Michele Y.C. Chew (2011), pp.: 202 et seqq.

water is priced at 1.17 S\$ per m³ for domestic users.²⁷⁹ It was a challenge for the PUB to find the right pricing for water in general, since water is considered to be a “social good” and thus was consumed progressively over the period of time due to its low cost.²⁸⁰ On the one hand, the government needed to propose new tariffs to cover production costs. On the other hand, the government also intended a change of attitude towards water consumption. In table 5 below, we can see the potable water pricing, its taxation and NEWater pricing. The general Water Conservation Tax (WCT) is at 30%. As soon as a domestic user exceeds the 40m³ per month he/she automatically falls into the next pricing tariff of 1.40 S\$ per m³ and even has to pay higher WCT of 40%. NEWater, however, has no WCT entailed and costs 1.22 S\$ per m³ for all units regardless of the user. “This shall motivate the Singaporeans to understand the scarcity of water,” says Dr. Vivian Balakrishnan, Singapore's Minister for Environment and Water Resources.²⁸¹ In order to give every person access to water, the government designed a Utilities Save (U-Save) rebate. U-Save functions as voucher for low-income groups, which amount a 20-22 S\$ discount.²⁸² Considering the fact that the average bill adds up to about 35 S\$, the government reduces the price for this group about 70 %.

Table 9: Water Tariffs Singapore²⁸³

Tariff Category	Consumption Block (m ³ /month)	Tariff (S\$/m ³)	Water Conservation Tax (% on tariff)
Domestic	0 to 40	1.1700	30
	Above 40	1.4000	45
None-Domestic	All units	1.1700	30
Shipping	All units	1.9200	30
NEWater	All units	1.2200	0

According to Balakrishnan, the pricing of water is a political question, because water conservation can be promoted through the government, private companies' needs for longterm

279 PUB (Public Utility Board), Singapore's national water agency. “Water Pricing in Singapore,” *PUB*, (last update: 09.03.2016), under “General Information,” <http://www.pub.gov.sg/general/Pages/WaterTariff.aspx> (accessed: 30.03.2016).

280 Tan Yong Soon (2009), pp.: 165 et seqq.

281 Vivian Balakrishnan, “Pricing Water Right in Singapore,” interviewed by Tom Freyberg at International Desalination Association (IDA) World Congress 2013 – China: Tianjin, *Water World*, (2013), under “Video Interviews,” <http://www.waterworld.com/video/video-interviews/ida-2011-video-showcase.html?bcpid=1519042027001&bckey=AQ~,AAAAAEheacc~,POub7blnBC8AWZToxPtHi2-N9Q0lNmzK&bclid=2816837309001&bctid=2789762751001> (accessed: 26.03.2016).

282 Created by author, data drawn from: PUB (Public Utility Board), Singapore's national water agency. “Water Pricing in Singapore,” *PUB*.

283 Ibid.

founding assurance can be met, and water can be perceived as an essential yet scarce resource.²⁸⁴ Furthermore, the government sees itself as key player for water management since it is responsible for pricing, R&D and masterplanning of water infrastructure.²⁸⁵ Private companies as well as individuals therefore rely on the government. The government provides the space for the business sector to innovate and to develop new technologies. It fosters competition and variety in the water business market. Proper pricing of NEWater and the government's engagement in R&D provide a solid ground for innovation. Furthermore, the acclimatization of private companies within the water market and in depth technological development indicate a retention of NEWater on the market – and with it the according rules on the meso level.

Singapore Case Study 2: Desalination

Singapore was not the first country to use desalination. The United Kingdom already built a desalination plant in 1970.²⁸⁶ By 1972, Singapore firstly considered applying this approach. However, it was very energy-consuming and involved distillation since membrane technology, which is in use now for desalination, was still in its developing stages.²⁸⁷ Since other countries such as Saudi Arabia, the United Emirates and Israel have been using desalination successfully and showed significant reliance on desalination for their water supply – Israel, for instance, covers 40% of its water through desalination – Singapore was drawn to this possible solution as well.²⁸⁸ Membrane technology advanced in the nineties and desalination was approached with the technique of reverse osmosis (RO), which is the least energy-consuming out of all four desalination process types.²⁸⁹ For reverse osmosis semipermeable membranes are used in order to separate water and salt. It not only removes ions and molecules, but also bacteria and other contaminative species.²⁹⁰ The PUB stepped into this business in 2001 by contracting out a 20 year DBOO for a desalination facility in Tuas.²⁹¹ The selection process was carried out in four steps via a “pre-qualification

284 Vivian Balakrishnan, “Pricing Water Right in Singapore,” interviewed by Tom Freyberg at International Desalination Association (IDA) World Congress 2013 – China: Tianjin, *Water World*, (2013), under “Video Interviews,” <http://www.waterworld.com/video/video-interviews/ida-2011-video-showcase.html?bcpid=1519042027001&bckey=AQ~~,AAAAAEheacc~,POub7blnBC8AWZToxPtHi2-N9Q0lNmzK&bclid=2816837309001&bctid=2789762751001> (accessed: 26.03.2016).

285 Ibid.

286 Jersey Water, “La Rosière Desalination Plant,” *Jersey Water*, <http://www.jerseywater.je/about-us/learn-more/desalination-plant/> (accessed: 22.03.2016).

287 Tan Yong Soon (2009), pp.: 155 et seqq.

288 Y. Dreizin, A. Tenne and D. Hoffmann, “Integrating large scale seawater desalination plants within Israel’s water supply system,” *Desalination*, Vol.220, No. 1-3, (January 2008), pp.: 132-149.

289 Desware, “Energy Requirements of Desalination Processes,” *Desware – Encyclopedia of Desalination and Water Resources*, <http://www.desware.net/desa4.aspx> (accessed: 22.03.2016).

290 Julius Glater, “The early history of reverse osmosis membrane development,” *Desalination*, Vol. 117, No.1-3 (20.09.1998), pp.: 298 et seqq.

291 Tan Yong Soon (2009), p.: 156.

exercise,” a compilation of eleven suppliers, followed by a paring down to four suppliers, and a final appointment of SingSpring Pte. Ltd. – a joint venture of Hyflux and Ondeo Group.²⁹² Even though Hyflux had 70% share of SingSpring, it forestalled and cornered the market by full acquisition in 2003. Furthermore, Hyflux also received the contract for EPC via its subordinate company *Hydrochem*. Notwithstanding the fact that Black & Veatch, an U.S. based consulting company, assisted Hyflux from the design to till the operation process, Hyflux remains the main actor for the desalination plants in Singapore with the state as their main recipient. Still, the PUB continues to be the employer, who has determined the specific moment in time for the desalination implementation. Overall, although the idea of desalination as water purification emerged in Singapore in the seventies it took 30 more years until RO was fully developed and costs sank to a lower level then, when the PUB first engaged in the technology's appearance in Singapore.

On 13th of September 2005 SingSpring the first desalination plant opened in an industrial part in the West of Singapore. On the one hand, this inauguration meant reducing the independence on imported water from Johor, and on the other hand, Singapore commenced the “fourth tap” and with it a new research and innovation direction for its future. The first plant produced 136.380 m³ of clean water per day, which covered about 10% of water demand then.²⁹³ At that time it was even considered as one of the largest RO desalination plant in the world.²⁹⁴

The second desalination plant, Tuaspring opened on the 18th of September 2013 with a capacity of 318.500 m³ per day than SingSpring.²⁹⁵ It is considered the biggest desalination plant in South East Asia. The new plant employs innovative membrane technology, the so called Kristal®, which allows ultrafiltration and lower energy consumption.²⁹⁶ Additionally, the plant has its own power plant to keep energy costs at low level. The Tuaspring contract with Hyflux is valid for 25 years of operation – five years longer than SingSpring. Both desalination plants combined meet currently about 25% of Singapore's water needs.²⁹⁷

On the 3rd of September 2015 the PUB announced that a third desalination plant will be build in order to maintain water demand coverage at 25% and possible to even coverage up to 30% by 2060.²⁹⁸ Like the first two desalination plants, the third desalination plant will be located in Tuas.

292 Ibid; Water-Technology, “Tuas Seawater Desalination Plant – Singapore.”

293 Agence France Presse, “Singapore opens first desalination plant to cut dependence on Malaysia,” *Singapore Window*, (13.09.2005), <http://www.singapore-window.org/sw05/050913af.htm> (accessed: 24.03.2016).

294 Ibid.

295 Hyflux, “Tuaspring Integrated Water & Power Project, Singapore,” *Hyflux*, under “Highlights,” <http://www.hyflux.com/highlights/tuaspring-iwpp-singapore/> (accessed: 25.03.2016).

296 Hyflux, “Kristal® – The Ultrafiltration Advantage,” *Hyflux*, Vol. 4 (August 2015), p.: 21.

297 Hyflux “SingSpring Desalination Plant, Singapore,” *Hyflux*, under “Highlights,” <http://www.hyflux.com/highlights/singspring-desalination-plant-singapore/> (accessed: 25.03.2016).

298 Tom Freyberg, “Singapore to Build Third Desalination Plant.” *Water World*, (13.03.2015).

However, it will be operated by HSL Constructor Pte Ltd, another Singapore based marine and civil engineer company, which won the PUB's tender offer with a tender price of 217 million S\$.²⁹⁹ The size of the plant is still unknown. However, compared to SingSpring, which cost about 200 million S\$, and TuasSpring, which cost 1.05 billion S\$, the third is estimated about the size of SingSpring due to its tender price. Notwithstanding the fact that the third desalination plant is expected to be completed in 2017, the PUB announced that a fourth desalination plant will be built in Marina East, which will treat fresh water from Marina Reservoir.³⁰⁰

Worthy of mention is Hyflux' reliance on the private sector, even though the company committed itself to a PPP with the PUB. As touched upon before, SingSpring is majorly financed via fund facilities by banks such as DBS Bank, KBC Bank, ING Bank and Standard Chartered Bank. For the second plant, Hyflux strived for financial support achieving ca. 190 million S\$ from KfW-IPEX Bank for the plant's energy component and ca. 197 million S\$ from Japan Bank to finance RO and the appropriate pumps.³⁰¹ Additionally, Hyflux closed a loan deal with Maybank Singapore and Maybank Kim Eng Securities Pte Ltd for a total over 720 million S\$ for both desalination plants.³⁰² Owing to the fact that Hyflux and PUB are in a PPP, Hyflux is required to obtain PUB's approval in regard to financing the projects.³⁰³

Similarly to the NEWater case, the pricing is subject to government's claim to meet the goal of demand coverage whilst stipulating for cost covering and profitable pricing. Prices of desalinated water are adjusted every year due to external factors such as oil prices and inflation rates. However, we can observe a trend towards a lowering of desalinated water prices. SingSpring's first year of operation demanded 78 cents/m³, whereas Tuaspring's first year the price for desalinated water was already 45 cents/m³.³⁰⁴

After the technology's adaptation and establishment on the Singaporean water market, its retention is signified by other contractor's/ provider's appearance on the market as it is the case with

299 CNA/wl, "HSL Constructor to build Singapore's third desalination plant in Tuas," *Channel NewsAsia*, (16.11.2015 11.51 o'clock), under "Business," <http://www.channelnewsasia.com/news/business/hsl-constructor-to-build/2265030.html> (accessed: 26.03.2016).

300 CNA/kk, "PUB to build 4th desalination plant," *Channel NewsAsia*, (03.09.2015;10:45 o'clock), under "Singapore," <http://www.channelnewsasia.com/news/singapore/pub-to-build-4th/2097274.html> (accessed: 26.03.2016).

301 Tom Freyberg, "Singapore's Second Desalination Facility Set to Open with Combined Power Plant," *Water World*, (11.09.2013), <http://www.waterworld.com/articles/2013/09/singapore-s-second-desalination-facility-set-to-open-with-combined-power-plant.html> (accessed: 26.03.2016).

302 PUB (Public Utility Board), Singapore's national water agency. "PUB and Hyflux officially open Singapore's second and largest desalination project," *PUB*, (18.09.2013; last update: 23.11.2015).

303 Cf.: *ibid*.

304 Hong Kong.. Research Office – Legislative Council Secretariat, "Fact Sheet: Seawater desalination in Singapore," FS09/14-15. <http://www.legco.gov.hk/research-publications/english/1415fs09-seawater-desalination-in-singapore-20150930-e.pdf> (accessed: 26.03.2016)

HSL Constructor, as well as by the different bidders for PUB's tender indicate diversity of economic and technological entrepreneurs. Dr. Vivian Balakrishnan, additionally emphasized that desalination technology “opens opportunities for academic research and private businesses” and as Singapore seeks to create “a working model for the future” the desalination project is obliged to be scaled up.³⁰⁵

Evident Rules

Through these two case studies it becomes apparent that the government is pivotal to the country's development and evolution in regard to economic and technical entrepreneurship of Singapore's water management. The meso level of economic and technical entrepreneurship is constituted of three pillars in which the government occupies a decisive role. On the one hand, the government decides which technology will be used in Singapore. Thus it also initiates innovation and the direction as we have seen in cases of both, NEWater and desalination. Although both technologies were already considered in the seventies, it was not until the government decided that the technology was mature enough to be actually applied in Singapore, that it came into use. In both cases, the government hired companies to shape the vision of desalinated water or NEWater via PPP and other types of contracts. Since the government invited tenders, it created a market and a free-market like competition, which attracted various suppliers. Through such endeavors and circumstances the government assured an effective and efficient technology at the most minimal cost possible.

Secondly, the government provides infrastructure and space for private companies to interact and position themselves on the market. For instance the companies earned ownership rights via DBOO over the particular plants. However, financing is still overseen by the government even though the process of securing financial resources is the companies' responsibility. The strategy of becoming a *Hydrohub* unquestionably led to technical spillovers for local companies and gave space for innovation either in form of a platform like SINGwater or actual physical space in form of research centers of international companies or government set up like IWP. Nonetheless, although the government provides the framework, the actual innovation and development is done and brought by private businesses and corporations.

305 Vivian Balakrishnan, “Pricing Water Right in Singapore,” interviewed by Tom Freyberg at International Desalination Association (IDA) World Congress 2013 – China: Tianjin, *Water World*, (2013), under “Video Interviews,” <http://www.waterworld.com/video/video-interviews/ida-2011-video-showcase.html?bcpid=1519042027001&bckey=AQ~~,AAAAAEheacc~,POub7blnBC8AWZToxPtHi2-N9Q0lNmzK&bclid=2816837309001&bctid=2789762751001> (accessed: 26.03.2016).

Thirdly, the government is in the position between the public and private components. On the one hand, it regulates the pricing of water with no intention of subsidization. The prices for water are free-market like. The goal is to have private businesses still stay engaged and motivated to operate water treatment plants. On the other hand, it provides water to everybody by making sure that low-income group receive price reduction in form of rebates.

Table 10: Case Study Criteria – Singapore³⁰⁶

Category	Singapore	
Governmental Requirements	Yes/No: yes in order to secure contract with government.	Specification: company needs to provide the best open competitive bidding
Funding and Financial Latitude	Origin of funding: Self-funding and independent financial search, R&D via government	Financial Restriction: overseen by government, last approval by government
Power of Decision (PoD) & Ownership Rights	Who obtains PoD & OR: self-management and ownership rights belong to company	Limitations: only with in period of contract, government initially decide upon technology
Sustainability Characteristics	integrating environmental needs: minimization of waste water outflow	integrating social needs: supply to commercial & non-commercial use of water; growing coverage
	economically sustainable: yes — cost-covering & profit generating pricing	

5.1.3. Legal Perspective – Singapore

Since Singapore has a small capacity for land use it needs to plan accurately, efficiently and sustainably with regard to its future. Thus, in the sixties the planning department had already created a “Master Plan” for land use for the next 40-50 years under the so-called *Planning Act*, which is reviewed every 10 years in order to incorporate new developments in needs.³⁰⁷ About ten years later the MEWR was established, which consists of the National Environment Agency and the PUB.³⁰⁸ The purpose was to generate a physical working and foremost sustainable infrastructure along with a impeccable institutional framework and inter-agency coordination. When the clean-up operation started it was the government's main priority to entrench facilities, water infrastructure and safe wastewater outflow. For every newly constructed building the government developed a process and stipulations in form of the *Simplified Planning and Approval System*, which was

306 Created by author.

307 Cf.: Ivy Ong Bee Luan (2010), pp.: 68 et seqq.

308 Note: It was not until 2001 that the PUB joined under MEWR. Before it was under the Ministry of Trade and Industry, where it was responsible of water, electricity and gas supply in Singapore.

launched in April 1987.³⁰⁹ The *Building Control Act* (BCA) constitutively, was enacted two years later in 1989 from which the drop-in centre, the *Central Building Plan Unit* (CBPU), emerged. NEA, the parent ministry, coordinates all the compliances a construction project needs, including sewerage, drainage, environmental health and pollution control.³¹⁰ Similar to the clean-up, many agencies cooperated and engaged with each other in order to assure a project compliance with the existing system. In table 6 below, we can see all government agencies and their responsibilities in a building development process. Crucial for understanding Singapore's legal system is not only that the agencies collaborate with each other, but also that each agency has the authority and the ability to stop the construction or even let it be demolished.³¹¹ This approval system is only one building block. Other legislations have been enacted over the time to assure a safe sewerage and drainage system, proper handling of wastewater and managing pollution.³¹² In this thesis we will merely observe the main water-related legal regulation.

Table 11: Involved Government Agencies in Construction Process³¹³

Involved Government Agency	Responsibility
Urban Redevelopment Authority (URA)	Planning/land-use approval Buffer Provision
Building & Construction Authority (BCA)	Building control Building plans
Public Utilities Board (PUB)	Drainage provision Sewer layout Water supply Developments within water catchment areas
National Environment Agency (NEA)	Siting of industrial/warehouse developments Environmental health & pollution control, including pollution to watercourses (for industrial premises) Refuse disposal requirements Developments within water catchment areas
Land and Transport Authority (LTA)	Road proposals for the development including issues of access, planting of verges in car parks & parking provision
Fire Safety Bureau (FSB), Singapore Civil Defence Force	Fire Safety Hazardous materials Dangerous Trades
Singapore Power	Electricity loading
National Parks Board (NParks)	Public open space provision Tree felling Tree conservation areas

In 1970 the local government had already passed the regulations *Disposal of Trade Effluent* and in 1971 the Environment and Public Health agency passed *Prohibition on Discharge of Trade Effluents into Water Courses* regulation, which were then combined in 1973 under the *Water*

309 Cf.: Ivy Ong Bee Luan (2010), p.: 69.

310 Statutes of the Republic of Singapore, *Building Control Act*, (Chapter 29), Act 9 of 1989, Law Revision Commission, revised edition 30.12.1999.

311 Cf.: *ibid.* p.: 71.

312 Cf.: *ibid.* p.: 71 et seqq.

313 Created by author by means of Ivy Ong Bee Luan (2010), p.: 70.

Pollution Control and Drainage Act (WPCDA).³¹⁴ However, in 1999 it was divided into the *Environment Pollution Control Act (EPCA)* and *Sewerage and Drainage Act (SDA)* in order to create clear responsibilities of agencies and to deepen regulation of particular issues. The SDA takes the BCA and previous acts as legal foundation.³¹⁵ The main characteristics of this law concerns all used water regardless of its origin – be it domestic, industrial, agricultural or otherwise – it had to be discharged into the one public sewerage system. Along with this act, penalties for breach of law were introduced as well. The PUB was the chosen ministry, which is responsible for the control and implementation of this act. Six main regulations form the framework for Singapore's wastewater, which are consolidated under SDA:

1. Sewerage and Drainage (Trade Effluent) Regulations
2. Sewerage and Drainage (Sanitary Works) Regulations
3. Sewerage and Drainage (Surface Water Drainage) Regulations
4. Sewerage and Drainage (Sewage Treatment Plants) Regulations
5. Sewerage and Drainage (Sanitary Appliances and Water Charges) Regulations
6. and Sewerage and Drainage (Composition of Offenses) Regulations.³¹⁶

The most significant for our analysis are the first three regulations from the SDA. *Trade Effluent* regulations were originally enacted in 1977 and were designed to have further control over industrial wastewater. At the same time industries are given the option to improve their waste water management, but not necessary have their own effluent treatment plant. *Trade Effluent* regulation is defined by the government as “any liquid, including particles of smaller and other substances in suspension in the liquid, which is the outflow from any trade, business or manufacture or of any works of engineering or building construction.”³¹⁷ These regulations permit industries to discharge biodegradable effluents into public sewers if their quality meets the required standards. Furthermore, industries can release effluents with higher concentration into public sewers for a fee, while biodegradable sludge will be induced into a designated water reclamation plant for a fee.³¹⁸

Sanitary Work regulations specify separation of rain water and wastewater and the redirection of the former into a specifically design surface stormwater drain.³¹⁹ The government lists

314 Tan Yong Soon (2009), p.: 194.

315 Statutes of the Republic of Singapore, *Sewerage and Drainage Act*, (Chapter 294), Act 10 of 1999, Law Revision Commission, revised edition 31.12.2001.

316 Cf.: Ivy Ong Bee Luan (2010), p.: 78.

317 Tan Yong Soon (2009), pp.: 194-195.

318 Cf.: *ibid*, p.: 195; Ivy Ong Bee Luan (2010), p.: 72.

319 Cf.: *uterque ibid*.

certain businesses such as motor workshops, eating establishments, car washing bays in petrol stations, and other source of sullage such as refuse chutes, bin centers, and backwash water from swimming pool filters, which are discharged via a grease trap directly into the used water system.³²⁰ Since sullage consists of pollutants such as detergents, organic material of food waste, oil and grease, as well as heavy metals from scrap metal yards, this regulation stipulates diversion of such from water courses and specifically design catchments.

First enacted in 1999, the third regulations, *Surface Water Drainage*, complements BCA and the previous regulations as it controls discharges into stormwater drainage system. More than 50 milligrams per liter are not allowed.³²¹ Furthermore, individuals or companies conducting any type of construction works or earthworks are obliged to take measures to avert “any earth, top soil, cement, concrete, debris, or any other material to fall or be washed into the stormwater drainage system.”³²² These regulations protect the stormwater drainage system, the effectiveness of the overall drainage network, and the color and cleanliness of all water courses in Singapore.

The government, however, continued to elaborate on water protection by developing the *Environmental Protection and Managements* regulations in 2008 to manage general environmental pollution and thus, the external influences on water. Under this act further *Trade Effluent* regulations are introduced to control general toxic or hazardous substances in the water. This is done through licensing industries, which need to discharge trade effluent.³²³ Penalties and fines are consequences of contravention. In addition, *Quality of Piped Drinking Water* regulations are consolidated under this act. These regulations require further measurements to secure water quality. Piped drinking water suppliers are required to design a water safety plan and a monitoring plan by the standards of WHO's drinking water guidelines.³²⁴

As we can see below in table 7 the main water-related legislations, their purpose and the responsible agency. The PUB is in charge of all regulations under SDA, while NEA is accountable for all regulations under the *Environmental Protection and Managements Act*. The separation of competencies results in an effective, legal and regulatory framework as it complements Singapore's single system of water cycle. For instance, with the requirements of *Quality of Piped Drinking Water* regulations NEA oversees water quality. However, the PUB has a water tasting laboratory as well, since it is responsible for securing water quality. Consequently, PUB and NEA can be seen as

320 Ibid.

321 Ibid.

322 Tan Yong Soon (2009), p.: 196.

323 Cf.: Ivy Ong Bee Luan (2010), p.: 73.

324 Ibid.

two distinct parties, which regulate and monitor water quality.³²⁵

Table 12: Main Water-Related Legislations

Responsible Agency	Legislation	Purpose of Legislation
PUB	Sewerage and Drainage Act	- To provide for and regulate the construction, maintenance, and improvement of sewerage and land drainage systems - To regulate the discharge of sewage and trade effluent into public sewers
PUB	Sewerage and Drainage (Trade Effluent) Regulations	- Control the industrial discharge of wastewater and trade effluent into public sewers
PUB	Sewerage and Drainage (Sanitary Works) Regulations	- Regulates sanitary works to ensure separation of rainwater from used water, and the diversion of rainwater into a surface stormwater drain. - Regulates sanitary appliances to ensure proper sanitary plumbing and drainage systems
PUB	Sewerage and Drainage (Surface Water Drainage) Regulations	- Regulates discharges into the stormwater drainage system through earth control measures and requirements
NEA	Environmental Protection and Management (Trade Effluent) Regulations	- Control trade effluent discharged from trade/industrial premises into any watercourse - Control discharge of toxic or hazardous substances into inland water
NEA	Environmental Public Health (Quality of Piped Drinking Water) Regulations	- Regulates and sets standards for the quality of piped drinking water

The PUB is nevertheless the pivotal agency for water management, because it is in charge of the whole water cycle (illustration 8). In March 2001 the *Public Utility Act* was specifically attributed the PUB with its reconstitutions, functions, duties and powers.³²⁶ As already mentioned above the PUB regulates construction, maintenance, and improvement of sewerage and land drainage systems. Further, it manages the discharge of sewage and trade effluent. The PUB also advises the government on all matters relating to the collection, production, and supply of water, and to sewerage and drainage.³²⁷ However, the PUB has also the authority to raise capital from banks and other financial institutions. It has the power to penalize infringement as far as arresting the offender.³²⁸ The PUB itself is made up of three central departments. One is accountable for water supply, in particular for potable water production and its supply via NEWater, desalination and conventional waterworks. Another one is in control of water reclamation. It specifically oversees the collection and treatment of used water.³²⁹ The third one manages the drainage system. Besides

325 Ibid.

326 Republic of Singapore. Government Gazette – Act Supplements, *Public Utility Act*, No.8 of 2001, signed by President Sellapan Ramanathan, published by Authority No.26 (30.03.2001).

327 Ivy Ong Bee Luan (2010), p.: 75.

328 Republic of Singapore. Government Gazette – Act Supplements, *Public Utility Act*, No.8 of 2001, signed by President Sellapan Ramanathan, published by Authority No.26 (30.03.2001).

329 Cf.: Ivy Ong Bee Luan (2010), pp.: 71 et seqq.

engaging contractors to clean and maintain Singapore's drains and canals, the PUB started to build a Deep Tunnel Sewerage System (DTSS). By its planned completion in 2022 the land usage of water treatment facilities and its infrastructure will be cut by 50%, it will reduce manpower, energy costs, and costs of sludge dispose due to implementation of new technology.³³⁰

We can concluded that the PUB, as an institution itself, is a very powerful agency. Not only does it influence the government through counsel and thus plays a legislative role, it even has executive powers of arresting and penalizing offenders. However, it also has the power to influence the markets. In the previous chapter we outlined that the PUB controls the water pricing. Apart from the pricing, the PUB can also regulate the products which relate to water consumption. For instance since April 2014 the PUB allowed only sales of minimum water efficient washing machines and even increase the standard of the minimum in October 2015.³³¹ This type of activity gives companies reason for further innovation and development of efficient and sustainable products.

In general, Singapore has a well coordinated institutional framework. It allows inter-agency collaboration and therefore a “whole-of government approach” to solve its water problem via land-use planning, water production management, wastewater management, stormwater management, sound built-environment, and pollution control of the general environment.³³²

Table 13: Legal Criteria Singapore³³³

Category	Singapore	
Allocation of Competencies	Competencies of agencies: mainly PUB (utility supply + drainage) & NEA (overall environment)	Crossing sectors: yes — executive (arresting someone) & judicature (enacting own regulation)
Transparency and Overlapping of Responsibilities	Clear responsibilities: yes	Overlapping responsibilities: yes — monitoring of water quality.
Interagency collaboration	Collaboration: yes	Competition: no
Logic coherence of legislature	Coherence: yes	Discontinuity: no

330 Water-Technology, “Deep Tunnel Sewerage System (DTSS), Singapore,” <http://www.water-technology.net/projects/deep-tunnel-sewerage-system-dtss/> (accessed: 10.04.2016).

331 PUB (Public Utility Board), Singapore's national water agency. “Our Water: The Flow of Progress,” *PUB*, Annual Report 2014/2015, p.: 41.

332 Cf.: Ivy Ong Bee Luan (2010), pp.: 71 et seqq.

333 Created by author.

5.1.4. Tacit Norms & Conventions – Singapore

Throughout the years Singapore's government has been quite active in promoting campaigns, engaging the community and initiating programs. We will observe the campaigns chronologically. However, in order to grasp the full range we will specifically look at media such as print-media, television and other types of publications. In the last step we will take a look at water-related NGOs in Singapore.

The Singaporean government knows that infrastructure, environmental service and effective enforcement is not sufficient to change Singapore's water management over a long period of time.³³⁴ The crucial element is people's behavior and attitude towards water. Hence, the government sets itself a target to educate its citizens about environmental challenges and change the mindset en route of shared ownership of water, responsible actions, and contribution.³³⁵ The government created the so-called “3P Partnership” approach. The 3P stand for Public, Private and People as stakeholders. The Ministry of Environment elaborated three main strategic directions for this 3P Partnership: communication, engagement and empowerment.³³⁶ In the chapter of case studies we have examined already how the government contracted PPPs. In this chapter we will address the public-people relationship.

Singapore's first campaign called “Keep Singapore clean” was launched in 1968 and was the first attempt to make the public aware of the existing water problem and eventually become interested or/and engaged. As already mentioned before in the History chapter, mass media channels were used to achieve maximum publicity for this campaign. From featured articles, programs in newspapers and magazines to rubber stamps and seals with the slogan “Keep Singapore clean” on letters, cinema tickets and stickers to documentaries, short films and jingle, the promotion was spread as widely as possible.³³⁷ First volunteers engaged in “broomstick brigades” to clean-up public areas.³³⁸ People or sites which did not comply were panelized and/or their names were published. This modus operandi of the government resulted also in high social pressure.

In 1971 as another drought was imminent, the government caused the population to remember how water rationing during the last draught was unpleasant by starting the “Water is Precious” campaign. Again people were encouraged to save water, school children even received stickers and posters via the Ministry of Education (MOE), and radio, television and newspapers

334 Cf.: Tan Yong Soon (2009), p.: 257 et seqq.

335 Cf.: *ibid.*, p.: 258.

336 *Ibid.*

337 *Ibid.* p.: 159.

338 *Ibid.*

reported Singapore's daily water consumption.³³⁹ Singapore eventually prevailed over the draught by reducing the overall water consumption by 4,9 % – conveying the idea that water saving is not merely a behavior to appear when it is mostly needed, but it should be come a conduct on daily basis.³⁴⁰

The government comprehended rapidly that young children and students needed to be invested in the issue too, because they are the building blocks for Singapore's future. Hence, since 1980, MOE started, in collaboration with the MEWR, to integrate environmental teachings into the conventional curriculum.³⁴¹ Further, the ministries initiated school talks and exhibitions, and even organized “behind the scenes” visits at plant sites. The government, nevertheless, did not stop there. In 1994 NEA started a network of so-called Environmental Educational Advisors (EEAs), who function as contact point for teachers on the one side and for NEA on the other side.³⁴² Consequently, exchange of information such as best practices, new student initiatives or other experiences could be shared and cross-pollinated. In order to facilitate activities outside the regular curriculum as well, MOE launched along other *Community Involvement Programs* a Seashore Life Program in 1997, where students are taught about the seashore and marine environment, whilst cleaning up the beach.³⁴³ Further, the PUB initiated the so-called “Our Waters” program, where any 3P partner such as a school can choose a waterway or a reservoir and take care for it for two years.³⁴⁴ Under *Corporate and School Partnership* (CASP) Program companies and schools can join together an environmental program; companies can share their technical knowledge and students learn, participate and contribute to the project.³⁴⁵ Furthermore, a company can use this opportunity to make acquisitions. One of the active corporation is Senoko Energy Pte. Ltd. The company invested by their own account 1,8 million S\$ into the National Weather Project.³⁴⁶ Those investments continue to grow, as Sonoko spends about 50.000 S\$ ever year on awards and projects with schools.³⁴⁷

Another engaging program, was the the *Clean and Green Week* (CGW), which it started in

339 Ibid. pp.: 260 et seqq.

340 Ibid. p.: 261.

341 Cf.: ibid.

342 Cf.: ibid. pp.: 264 et seqq.

343 Ibid. p.: 265.

344 Ibid.

345 Ibid. p.: 267.

346 Senoko Energy Pte Ptd, “Senoko Power Launches National Weather Study Project 2009,” *Senoko*, Singapore: 24.07.2009. http://www.senokoenergy.com/uploads/news/2008_July_24_-_Senoko_Power_Launches_National_Weather_Study_Project_2009.pdf (accessed: 13.04.2016).

347 Senoko Energy Pte Ptd, “Students showcase refreshing initiatives in environmental & social causes at Senoko Sustainability Challenge (SSChallenge) 2013,” *Senoko*, Singapore: 28.08.2013, <http://www.senokoenergy.com/uploads/news/media-releases-20130830165522-FINAL%20Senoko%20Sustainability%20Challenge%202013.pdf> (accessed: 13.04.2016).

1990. By 2004 NEA began to co-organize the event. In 2007 the *Clean and Green Week* was expanded to a whole year project and was renamed *Clean and Green Singapore* (CGS). The main goal of this project is to build a community, which cares and also takes action. To engage the youth, it features celebrities and singers for its advertisement.³⁴⁸ Through social media such as Facebook, Instagram and Twitter CGS has a wide reach as people are also encouraged to use hashtags such as #keepSGclean or #nowasteday.³⁴⁹ Environmental ownership is attained through learning, participating and volunteering. CGS has awards on national and district level such as “Best Community Achievement,” “Best Community Commitment,” “Best Constituency (ownership),” or the “CGS Award 2015.”³⁵⁰ In order to adopt the “clean and green lifestyle,” CGS embeds own programs such as “Youth for the Environment,” “Bright Spots' Challenge,” “Eco Music Challenge,” “Environment Challenge for Schools,” or “Clean Singapore Learning Trail.”³⁵¹

In 2006 the PUB initiated the so-called “10 liter challenge.” By promoting economical water usage behavior and rating water-efficiency of devices, the PUB pursued the goal to decrease everyone's daily water consumption by 10 liters a day. In the same year PUB started another program called Active, Beautiful, Clean Waters (ABC Waters) Program. Since then ABC Waters became an continuously growing project. With the aim to transform Singapore into a “city of gardens and water,” ABC Waters pursues a strategy to improve Singapore's water quality.³⁵² It has currently 30 projects of which 28 have been completed and more projects are in planning, according to PUB's annual report from 2015.³⁵³ From Alexandra Canal to Yishun Pond, almost every public space, which has water, is somehow connected to a ABC Waters Program. Its flagship is the Bishan-Ang Mo Kio Park, which was completed in 2011. The Kallang River was bypassed into the park by redesigning a canal, creating manmade riverbanks and enhancing greenery and community gardens along the process. ABC Waters has its own guidelines for developers and industry in order to get an ABC Water Certification. The launch of its certification in 2010 is supposed to support recognition of sustainable agencies, developers and projects.³⁵⁴ Four categories are assessed for the ABC Water Certificate, for instance, whether community is or can be facilitated (Active), water features and

348 Clean and Green Singapore, “Mother Nature's Cry,” *National Environment Agency* (NEA), composed by: Sheeq, Enero and Requiem, Clean and Green Singapore 2014 Theme Song, <https://www.cgs.sg> (accessed: 13.04.2016).

349 Clean and Green Singapore, “Home,” <https://www.cgs.sg> (accessed: 13.04.2016).

350 Clean and Green Singapore, “Awards,” *Clean and Green Singapore*, under “News & Awards,” <https://www.cgs.sg/news-awards> (accessed: 13.04.2016).

351 Clean and Green Singapore, “Take up the Challenges here and do your part for the Environment,” *Clean and Green Singapore*, under “Programmes,” <https://www.cgs.sg/programmes> (accessed: 13.04.2016).

352 PUB (Public Utility Board), Singapore's national water agency. “ABC Waters Programme,” *PUB*, <http://www.pub.gov.sg/ABCWATERS/Pages/default.aspx> (accessed: 13.04.2016).

353 PUB, Annual Report 2014/2015, pp.: 44 et seqq.

354 PUB (Public Utility Board), Singapore's national water agency. “Get ABC Waters Certified,” *PUB*, <http://www.pub.gov.sg/abcwaters/abccertified/Pages/default.aspx> (accessed: 13.04.2016).

greenery are implemented (Beautiful), a holistic water management is installed at the particular site (Clean), and whether innovative technology or process are incorporated.³⁵⁵ Furthermore, in cooperation with PUB, Nparks, Institute of Engineers Singapore, Singapore Institute of Architects, Singapore Institute of Landscape Architects, Housing and Development Board and LTA an educational program was specifically designed for professionals such as architects and engineers. The purpose is not only recognition but also to reach potential partners from 3P sector in order to collaborate on water management.³⁵⁶

Although not every campaign addresses water directly, nonetheless, every campaign, program, and initiative concerns environment and thus water as well. In case of print media, the PUB published its own magazine *PURE* since beginning of 2011 quarterly. The magazine is a water-themed lifestyle magazine, which targets “young and busy people on the go.”³⁵⁷ According to its own account, the magazine has 38,000 copies and about 105,000 reader per issue.³⁵⁸ It gives water related establishments and companies opportunities to position itself as environmentally-responsible via advertisements. Key characteristic of *PURE* are the celebrities, which are featured in every issue. In the October-December issue 2015, for instance, the actor and singer Nat Ho starred in the magazine pointing out the importance of water and its careful usage.³⁵⁹ Furthermore, the magazine is designed to reach a broad range of target groups. Children and families can find interest in articles about Wally, Singapore's water mascot, family events, quizzes and water-sights. While teens and students are aimed at through by articles about eco-friendly fashion, trendy devices like spiky shower curtains to save water or the PUB Book Prize featuring extraordinary students.³⁶⁰ Even corporation and premises are targeted via the publishing the so-called WEB (Water Efficient Building) certificate. The PUB's intends to not only reach people passively, but also engage them actively. In its magazine PUB invites its readers to write letters to the editors, give feedback and propose wishes for future issues.³⁶¹ Apart from the physical magazine, the PUB offers a *PURE* app available for on Google play for Android, Apple App Store, Windows phone and Black Berry App world. In illustration 11, three screenshots of the *PURE* app are depicted. On the app all released issues are available as well as in for on the PUB and the option to give feedback.

In addition to the magazine, the PUB has its own You Tube channel, called sgPUB, since

355 Ibid.

356 PUB (Public Utility Board), Singapore's national water agency, “ABC Waters Design

357 *PURE*, “*PURE* Advertiser's Guide 2007,” *PUB*, under “Pure Contents,”

<http://www.pub.gov.sg/mpublications/pages/pure.html> (accessed: 14.04.2016).

358 *PURE*, “*PURE* Advertiser's Guide 2007,” *PUB*, under “Unique selling points,”

<http://www.pub.gov.sg/mpublications/pages/pure.html> (accessed: 14.04.2016).

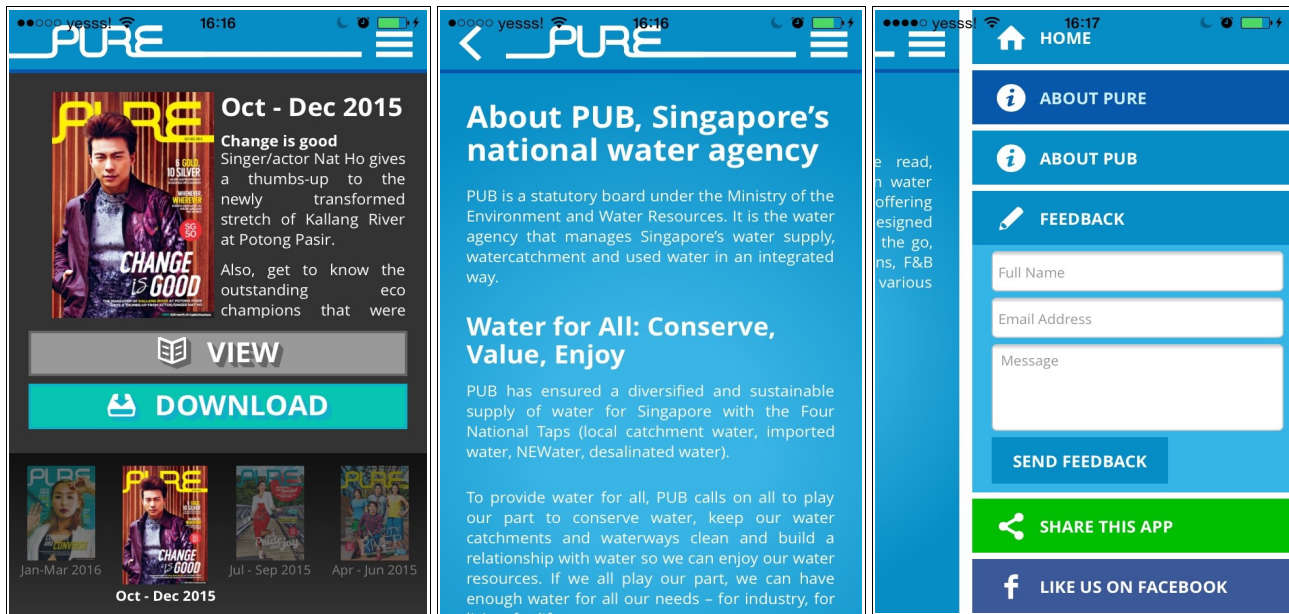
359 *PURE*. Change is Good. October-December 2015, pp.: 5-9.

360 Ibid.

361 Ibid. p. 2.

26.03.2011, with currently 1733 subscribers and 1.205.904 views.³⁶² The most viewed video of sgPUB is “Water Wally'Shower Dance MTV” with 127.993 views.³⁶³ Furthermore, PUB engages in other social media such as Facebook (85.471 likes), Instagram (1.515 followers), Twitter (24.300 followers), Google+ and it even has its own Word Press blog.³⁶⁴

Illustration 11: PURE app³⁶⁵



In spite of the fact that Singapore's government is highly involved in promoting water ownership and its careful and efficient use, Non-governmental Organizations (NGOs) have established further operations to build communities or to engage in water protection. The Singapore Environment Council, for instance, is a NGO which generally works on sustainability issues and the general environment. Founded in 1995, it pursues its goals via holistic programs, various awards for schools and journalists, and projects such as the Green Labeling Scheme.³⁶⁶ Similar focus of engagement is shown by the ECO (Environmental Challenge Organization) Singapore NGO, which specifically targets younger generations and thus emphasizes on community building and enrollment of schools.³⁶⁷ Another NGO, which deals with water, is the Restroom Association

362 SgPUB [pseud.], PUB's You Tube channel. <https://www.youtube.com/user/pubwebadmin> (accessed: 14.04.2016).

363 Ibid.

364 PUB, Singapore's National Water Agency – Public Service [pseud.]. PUB's Facebook page.

<https://www.facebook.com/PUBsg/> (accessed: 14.04.2016); pubsingapore [pseud.]. PUB's Instagram page

<https://www.instagram.com/pubsingapore/> (accessed: 14.04.2016); @pubsingapore [pseud.]. PUB's Twitter account.

<https://twitter.com/PUBsingapore> (accessed: 14.04.2016); Water Chatter [pseud.]. PUB's Word Press account.

<https://waterchatter.wordpress.com> (accessed: 14.04.2016).

365 Pictures by the author.

366 Singapore Environment Council, “Overview,” *Singapore Environment Council*,

<http://www.sec.org.sg/web/overview.php> (accessed: 20.04.2016).

367 Environmental Challenge Organization Singapore, “It's all happening because we care for our Earth,” *ECO Singapore*, <http://www.eco-singapore.org> (accessed: 20.04.2016).

Singapore (RAS). Founded in 1998, it particularly works with 3P partners to improve toilet technology and lavatory management to optimize outflowing water as well as social behavior in regard to restroom manners.³⁶⁸

The Waterways Watch Society (WWS) operates on and with the water since 1998 WWS with the goal to keep Singapore's rivers and other waterways clean.³⁶⁹ They provide various opportunities to engage with WWS, for instance, through kayaking activities, volunteers, corporation and educational programs. Their core principles are to make people aware of the interconnectedness between water problems and environmental problems, to educate and practice sustainability, and to procure ownership sentiments towards water.³⁷⁰ As a consequence, WWS engages schools, organizes meet-ups, works with corporations and their CSR field such as the Jeans Brand Levi's or even governmental ministries like the Ministry of Finance (MOF), and implements beach clean-ups or kayaking clean-ups within those activities.³⁷¹ Hence, we can say that not only does the government engage in altering individual's perceptions and attitude towards water, but also Singapore's own citizens and private persons take part in the movement of awareness and ownership of water. As Eugene Heng, founder of WWS puts it: "By involving one in good environmental practices, we make him a better citizen, a better parent or student and a better person."³⁷²

In its annual report the PUB also provides opportunities for individuals from various fields to speak and publish their opinion. This includes well-known academics in the field of water management such as Cecilia Tortajada and Asit K. Biswas lauding "consistent and strong political support" and "long-term visionary planning," which made Singapore's development of becoming a hydro-hub possible.³⁷³ Besides the recognition of governmental activities, other individuals working in the field of water clearly emphasize the need of innovation, but also how pivotal people's participation in taking care of water is since the government has a limited spectrum of its actions.³⁷⁴

368 Restroom Association Singapore, "About Us," *RAS*, <http://www.toilet.org.sg/aboutus.html> (accessed: 20.04.2016).

369 PUB (Public Utility Board), Singapore's national water agency. "Our Water: The Flow of Progress," *PUB*, Annual Report 2014/2015, p.: 46.

370 Waterways Watch Society (WWS), "Our Mission," *WWS*, http://www.wws.org.sg/?page_id=708 (accessed: 21.04.2016).

371 Waterways Watch Society (WWS), "Annual Report 2015," *WWS*, Singapore: 17.08.2015; Waterways Watch Society (WWS), "Events," *WWS*, http://www.wws.org.sg/?page_id=406 (accessed: 21.04.2016).

372 PUB (Public Utility Board), Singapore's national water agency. "Our Water: The Flow of Progress," *PUB*, Annual Report 2014/2015, p.: 47.

373 Ibid. p.15.

374 C.f.: *ibid.* pp.: 30 et seqq.

Table 14: Norms & Convention Criteria Singapore³⁷⁵

Category	Singapore	
Activities & Campaigns	Activities: physical clean-ups, water education, awards & certification, challenges	Campaigns: “Keep Singapore clean,” “Water is precious,” “Clean & Green Week/ Singapore,” “10% Challenge”
Nature of Content	Change of behavior: save water, not littering	Change of opinion: feeling of water ownership, support government in its doing
Media & Form	Channels of Communication: print media, TV & radio, social media	
Origin of campaigns	Sector: mainly public sector, private sector & social sector (NGOs)	Foreign: no

5.1.5. Core Meso Configuration – Singapore

In Singapore's case it is evident that its government is the driving force and key booster of its water transformation. It becomes apparent that the people are used to the government dominant role of taking initiative and taking care of “everything.” By first envisioning to provide clean water for its citizens on a self-sufficient basis with no shortages and clean rivers in all of Singapore, the government impacted the collaboration between agencies. Furthermore, competencies and responsibilities of agencies were rearranged. Laws are built upon each other and new ones strengthen the old ones. By working with the private sector according to its 3P concept, the government artificially created competition and markets via contract such as DBOO. Thus, the private sector is used as a tool for innovation and continuous development in the water sector. But also the public and individual aspects are affected by government's efforts. The utilization of mass media, from radio and TV to magazines and social media, is a tool the government particularly uses to change people's behavior and attitude towards water as well as to foster ownership of water. These undertakings were the building blocks for Singapore in becoming a HydroHub, because it based itself on leading companies in water technology, experts, and education with the goal to become a leading country on hydro-innovation and development. Besides the government, the NGO sector and the private sector are involved in education, signifying that besides the government the corporate world and Singapore's citizen themselves are concerned with water. A clear focus point of the government, the private sector and NGOs is education to influence norms and habits from early age on. Still, the government has the biggest say and opportunity to influence legal formation,

³⁷⁵ Created by author.

education, private markets and its population's behavior towards water.

5.1.6. History of Indonesia

In 1965 Indonesia experienced their first sudden regime change in recent history. In this time of economic deterioration, inflation was high, exports were shrinking, infrastructure was declining, factories were working at minimal capacity, and the people were experiencing severe poverty and hunger.³⁷⁶ After two decades in power Sukarno, an advocate of the socialist system, was replaced by his former general Suharto, who ruled Indonesia under a military regime for the next three decades. It was a violent coup d'état, in which about half a million Indonesians (alleged communists) were massacred between 1965 and 1966. Accordingly, even after the Dutch colonial rule of over 350 years, World War II and Japanese colonial rule, Indonesia was characterized by authoritarian control, where the common people were suppressed. Water governance, therefore, was handled through a top down approach, where key officials were appointed by the government. Generally, we can say that Indonesia's water history is marked by political change and legal turmoil rather than by concrete operation and longterm action plans – as we have seen the case of Singapore. More precisely, Indonesia shows a pattern of decentralization and centralization. By 1965 Indonesia had experienced first a centralization due to the revolution and the establishment of a unitary republic (1945), second a decentralization due to introduction of federation policies (1948-1949), and finally another centralization under Sukarno as Indonesia gained independence from the Dutch (1949).³⁷⁷ Even after the power change in 1965, Soeharto intended to lead the country to a “New Order.” However, his policies for decentralization turned out to generate even more control by the central government – even down to the level of the village decision-making, as civil leadership positions were substituted with military officials with ties to the centralized government. Scholars summarize the relationship of the local politics and civic initiatives with the central government as a “patron-client relationship.”³⁷⁸ This first part of our timeframe is pivotal for subsequent developments and particularly for our understanding of the individuals and the common people of Indonesia. As Eka Nugraha Abdi explains, Indonesians are not accustomed to bottom-up approaches because of their traditional culture, but also because they have been “traumatized by highly centralized

376 Adam Schwarz, *A Nation Waiting: Indonesia's Search for Stability*, 2nd ed., (St. Leonards NSW: Allen & Unwin 1999), p. 24.

377 Eka Nugraha Abdi, “Water Resource Development in a Decentralizing Indonesia: A Challenge for Policy Design,” (Dissertation, University Southern California, 2007), p.: 45 et seqq.

378 Christoph Beier, *Dezentralisierung und Entwicklungsmanagement in Indonesien. Beobachtungen zur politisch-administrativen und zur wissenschaftlichen Kommunikation: Ein systemtheoretischer Versuch*. Saarbrücken: 1995.

authoritarianism.”³⁷⁹ Hence, public participation in decision making is hindered as we will learn later.

During Suharto's regime, several reservoirs were built. Although the reservoirs were created according to the “Welfare Plan” of a Dutch hydrological engineer, the first reservoir Jatiluhur – with a scope of 3 billion m³ – was completed in 1969.³⁸⁰ In the following decades, a series of reservoirs were constructed in the Brantas River Valley, located in East Java:

- in 1972 Selorejo with 54,6 million m³
- in 1973 Karangkates with 253 million m³
- in 1978 Wlingi with 5,2 million m³
- in 1983 Lodoyo with 5 million m³
- in 1984 Bening with 24,8 million m³
- in 2000 Wonorejo with 106 million m³.³⁸¹

These reservoirs had and have several purposes such as flood control on the upper stream, electricity generation and distribution of bulk water for domestic and industrial usage as well as irrigation.³⁸² Overall Indonesia has 521 lakes and over 100 reservoirs of different capacities, of which most are located in Java. Although the general water availability is at an average flow rate of 15.165 m³ per capita per year, we should again bear in mind, Indonesia's size and geomorphology, as well as the various water needs of different islands and regions. Java, with 59% of the total population, is the most inhabited island, but has merely 4,5 % of the overall water resources.³⁸³ In the table below we can see the different demand and possible surface water availability of the four main islands. The demand of water is steadily increasing. However, the biggest surface areas are the least used, while the smallest surface areas are the most used.

379 EkaEka Nugraha Abdi, “Water Resource Development in a Decentralizing Indonesia: A Challenge for Policy Design,” (Dissertation, University Southern California, 2007), pp.: 38 et seqq. Nugraha Abdi, “Water Resource Development in a Decentralizing Indonesia: A Challenge for Policy Design,” (Dissertation, University Southern California, 2007), pp.: 38 et seqq.

380 Raymond Valiant Ruritan, “Water governance in Indonesia: from indigenous to post-colonial technology,” in *Community Based Water Management and Social Capital*, ed. Kiyoshi Kobayashi, Ibnu Syabri, Ismu Rini Dwi Ari and Hayeong Jeong (London: IWA Publishing, 2014), pp.: 127 et seqq.

381 Ibid. p.: 128.

382 Ibid.

383 Joni Hermana, “Sustainability of water supply synchronizing PDAM and HIPPAM in Indonesia,” in *Community Based Water Management and Social Capital*, ed. Kiyoshi Kobayashi, Ibnu Syabri, Ismu Rini Dwi Ari and Hayeong Jeong (London: IWA Publishing, 2014), p.: 243.

Table 15: Surface Water Availability & Demand of Four Main Islands³⁸⁴

Island	Area (1000 km ²)	Maximum Water Surface (m ³ /s)	Minimum Flow (m ³ /s)	Irrigation + Domestic-Municipal-Industry Demand			Water Resource Utilization (%) in 2015
				1990 (m ³ /s)	2000 (m ³ /s)	2015 (m ³ /s)	
Java/Bali	139	6.199	786	1.074	1.777	1878	29,8
Sulawesi	187	2.488	561	126	365	529	21,3
Sumatera	470	23.660	4.704	297	497	693	2,9
Kalimantan	535	32.279	6.956	73	93	193	0,6

The water listed in the table is just raw water, which still needs to be treated. In Indonesia, the so-called PDAMs (Perusahaan Daerah Air Minum) are responsible for water obtainment, development, treatment and transmission facilities.³⁸⁵ PDAMs trace back to Dutch colonial times when the first PDAM was established in 1911 in Semarang City. This PDAM was followed by Salatiga in 1921 and Solo in 1929.³⁸⁶ Along with Indonesia's independence PDAMs became part of local the Public Work division. This is a ministry of Indonesia set up in 1959 to be responsible for infrastructure such as roads, bridges, dams, irrigations, waterways, water supply, and public buildings in order to enliven economic activities. In 1962 the government issued Law No. 5/1962 stating that establishments such as PDAMs are to be transformed into local government companies with one more purpose than it would be the case with state-owned companies.³⁸⁷ Usually, a state-owned company's role is either to serve as a public utility (Indo.: Perusahaan Umum) or to make a profit as a limited company (Indo.: Persero).³⁸⁸ PDAMs are suppose to fulfill both functions. The duties themselves indicate a contradiction in the focus of interests for the company. Additionally, considering events of recent history, the management of PDAMs is becoming even more complex. In 1987, the Law No. 14/1987 was issued, which transferred “some of its public works businesses” to a local level, and furthermore defined that the water supply system shall be provided by local PDAMs.³⁸⁹ Nonetheless, at that time decentralization policies were merely used as political tools to silence the people, who were demanding decentralization. The goal was to give the people the impression that they were in charge, even though the central government was still in control of PDAMs.³⁹⁰

384 Created by author; data from *ibid*.

385 Masamitsu Onishi, Mangapul L. Nababan and Kiyoshi Kobayashi, “Partial authority allocation of regional water supply system in Indonesia and economic efficiency,” in *Community Based Water Management and Social Capital*, ed. Kiyoshi Kobayashi, Ibnu Syabri, Ismu Rini Dwi Ari and Hayeong Jeong (London: IWA Publishing, 2014), p.: 143.

386 C.f.: Hadipuro (2010), p.: 476.

387 C.f.: *ibid*.

388 *Ibid*.

389 *Ibid*.

390 C.f.: Abdi (2007), p.: 43. Note: Decentralization and respectively centralization are usually measured political, administrative and fiscal indicators. In the following chapter we will go deeper into the latest decentralization in

To cover Indonesia's water demand, many water suppliers are engaged in this market. One of the most consumed water products is bottled water. In 1973 the first bottled water company named *Aqua* started their business in Jakarta, which focused on the “low-class” market, specializing in areas where households are not connected to PDAM water.³⁹¹ Although the company underwent hardship in its early years, it eventually got hold of the market. More bottled water companies have joined the market over the years. While in 1990 merely five bottled water companies were competing, eight years later 184 companies were on the market.³⁹² Table 9 below shows the increasing capacity of bottled water productivity, indicating proportional growth of demand. Except for the year 1998, the rate of growth was continuously ascending. In 1997 the Asian Financial Crisis hit Indonesia, introducing a second era of Indonesia's recent history. By 1998 the Indonesian *Aqua* company was taken over by *Danone*, the international food and water company.

Table 16: Bottled Water in Indonesia till 1998³⁹³

Year	Production Capacity (1 mil. litre)	Rate of Growth from presiding year (in %)
1990	399	-
1991	637	59,6
1992	1.321	107,4
1993	1.590	20,5
1994	1.832	15,2
1995	2.055	12,2
1996	2.215	7,8
1997	2.500	12,9
1998	2.000	-20

The last crucial event in the first half of Indonesia's recent history is Jakarta's water privatization. In 1993 Suharto's son Sigit Harjojudanto started negotiations with the British utility company *Thames Water* to become Jakarta's private water company, in turn encouraging its French competitor *Suez Lyonnaise de Eaux* to engage in negotiation talks with the son of Suharto's friend, Anthony Salim.³⁹⁴ The result was that the water supply of Jakarta was divided into two areas: the western area of the Ciliwung River, which was assigned to *Suez* and was called PT PAM Lyonnaise

order to understand the predicament, which PDAMs are facing.

391 Hadipuro (2010), p.: 477.

392 Ibid., p.: 479.

393 Source modified by author according to Hadipuro (2010), p.: 479.

394 Wijanto Hadipuro and Nila Ardhanie, Wijanto Hadipuro and Nila Ardhanie. “Critical Review of Jakarta Water concession contract.” *AMRTA Institute for Water Literacy and Public Services International* (01.07.2007), p.: 1.

Jaya (Palyja), and the eastern area, which was assigned to *Thames* and was called PT Thames PAM Jaya (TPJ).³⁹⁵ Both multinational companies were assured a payment in the form of water charges, which do not correlate to customer tariffs in any way, while Harjojudanto's and Salim's companies each received a 20% share of the profits.³⁹⁶ These water charges implied that the local government would assume the risk of currency and cost recovery. It almost goes without saying that political power was used in this case to pursue economic gain. Often these concessions are regarded as collusive, corrupt, and nepotistic.³⁹⁷ However, it was not until the 6th of July 1997 that those cooperation agreements (CA) were signed and Jakarta's water was privatized. The concessions were designed for 25 years and took effect in 1998. Thus they would have been active until 2022. However, the well known East Asian Financial Crisis hit Indonesia and the Rupiah fell about a fourth of its previous value. Along with riots, economic decline and general political unrest, Suharto resigned and was replaced by his Vice-President Habibie. Chaos spread throughout the country, and local administrators cancelled the CA, only to be convinced by the concessionaires that they renounced the previous local partners, which were tied to Suharto, and thus restored the validity of the CA again.³⁹⁸ Due to the devaluation of the Rupiah, the two private multinational companies charged more for the delivered water. However, the local government could not increase water tariffs because of the public unrest. Consequently, the governments expenditure radically increased while the revenue radically decreased, leaving a gap of 11% in 1997, which jumped more than 60% in 2001.³⁹⁹ These companies continued to service the Greater Jakarta area. However, they are regarded as inefficient and as possessing low coverage, which is mainly restricted to business districts and commercial buildings. In addition, an improved bill collection method and steps against illegal private well digging are seen as their only added value. As a consequence, protests against water privatization are being held in public continuously.⁴⁰⁰

Suharto's fall was the second sudden change in Indonesia's history. The transformation from Suharto's "New Order" towards a new state of liberal and social politics began in form of *Reformasi* (Indonesian for reformation) in 1998. Two crucial laws were passed – Law 22/1999 and 25/1999, which gave more autonomy and financial equalization to the regions. However, the motivation behind the passing of these laws was the "urgent need to ease the local uprisings demanding the

395 Ibid.

396 Ibid.

397 C.f.: idid; Karen Bakker, Michelle Kooy, Nur Endah Shofiani, and Ernst-Jan Martijn, "Disconnected: Poverty, Water Supply and Development in Jakarta, Indonesia," UNDP (Human Development Report Office Occasional Paper, draft: 13 March 2006) Human Development Report 2006, p. 25.

398 C.f.: Bakker (2007), pp.: 26 et seqq.

399 Ibid. p.: 26.

400 Irfan Zamzami, "Jakarta Water Privatization Today – Dried Water Tap, or Change," *AMRTA Institute for Water Literacy and Public Services International* (March 2012), pp.: 2 et seqq.

national government be just and accountable.”⁴⁰¹ Hence, the decentralization was initiated by the government while the rest of the country might have not been ready for those sudden changes. Strict deadlines were set for the needed implementing policies to be ready by the beginning of 2001.⁴⁰² This set-up indicated trouble in the process of decentralization. For example: as the structures and infrastructures had been delegated to subnational level “as far as it could,” the formulations of these laws were unclear as to who exactly had what competency.⁴⁰³ Furthermore, decision-making and the general management of the local water supply changed along with the amendment of the institutional framework. This rather uncommon rapid change for such a diverse and big country as Indonesia lead to a dilemma on a political level, with social and economic consequences as well. If there were to be too many decentralized units the chance of subnational disputes would increase, while if the management were be too centralized local experience and needs would be unheard.⁴⁰⁴ Indonesia was under pressure to find the right balance. After the major steps towards decentralization in 1998, the general division of water management was as follows:

1. National government is responsible for any construction and authorization of policies regarding water, as well as diverse programs, management and evaluation.
2. Provincial government is responsible for monitoring and controlling regional planning, as well as counseling and reporting progress to the national government.
3. County or municipal government is responsible for the operational implementation of the nationally decided program and is eligible further for counseling from national and state government.⁴⁰⁵

Furthermore, if the next tier authority is believed to have the ability, projects and tasks are delegated to the next lower level of government.⁴⁰⁶ The result of this policy change was that the subnational water units increased along with the assigned staff's responsibilities of local management sites, as more coordination was required while old responsibilities were kept. After decentralization PDAMs were in charge of raw water availability and its transmission, water treatment facilities, clean water transmission, development of reservoir units, and water distribution to customers.⁴⁰⁷ The

401 Abdi (2007), p.: 110.

402 Bert Hofman and Kai Kaiser, “The Making of the Big Bang and its Aftermath – A Political Economy Perspective,” *World Bank*, (Conference paper on 'Can Decentralization help to rebuild Indonesia?', International Studies Program, Andrew Young School of Public Policies, Georgia State University, 01-03.05.2002), p. 4 et seqq.

403 Abdi (2007), p.: 55.

404 Ibid., pp.: 22 et seqq.

405 Ibid., pp.: 55 et seqq.

406 Ibid. p.: 56.

407 Mangapul L. Nababan, Masamitsu Onishi and Kiyoshi Kobayashi, “Asymmetric ownership between municipalities in water supply system provision Indonesia,” in *Community Based Water Management and Social Capital*, ed. by Kiyoshi Kobayashi, Ibnu Syabri, Ismu Rini Dwi Ari and Hayeong Jeong, pp.: 165. London: IWA Publishing, 2014.

local government became more important, since it now had ownership and rights over local water resources. Along with unclear allocation of competencies and unqualified staff who were and still are part of “chronic-but-systemic” corruption, PDAMs are required to coordinate and cooperate with each other.⁴⁰⁸ The mismanagement and insufficient communication between local governments became evident during the floods of the Greater Jakarta Area in 2002 and 2007. The problem is not only due to a poor flood control system, but also because the floodwaters of the particular rivers are upstream and thus belong to another jurisdiction outside Jakarta.⁴⁰⁹ The fact that five years after the first flooding a second flooding of a similar extent reoccurred, only demonstrated that management and cooperation between PDAMs of different jurisdictions had not changed. In both events, however, accusations of different parties began along with individual assertion of “being a good politician,” which ended in the “new” decentralization as the perceived malefactor, that hinders appropriate flood management.⁴¹⁰

Evidently, every jurisdictional authority is keen to fulfill the local needs: while upstream regions need faster flood drainage, the lower ones demand slower drainage. Before decentralization such matters were discussed on a national level, yet after decentralization the local government received enough power to disobey national requests.⁴¹¹ Since the decentralization, another problem arose, demonstrating the lack of intergovernmental cooperation. In some cases, several local governments are responsible for one PDAM such as the Bandung Regency and Cimahi City, which are assigned to one PDAM called Tirta Raharja. This asymmetric ownership shows particularly the complexity of competencies allocation and the decision-making processes, and highlights the difficulty of service coverage while keeping the local enterprise (PDAM) efficient. Hence, we will examine this case in more detail in the next chapter.

In total, there are 337 PDAMs in Indonesia spread over 83 cities and 319 regencies, of which merely 103 are rated as “healthy” in terms of performance, 115 as “not healthy,” and 119 as “ill.”⁴¹² The Indonesian Government reports that 24% of Indonesians (8.032.099 customers) do not have access to PDAM water, although they actually should be covered by 47% in urban areas and 11% in rural areas.⁴¹³ Other sources stated that 77% of Indonesia's overall population has access to improved water, out of which 17% have connection to PDAM.⁴¹⁴ It further differentiates between municipal areas with 87% improved water access, but merely 30% PDAM connection, and rural

408 C.f.: Abdi (2007), p.: 103.

409 C.f.: *ibid.*, p.: 23.

410 C.f.: *ibid.*, pp.: 26 et seqq.

411 *Ibid.*, p.: 27.

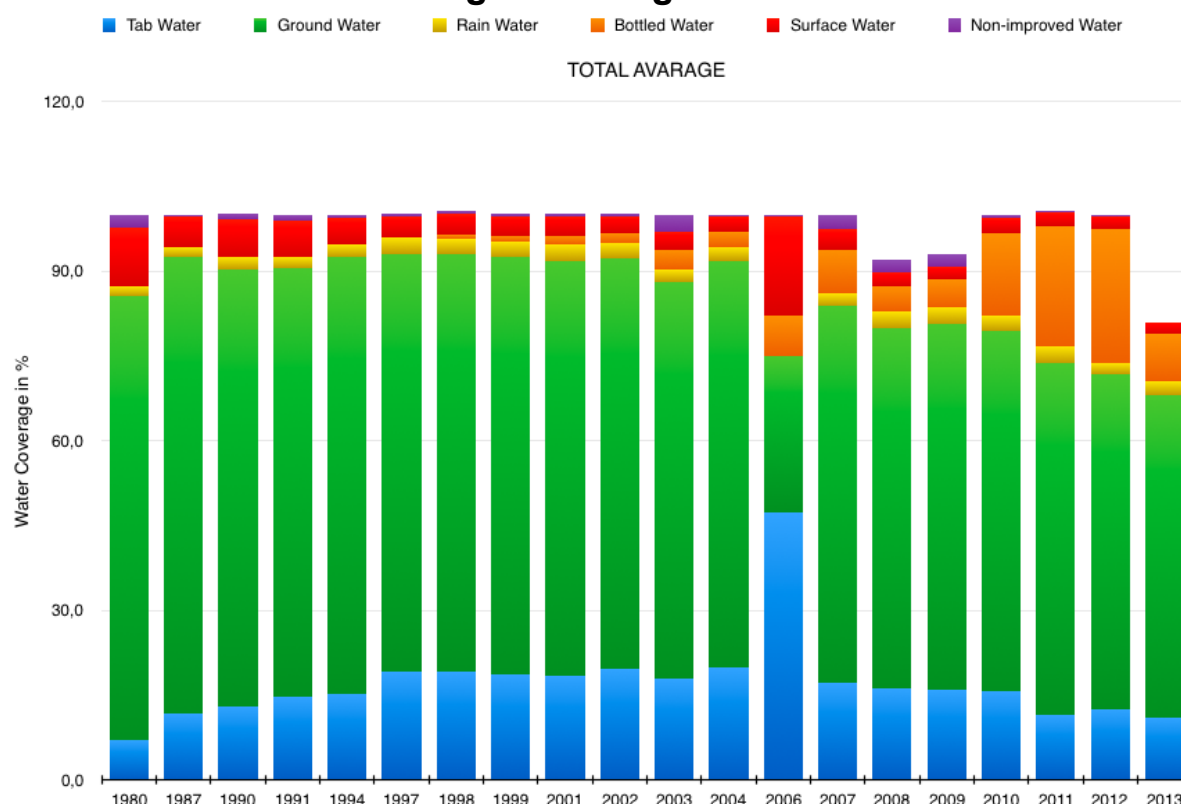
412 Nababan (2014) p.: 165.

413 *Ibid.*

414 Hermana (2014), p.: 239.

areas with 69% improved water access, but solely 6% PDAM connections.⁴¹⁵ Hence, the population hearkens back to other water resources such private pumps and wells with 52% of total alternative water supply, public owned water hydrants with 25%, and about 15% rely on public or communal utilities.⁴¹⁶ In table 17 we see the average total water coverage of Indonesia and its six different water sources. Important to note is the difference of water source coverage between urban and rural areas, as shown in table 18 and 19. Rural areas use groundwater to a much bigger extent than urban areas. Urban areas, on the other hand, utilize tap water (PDAM water) to a greater degree. Important to emphasize is the increasing population (from 145.494.452 in 1980 to 255.708.785 in 2015) and the growing percentage of urban population (from 22,1% in 1980 to 53,7% in 2005). This explains the decrease of tap water coverage as more people move into cities, but do not obtain a connection to PDAM water. Noticeable is also the increase of bottled water since 2004, although it entered the market in 1998. The survey for the year 2008, 2009 and 2013 are uncompleted and 2006 is not coherent with the rest of the data, they were included for the sake of integrity.

Table 17: Total Water Coverage – Average⁴¹⁷



415 Ibid.

416 Ibid.

417 Created by author on the basis of WHO/UNICEF JMP (Joint Monitoring Programme) for Water Supply Sanitation, "Indonesia: estimates on the use of water sources and sanitation facilities (1980 – 2015)," (2015).

Table 18: Water Coverage in Urban Areas⁴¹⁸

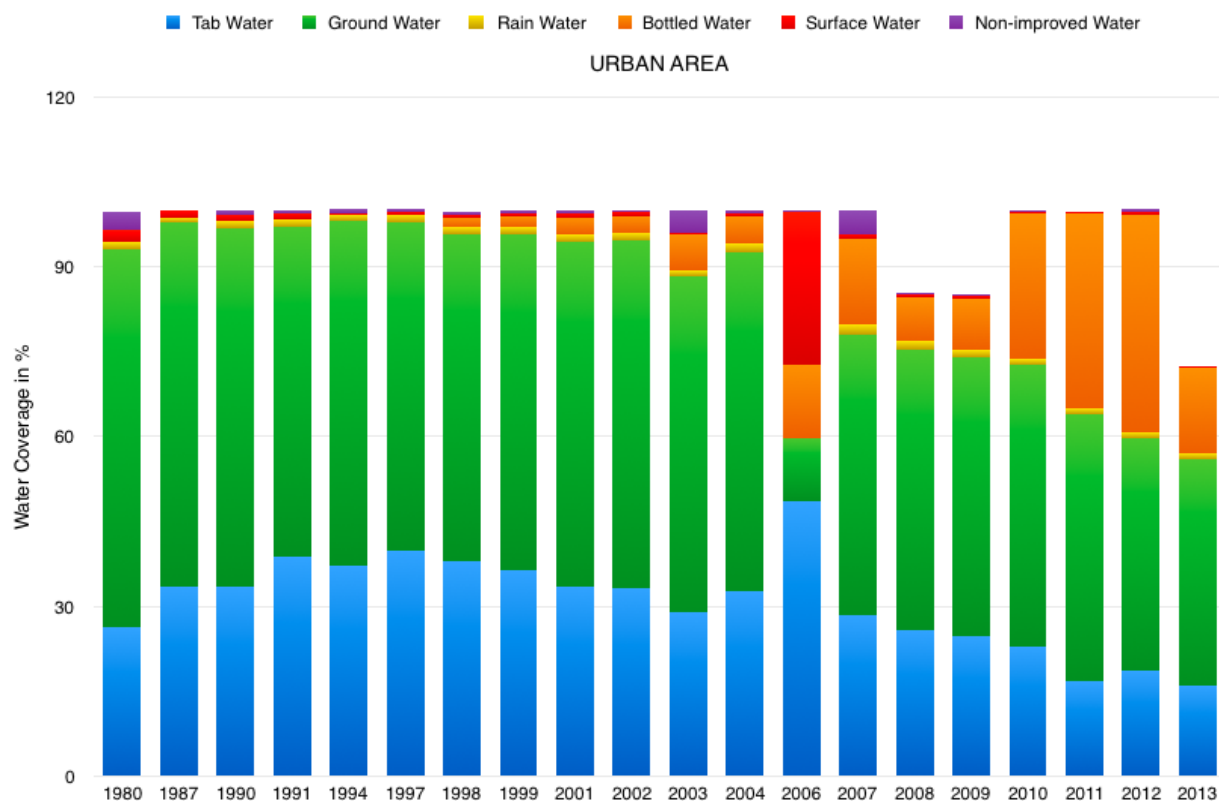
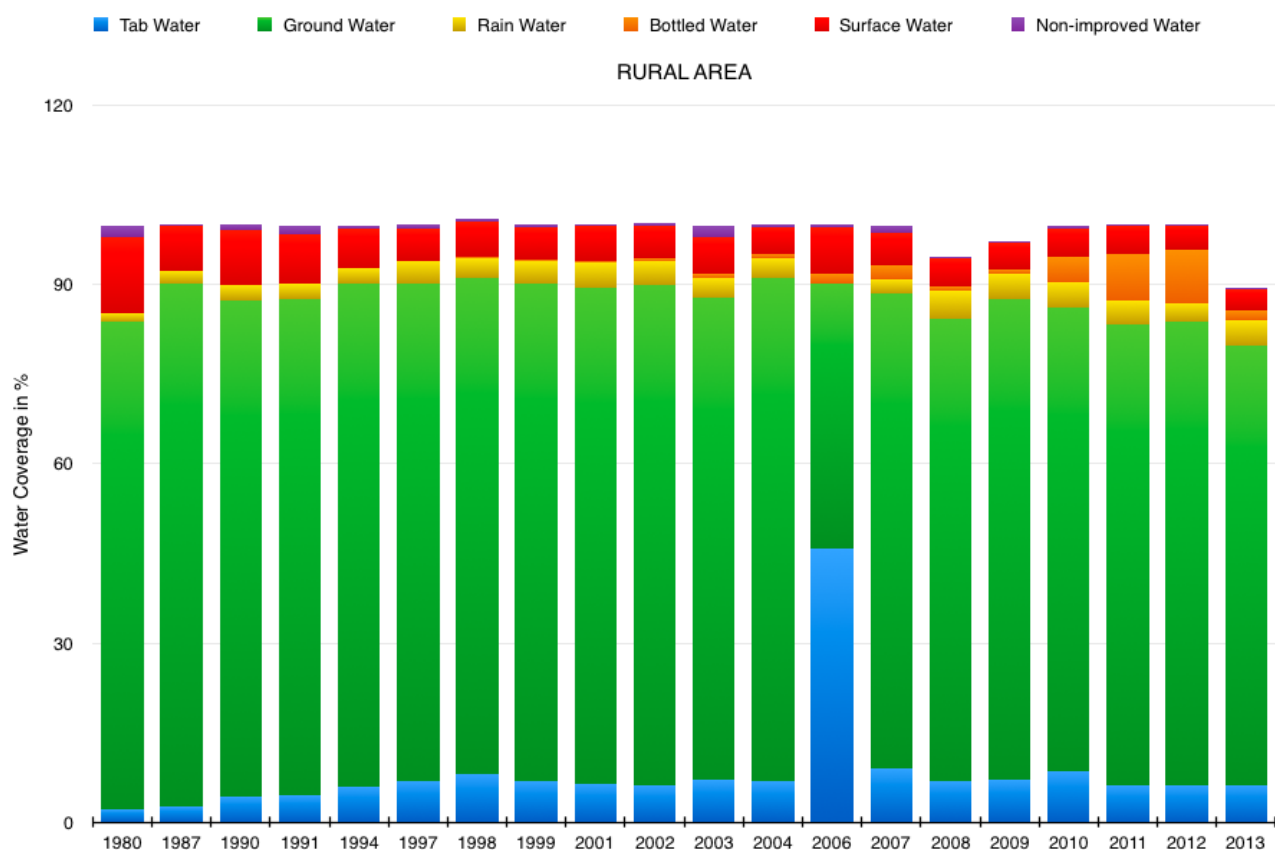


Table 19: Water Coverage in Rural Areas⁴¹⁹



418 Ibid.

419 Ibid.

Due to the lack of proper waste water management, which led to phenomena such as open littering into rivers, open defecation or other waste discharge manners of households and industry, the quality of raw water quality is continuously declining, causing water borne diseases. As a consequence, the population has lost trust in the quality of water. Moreover, most of the PDAMs have merely conventional methods to treat water and not the resources for proper handling of “modern” pollutants such as chemical traces (nonylphenol, atrazine, other pharmaceutical products), pesticides from extensive agriculture, and heavy metals (lead, arsenic, chromium, mercury).⁴²⁰ Modern membrane technology would be appropriate to treat such polluted water. However, local PDAMs can not obtain such technology due to financial deficits. Consequently, bottled water became a reliable source for water. The shift to the year 2000 shows a leap of a 54% growth rate in bottled water business; and by 2004 the production of bottled water was already at 9.100 mil. liters.⁴²¹ As we can see in table 10, this trend continues well into the present.

Table 20: Bottled Water in Indonesia 2009-2014⁴²²

Year	Production Capacity (1 bil. litre)	Rate of Growth from Presiding Year (in %)
2009	12,9	-
2010	14,5	12,4
2011	17,9	23,4
2012	18,8	5
2013	20,3	7,9
2014	23,1	13,8

Not included in this data are the refilled bottled water seller, whose pricing is usually about 30% of normal bottled water, and other private organized water suppliers, who use groundwater in order to fill the gap of PDAM coverage.⁴²³ Bottled water is nearly 200 times more expensive than PDAM water and refilled water is 10-30 times more costly. Particularly the poor rely on those water sources, because the connection fees for PDAMs water services are too high.⁴²⁴ Those bottled

⁴²⁰ Ibid., p.: 244.

⁴²¹ Hadipuro (2010), p.: 479.

⁴²² Created by author according to data from: Nadia Kusuma Dewi, “Analysis: Bottled water industry faces both growth and challenges,” *Jakarta Post* (27.05.2015 at 8.43 o'clock), <http://www.thejakartapost.com/news/2015/05/27/analysis-bottled-water-industry-faces-both-growth-and-challenges.html> (accessed: 15.05.2016).

⁴²³ Wijanto Hadipuro and Nurma Y. Indriyant, “Typical urban water supply provision in developing countries: A case study of Semarang City, Indonesia,” *Water Policy*, Vol. 11 No. 1 (2009), pp.: 56 et seqq.

⁴²⁴ C.f.: Hermans (2014), p.: 244; Richard Francey and Esther Gerlach, *Regulating Water and Sanitation for the Poor: Economic Regulation for Public and Private Partnerships*, London: Earthscan (2008), p.: 110 et seqq.

water companies, however, are international global players such as Coca Cola and Danone. The latter took over the Indonesian company *Aqua* in 1998. Currently, these companies own about 65% of the Indonesian bottled water market – with an increasing tendency.⁴²⁵ Besides the above mentioned water resources, there are also other methods to access water in Indonesia; for example through groundwater subtractors, privately built wells or private groundwater pumps.

In 2004 the *Water Resources Law* No. 7/2004 passed. It stipulates that water is a basic water right for basic needs. Article 5 declares: “The State guarantees the right of every person to get water for basic daily needs to fulfill the healthy, clean and productive life.”⁴²⁶ PDAM's water usage is, nonetheless, classified as commercial usage rights. The law itself was an act, which not only implemented IWRM principles, but it also was a longterm “framework” act covering a scope of water functionalities. Furthermore, article 5 paragraph 1 of the same law states: “Water resources shall be controlled by the State and used for the maximum public welfare.”⁴²⁷ This, however, contradicts Jakarta's water privatization, which was carried out shortly before the sudden political change in 1998. Private vendors and other water supply companies, which are able to access groundwater due to insufficient regulations, affect government's control over Indonesia's water resources. Nevertheless, the law also covered economic aspects of water, and thus it institutes the involvement of the private sector.⁴²⁸ This law was a fundamental step for Indonesia to build up its water management infrastructure as other regulations were enacted on the base of Law No. 7/2004. On the 18th of February 2015 the Constitutional Court of Indonesia declared the annulment due to this law because of its conflicting aspects with the 1945 constitution – in particularly in relation to the involvement of the private sector.

Indicators for further investigation

Through the review of Indonesia's history of water management, we can find several indicators which serve us for our analysis. PDAMs appear to be the most interesting subject for this analysis. On the one hand, they belong to local government and have the responsibility to provide water. On the other hand, they also need to function as a profit generating company. For one case study, we will examine the PDAM Tirta Raharja in regard to its ownership and responsibilities.

425 C.f.: Hermana (2014), p.: 244.

426 President – Republic of Indonesia. *Law on Water Resources*. Law of the Republic of Indonesia Number 7 of 2004 Regarding Water Resources.

427 Ibid.

428 Bart Teeuwan, “The Role of the Legal Framework in Implementing Water Resources Developing Projects during the Second Part of the 20th Century,” in *Irrigation Revisited – An Anthology of Indonesia-Dutch Cooperation 1965-2014*, ed. Jan Kop, Wim Ravensteijn and Kasper Kop (Delft: Eburon (2016), pp.: III-9.

While PDAM are semi-governmental companies, Jakarta's water was fully privatized. The privatization plays a role in civic formation against water privatization as can be observed through events such as demonstrations and the activities of NGOs. Jakarta's water privatization is an example of how it could be if water supply would be privatized throughout Indonesia. Thus, for the second case study we will examine the takeover of Jakarta's water by *Thames Water* and *Suez*.

As for the analysis of the legal perspective, we will examine the effects of the centralization and decentralization on legislature in order to understand how this oscillating pattern impact the coherence of water concerning legislature. Furthermore, besides the examination of the PDAM in the first case study, we will also observe jurisdiction and responsibilities of PDAMs, because PDAMs are owned by local governments. Thus, the coordination of water resource will give us an indication of how interagency coordination in Indonesia takes place.

Tacit norms and conventions are the third analysis point in our framework. Scanning through the previous chapter, we have only a few indications of civic activity in the field of water. The government's engagement in form of campaigns or other opinion influencing activities do not stand out from its usual undertaking. Hence, we will particularly focus on NGO activities and external involvement. If any are existent, we will also investigate governmental activities.

5.1.7. Case Studies – Indonesia

For the case study we will take a) the PDAM Tirta Raharja and b) the privatization of Jakarta's water by *Thames Water* and *Suez Lyonnaise de Eaux*. We will apply the meso trajectory by first examining the emergence of the venture, afterwards its adaptation and ultimately its retention on the market. Subsequently, we summarize evident rules conveyed in the case studies.

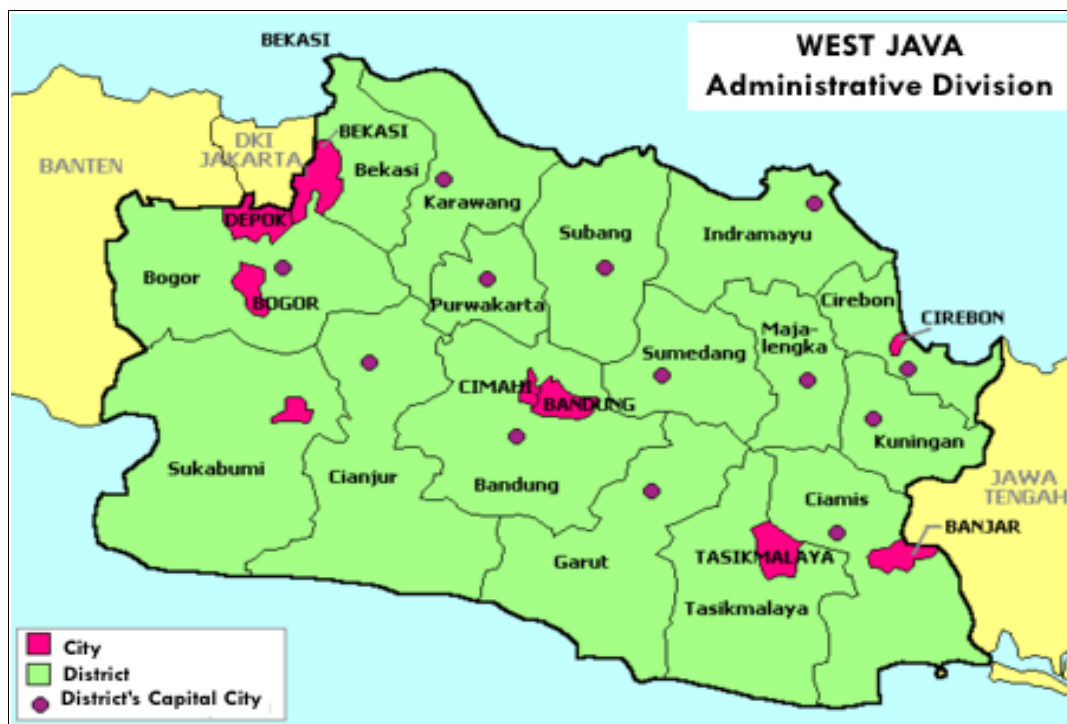
Indonesia Case Study 1: PDAM Tirta Raharja

PDAM Tirta Raharja lies in the West Java province and was first established under the Dutch rule in 1926. The initial name was *Water Leiding Bedrijf* (Dutch). It was accountable for Cimahi and Lembang. In 1977 the area changed to Bandung Regency (in Indonesian: Kabupaten Bandung) due to the Regional Policy No. XVII and Governor of West Java Decree No. 510/H.K/011/SK/77.⁴²⁹ PDAM Tirta Raharja, being the property of the Bandung regency, was required to supply water to the region of Bandung, Cimahi city, the city Bandung, and West Bandung regency. In illustration 12 we can see the state West Java and its subdivision of regencies.

⁴²⁹ Nababan et al. (2014), p.:170.

Two important cities lie within Bandung regency: Cimahi City and Bandung City. Before decentralization Cimahi belonged to Bandung regency. However, along with decentralization some regions and cities gained an autonomous status. Cimahi City was one of such cases. The ownership of the PDAM, nonetheless, stayed with the local government of Bandung district. According to the same regulations of decentralization, the responsible regent of a PDAM has the power to appoint the Directors Board of the same PDAM and decides on the members of a so-called supervision board.⁴³⁰ The local Bandung government, therefore, not only owns PDAM Tirta Raharja, but also controls its management and administration indirectly by appointing personnel to particular positions. Furthermore, regional autonomy is carried out through Law 22/1999 by autonomous provinces (Indo.: Propinsi), regencies (Indo.: Kabupaten), and cities (Indo.: Kota) within “the interest of local community” – changing the hierarchical correlation between those levels of government.⁴³¹ Thus, Bandung's local government is only responsible for acting in its regency interest. But because it is in charge for PDAM Tirta Raharja as well, it is also responsible to provide water to Cimahi City.

Illustration 12: Administrative Division of West Java⁴³²



430 C.f.: *ibid.*

431 President of the Republic of Indonesia. Law of the Republic of Indonesia Number 22 of 1999, *Regarding Regional Governments*, Consent by House of People's Representatives of the Republic of Indonesia, chapter 3, article 4, paragraph 1.

432 Modified by author according to: File.tkplb.net, “Peta Indonesia: Jawa Barat,” http://file.tkplb.net/PETA_INDONESIA/jawabarat%20tk%202.png (accessed: 18.06.2016).

After the autonomy shifted, the ownership and answerability had been modified as well. According to Law No.: 22/1999, city mayors (Indo.: Walikota) and regents (Indo.: bupati) do not have to answer to the governor of the particular province as it was before decentralization, but are rather bound to its local Regional Representatives Council (DPRD = Dewan Perwakilan Rakyat Daerah).⁴³³ Hence, there is no other administrative authority, which can intervene in these regional water affairs. This is the result of Indonesia's change towards decentralization. Since centralization policies were perceived as “repressive and neglectful of local political aspiration,” the demand for more local authority was granted without another overseeing entity.⁴³⁴ Nonetheless, PDAM have additional legal rights and duties. They have to coordinate and cooperate with other governmental agencies on three levels:⁴³⁵

- Central level coordination with
 - Ministry of Health and Ministry of Environment in regard to health issues.
 - Ministry of Public Works in regard to water resources and drinking water issues
 - National Development Planning Board and Development Support Agency for Water Supply System (BPPSPAM = Badan Pendukung Pengembangan Sistem Penyediaan Air Minum)
- Provincial level coordination with
 - provincial offices associated with water resources
 - the mining industry
 - the forestry
- Local level coordination with
 - local planning divisions
 - environment divisions
 - city/recency revenue divisions
 - health divisions

Hence, collaboration is required. Authorities of higher levels however, are not entitled to intervene. As already mentioned above, 7/2004 included components of water privatization, which allowed the

⁴³³ Nababan et al. (2014), p.:163.

⁴³⁴ Ibid.

⁴³⁵ Ibid. p.: 166.

disposition of government's shares of stated owned companies to other parties.⁴³⁶ In addition, the 43/2000 decree of Minister of Internal Affairs allows local governments to cooperate with third parties in order to accelerate PDAM's performance.⁴³⁷ Although Bandung's regent H. Dadang M. Naser has the ownership of PDAM Tirta Raharja, he/Bandung regency has the power to sell its shares. Even a sale to Cimahi would be possible. This, however, has not occurred so far. Cimahi City, nevertheless is excluded from any water management decision in regard to infrastructure, suppliance or any other fiscal decision.

According to Art. 21, Chapter V, Part 2 of 22/1999, DPRD holds the financial and administrative right of the region together with the head of a particular region, who possesses the overall account of the finances.⁴³⁸ Consequently, all income and expenditure are managed by the local government (Art. 86, §6) – including those of the PDAM Tirta Raharja. As this PDAM also falls under the administration of Bandung regency, Tirta Raharja is required to transfers 55% of the income to regional income funds (Bandung Regency). Due to Law 7/2004, the local government has the authority to make PDAM related policies and to set the pricing for PDAM water. Before decentralization, central government approved all budget proposals for local infrastructure.⁴³⁹ After local governments became independent, they had enough power to make all fiscal decisions concerning water. Illustration 13 below shows Indonesia's infrastructure budgeting. In the case of Tirta Raharja, it would translate that the Bandung regency is responsible to provide the budget for the development of infrastructure in West Bandung and Cimahi City. Those, however, do not contribute to regional budget but merely to the PDAM's income through subscriptions. Consequently, Bandung regency makes its decisions to its own advantage. On the other hand, six facilities of PDAM Tirta Raharja are located in Cimahi City.

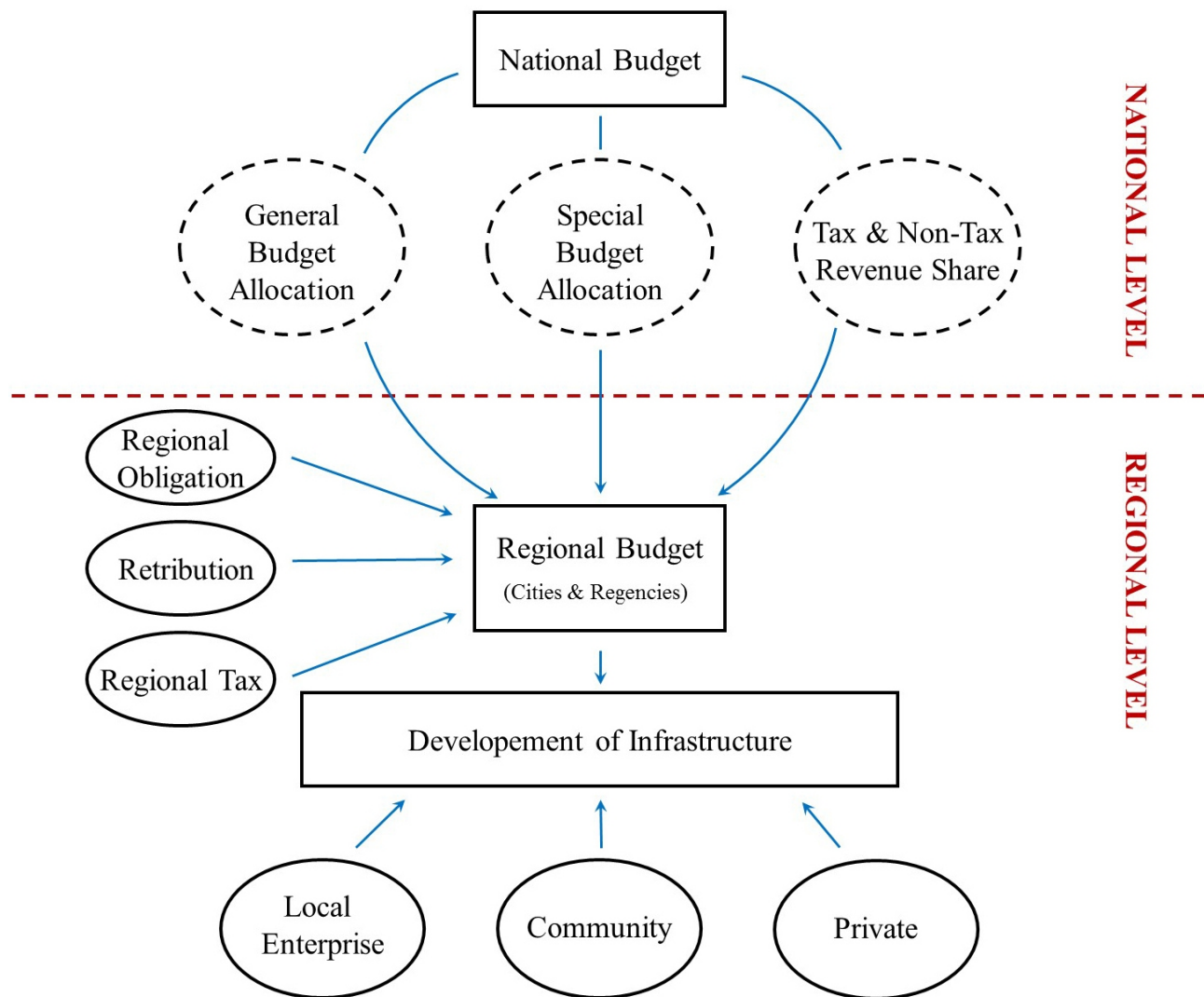
436 Ibid. p.: 164.

437 Ibid. p.: 165.

438 President of the Republic of Indonesia. Law of the Republic of Indonesia Number 22 of 1999, *Regarding Regional Governments*, Consent by House of People's Representatives of the Republic of Indonesia, chapter V second part, article 21 and fifth part, article 46.

439 C.f.: Nababan et al. (2014), p.:163.

Illustration 13: Infrastructure Budgeting⁴⁴⁰



Tensions between the two local government arise, because infrastructural investments for pipelines in Bandung are “excessive,” while Cimahi City is still struggling with insufficient pipeline coverage.⁴⁴¹ Cimahi City has less water resources available than Bandung as we can see in table 21. According to Nababan, PDAM water is the most used water source, which makes PDAM water availability even more crucial for Cimahi. The city is at the same time a crucial contributor to PDAM Tirta Rahajar's income. Data from 2006 in table 22 show that Cimahi had the most subscribers of the PDAM's subdistricts. By 2014, Cimahi is moved to the third place of Tirta Raharja's biggest contributor. This can be interpreted as the consequences of the asymmetrical ownership of this PDAM and lack of appropriate separation of management assets of Cimahi city. Cimahi is a city, it has the second highest customer rate compared after Bandung district as it is

⁴⁴⁰ Created by author according to Nababan (2014), p.:164.

⁴⁴¹ Onishi et al. (2014), p.: 153.

shown in illustration 14. The overall connection subscription rose from 2009 till 2014 by 54% from 53.046 to 81.718 subscribers. Illustration 15 displays the yearly growth of PDAM subscribers.

Table 21: Alternative Water Resources⁴⁴²

Alternative Water Source	Cimahi	Bandung
Packaged water	x	x
PDAM (public hydrants & private pipes)	x	x
Private pumps		x
Protected wells	x	x
Unprotected wells		x
Protected spring		x
Protected groundwater	x	
Total	4	6

Table 22.: Subdistricts Subscription⁴⁴³

Subdistrict Served Pipeline Taps	Total Connections 2006	Total Connections 2014
Soreang Branch (5 subdivisions)	10.887	23.072
Ciparay Branch (5 subdivisions)	11.306	16.067
Malaya Branch (4 subdivisions)	5.126	13.038
Padalarang Branch (6 subdivisions)	7.807	10.887
Cimahi City (0 subdivision)	14.144	15.882
TOTAL	49.270	78.946

442 Created by author by the means of Nababan (2014), p.:169.

443 Created by author by the means of PDAM Tirta Raharja, "Sambungan Langganan" (Engl: Subscription Connection), *PDAM Tirta Raharja*, under "Profil" (Engl.: Profile), <http://www.tirtaraharja.co.id/profil/detail/sambungan-langganan> (accessed: 26.06.2016); Nababan (2014), p.:170.

Illustration 14: Service Coverage of PDAM Tirta Raharja⁴⁴⁴

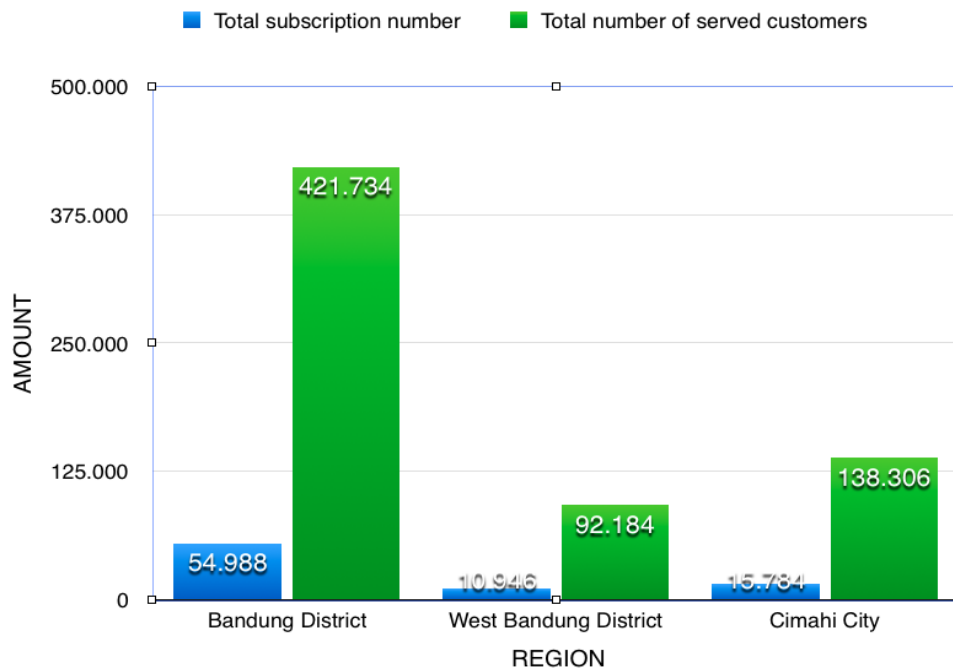
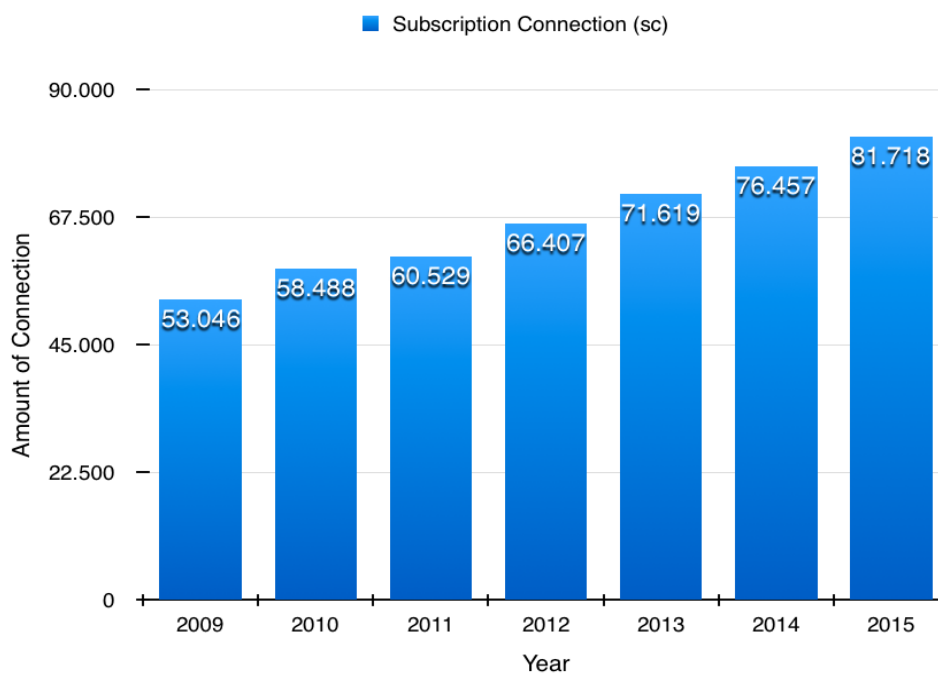


Illustration 15: Overall Subscribers 2009-2015⁴⁴⁵



⁴⁴⁴ Created by author by the means of: PDAM Tirta Raharja, “Cakupan Pelayanan (%)” (Engl.: Service Coverage (%)), *PDAM Tirta Raharja*, under “Perkembangan Usaha” (Engl.: Business Developments), <http://www.tirtaraharja.co.id/perkembangan/detail/cakupan-pelayanan> (accessed: 26.06.2016)

⁴⁴⁵ Created by author by the means of: PDAM Tirta Raharja, “Jumlah Sambungan Langgan (Unit)” (Engl.: Total Connections Subscriptions (Units)), *PDAM Tirta Raharja*, under “Perkembangan Usaha” (Engl.: Business Developments), <http://www.tirtaraharja.co.id/perkembangan/detail/jumlah-sambungan-langgan-unit> (accessed: 26.06.2016)

As connections increase the production or treatment of water also increases. In table 23 water sales, distribution and production from 2009 to 2015 are depicted in numbers and in illustration 16 we see those numbers assembled in a graph. All three indicators continuously grew since 2009. However, these indicators show a descending pattern from production to distribution to sales. As mentioned in the chapter before, PDAMs have overall a low coverage rate even though they are responsible for water supply. Within those six years, water production increased by 27%, water distribution by 30,7% and water sales by 49,6%. Yet the average water consumption per household stayed about the same amount. This emphasizes that the PDAM water market has not matured yet in terms of its saturation and that there is still potential. The overall production capacity is still not at its highest potential of 926,5 l/s. Cimahi City is the second biggest contributor to the PDAM's capacity, as table 24 illustrates it. In total, there are 22 sources for water production at the PDAM Tirta Raharja. Hence, facilities in Cimahi City produce 21,4% of the overall production. Nonetheless, Tirta Raharja suffers high water-loss rate as it is shown in table 23. Even though it was able to lower the rate by 19,3% within these six year, 30,78% is sextuple times of Singapore's water rate loss (5%).

Table 23: Sales, Distribution, Production, Water Rate Loss, Average Water Consumption⁴⁴⁶

Year	Water Sales (in m ³)	Water Distribution (in m ³)	Water Production (in m ³)	Water Rate Loss (in %)	Average Water Consumption (m ³ /month/sc)
2009	11.098.979	17.934.509	19.274.120	38,12	17,43
2010	11.490.562	18.820.190	20.796.089	38,95	16,95
2011	12.695.762	20.109.450	22.670.369	36,87	17,48
2012	13.852.527	20.996.131	22.572.760	34,05	17,38
2013	14.653.270	21.936.571	22.860.340	33,39	17,05
2014	15.849.743	23.268.391	24.334.171	31,88	17,82
2015	16.604.894	23.363.432	24.481.716	30,78	16,93

⁴⁴⁶ Created by author and assembled by the means of: PDAM Tirta Raharja, “Aspek Teknik” (Engl.: Technical Aspects), *PDAM Tirta Raharja*, under “Perkembangan Usaha” (Engl.: Business Developments), <http://www.tirtaraharja.co.id/perkembangan/detail/tingkat-kehilangan-air> (accessed: 26.06.2016).

Illustration 16: Sales, Distribution & Production 2009-2015⁴⁴⁷

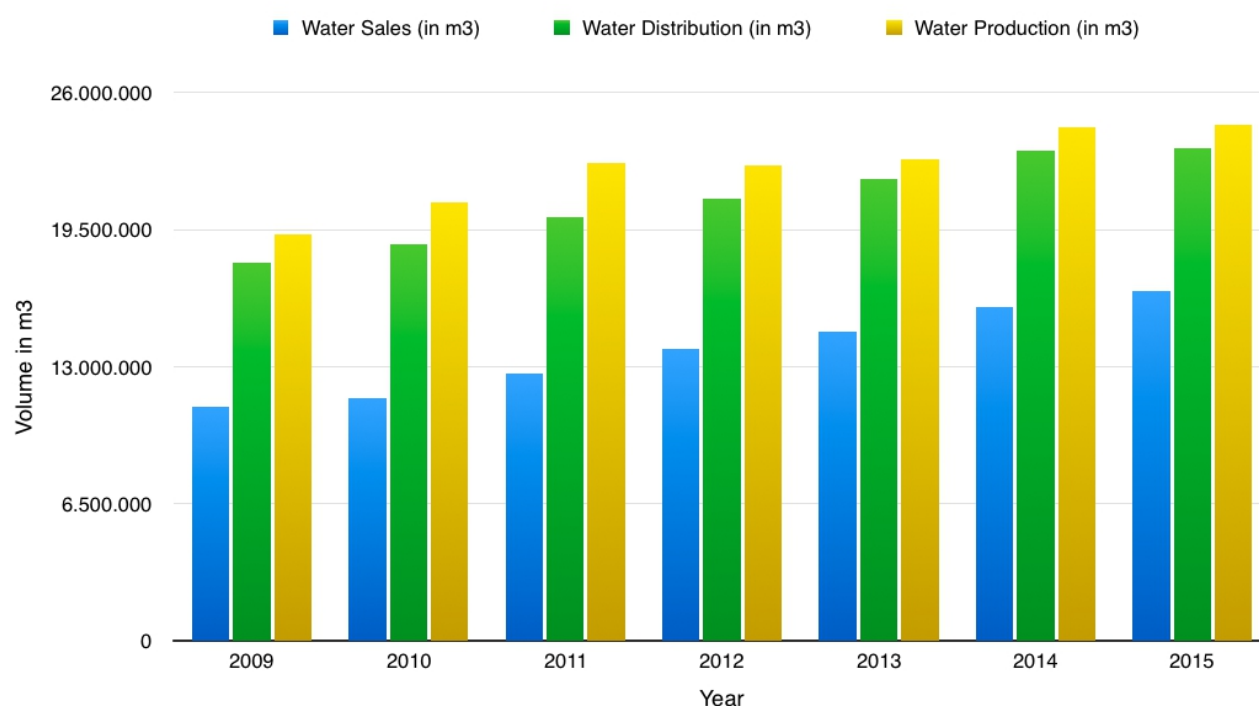


Table 24: Production Capacity by Regency in 2013⁴⁴⁸

Regency	Production Source	Production Capacity (in liquid flowrate l/s)
Bandung	Sukamaju	200
	Cigadog Ciwidey	30
	Citere Pangalengan	30
	CiKoneng-Ciparay	200
	CiKoneng-Dayeuhkolot	50
	Cilembang	5
	Rancaekek	24
	Cihampelas	6
	Majalaya	12,5
TOTAL		557,5
West Bandung	Cikole Gene-Cipanghuluan	12
	Pasir Ipis	30
	Cisarua	36
	Padalarang I	15
	Padalarang II	20
	Cibulakan	8
	Cipulus	30
	Cililin	20
TOTAL		171
Cimahi City	Cikudapati	5
	Cisintok	5
	Cimahi 11	8
	Cimahi 12	3
	Cimahi	177
TOTAL		198
TOTAL CAPACITY		926,5

⁴⁴⁷ Ibid.

⁴⁴⁸ PDAM Tirta Raharja, “Kapasitas Produksi” (Engl.: Production Capacity), *PDAM Tirta Raharja*, under “Profil” (Engl.: Profil), <http://www.tirtaraharja.co.id/profil/detail/kapasitas-produksi> (accessed: 26.06.2016).

PDAM Tirta Raharja charged in 2006 1.000 IRP for the first usage block of water (1-20 m³), by 2009 it was 2.100 IRP, and currently it charges 2.200 IRP.⁴⁴⁹ Despite the fact that water prices are supposed to be reviewed every three to five years, adjusting water prices prove to be difficult due to high fluctuation of inflation rates in Indonesia.⁴⁵⁰ Nonetheless, not every person can afford PDAM water prices let alone PDAM connection fees. In the midst of the East Asian Crisis Indonesia's inflation rate was up to 82%, 2006 it was at 18%, 2009 at 13%, and 2015 at 8% with a reduction up to 3%.⁴⁵¹ Overall, Tirta Raharja's steadily improves its operating revenues as table 25 illustrates. From 2009 to 2014 it achieved an total increase of 80% of operating revenue. Yet in 2015 the revenue dropped by 37%. The total assets of Tirta Raharja continuously grew in the past six years by 173,5% due to investments in infrastructure. However, the PDAM's costs are capital expenditures, interests costs, operational and maintenance costs. Those costs are subtracted from the revenue in order to get the PDAM's equity, the net revenue. Tirta Raharja's equity shows a surplus even though it fluctuates yearly for about 1.000.000 IRP. In the years of decentralization 1997-2001 Tirta Raharja was in a constant deficiency. Illustration 17 gives us a graphical overview for the numbers in table 25, emphasizing on the difference between the PDAM's equity, revenues and total assets.

Table 25: PDAM Tirta Raharja's Financial Performance⁴⁵²

Year	Operating Revenues (in IRP)	Total Asset (in IRP)	Profit/Loss (in IRP)
2009	41.160.869	95.505.315	6.152.079
2010	46.079.209	139.699.093	4.338.317
2011	53.208.032	172.013.607	3.635.640
2012	58.553.522	181.184.597	4.617.783
2013	60.463.966	200.843.682	3.409.539
2014	74.091.516	246.303.328	4.473.856
2015	46.643.913	261.265.512	5.354.226

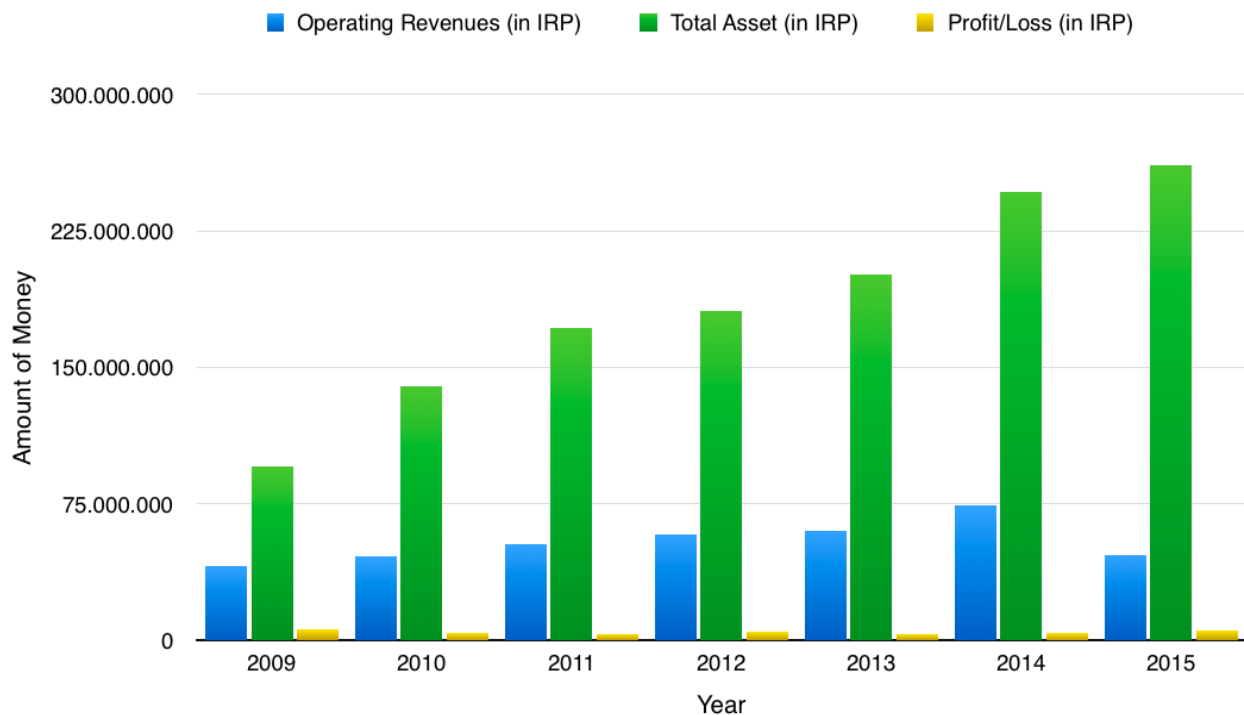
449 BPPSPAM – Badan Pendukung Pengembangan Sistem Penyediaan Air Minum (Engl.: Development Support Agency of Water Supply System), “PDAM Tirta Raharja Akan Naikkan Tarif” (PDAM Tirta Raharja Will Raise Rates), *BPPSPAM* (14.03.2013), http://www.bppspam.com/index.php?option=com_content&view=article&id=726:pdam-tirta-rahharja-akan-naikkan-tarif&catid=34:bam&Itemid=99 (accessed: 28.06.2016); c.f.: Nababan (2014), p.:172.

450 Nababan (2014), p.:171.

451 Trading Economics. “Indonesia Inflation Rate,” (2016) <http://www.tradingeconomics.com/indonesia/inflation-cpi> (accessed: 01.07.2016).

452 Created by author by the means of PDAM Tirta Raharja, “Aspek Keuangan” (Engl.: Financial Aspects), *PDAM Tirta Raharja*, under “Perkembangan Usaha” (Engl.: Business Developments), <http://www.tirtaraharja.co.id/perkembangan/kategori/aspek-keuangan> (accessed: 28.06.2016).

Illustration 17: PDAM Tirta Raharja's Financial Performance⁴⁵³



In terms of investment the PDAM does not disclose any data or information, nor any information regarding the type of technology used to treat water or any information about development or introduction of new technologies. Considering the low equity rate and slow expansion of pipe network, it is anticipated that the focus of investment is in repairments and further development of the pipe grid. Illustration 18 demonstrates how the number of PDAM officers per 1000 customers has declined over the past nine years. Still, the amount of subscribers divided by officers per subscribers from 2009-2015 results in a doubling of employees within this time frame. The productivity of employees increased, according to Titra Raharja. This ratio of employees per production in IRP per year is illustrated in table 26 in numbers and in illustration 19 in a graph.

⁴⁵³ Ibid.

Illustration 18: Ratio of Officers per 1000 customers⁴⁵⁴

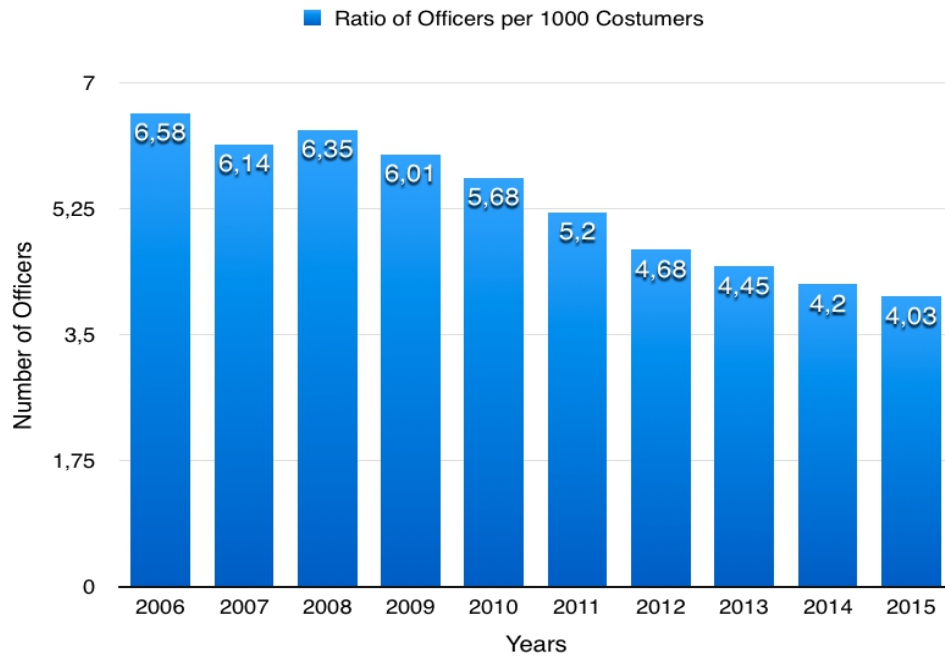


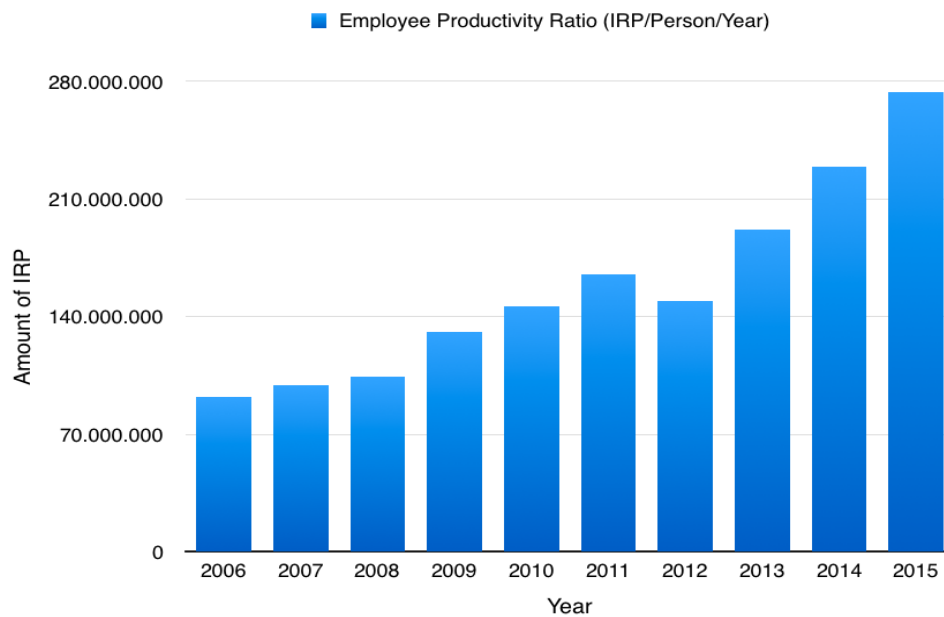
Table 26: Employee Productivity Ratio⁴⁵⁵

Year	Employee Productivity Ratio (IRP/Person/Year)
2006	92.357.900
2007	99.190.708
2008	104.535.314
2009	131.041.060
2010	145.869.538
2011	165.415.165
2012	149.237.686
2013	191.551.338
2014	229.358.501
2015	273.514.366

⁴⁵⁴ Created by author by the means of PDAM Tirta Raharja, “Aspek Manajemen” (Engl.: Management Aspects), *PDAM Tirta Raharja*, under “Perkembangan Usaha” (Engl.: Business Developments), <http://www.tirtaraharja.co.id/perkembangan/detail/rasio-pegawai-per-1000-pelanggan> (accessed: 28.06.2016).

⁴⁵⁵ Ibid.

Illustration 19: Employee Productivity Ratio⁴⁵⁶



Overall, we see a lack of cooperation between the stakeholders and disadvantages of some parties due to decentralization and the new decision processes. Cimahi City, as a stakeholder, does not have the authority to participate in decision making processes. Furthermore, a superior authority, which could intervene and act as a mediator in order to provide water for all inhabitants, is not present. Although, Cimahi City urges for more water supply, ownership rights and influence, Bandung regency continues to deny the city such privileges.⁴⁵⁷

Indonesia Case Study 2: Thames Water and Suez Lyonnaise de Eaux

As already described in chapter 5.2.1, Thames Water and Suez Lyonnaise de Eaux where the two private partners (PP) to sign the CA with Jakarta's own water treatment enterprise PAM Jaya, which allows the two companies to operate plants, develop technology/network and transfer water. Because of regime change and East Asian Financial Crisis, the CA was revise in 1998 and restated in 2001. However, the termination year of CA (2022) was not changed. In the following, we will also examine the content of CA, since crucial issues arise from its rights and duties. One of the first clauses of CA we should look into is Clause 47, which states that the parties should treat their commercial and technical data confidentially.⁴⁵⁸ As result, only little information is accessible. Furthermore, data to Palyja is found more easily than TPJ's. Hence, in the following we will focus

⁴⁵⁶ Ibid.

⁴⁵⁷ Nababan (2014), p.:173.

⁴⁵⁸ Wijanto Hadipuro and Nila Ardianie. "Critical Review of Jakarta Water concession contract." *AMRTA Institute for Water Literacy and Public Services International* (01.07.2007), p.: 5.

more on Palyja.

Before the CA, Jakarta's own PAM Jaya was fully responsible for Jakarta's water supply. In order to improve water supply and infrastructure, PAM Jaya needed to invest a significant amount of money for the following 25 years to achieve proper coverage and development of a pipeline network. Hence, it was believed that PAM Jaya itself would not have the capacity to invest, whereas international private companies would have the necessary resources.⁴⁵⁹ In literature water privatization is described to have rather negative effects on a country's water supply, such as increase of water tariffs, lack of accountability, no or limited access to clean water for the poor, no or little investment/development of water pipes due to profit orientation of private companies, job reduction for efficiency, which affects service quality, and more expenditure on the side of the state.⁴⁶⁰ Nonetheless, due to the Instruction of Minister of Home Affairs No. 21/1996 PAM Jaya needed to be linked with Palyja and TPJ via CA.⁴⁶¹ According to the 21/1996 instruction, the CA (clause 2.2.) has its purpose in development of water infrastructure, improvement of distribution, assurance of quantity, quality and continuity of water services, and reduction of non-revenue water.⁴⁶²

The PP obtains the single right to provide water service for Jakarta's citizens.⁴⁶³ As mentioned previously in the history part, PT PAM Lyonnaise Jaya (Palyja) operates in the Western part of Ciliwung River, while PT Thames PAM Jaya (TPJ) is in charge of the Eastern side of Jakarta. With his company, PT Kekarpola Airindo, Soeharto's son Sigit Harjojudanto acquired 20% of PT Kekarpola Thames Airindo's (KATI) while Thames Water Overseas Ltd. Had the other 80% of shares.⁴⁶⁴ However, after the 1998 renegotiations, CA KATI was renamed PT Thames PAM Jaya (TPJ). Furthermore, Harjojudanto's company, PT Kekarpola Airindo, kept 5% while 95% were obtained by Thames Water Overseas Ltd, which was later taken over by the German utility company RWE in 2001.⁴⁶⁵ Only five years later, RWE sold Thames Water Holdings to Kemble Water Ltd on 1st of December 2006 for 7,2 billion EUR.⁴⁶⁶ In the case of Palyja, which was

459 Nila Ardhanie and Ifran Zamzami, "No Pro-poor Agenda in Jakarta Water Concession," *AMRTA Institute for Water Literacy*, (21.10.2010), p.: 3.

460 PSI (Public Service International), "The Impact of Water Privatization in Jakarta," *PSI, TNI (Transnational Institute), AMRTA Institute for Water Literacy, SP-PDAM Jakarta (Jakarta's Water Trade Union)*, (01.01.2015), p.:1; Mildred E. Warner, "Water Privatization Does Not Yield Cost Savings," *TNI (Transnational Institute)*, (22.03.2011), p.: 2.

461 Hadipuro and Ardhanie (2007), p.: 5.

462 PSI (Public Service International), "The Unfair Cooperation Agreement on Water Privatization," *PSI, TNI (Transnational Institute), AMRTA Institute for Water Literacy, SP-PDAM Jakarta (Jakarta's Water Trade Union)*, (01.01.2015), p.: 2.

463 Nila Ardhanie and Ifran Zamzami (2010), p.: 3.

464 Hadipuro and Ardhanie (2007), p.: 2.

465 Ibid.

466 C.f.: RWE, "RWE completes sale of Thames Water Holdings plc to Kemble Water Limited," *RWE (Essen:*

perviously called PT Garuda Dipta Semesta (GDS) and was owned 40% by Suez Lyonnaise des Eaux and 60% by Anthony Salim, the son of Soeharto's companion, and his company PT Elang Sakti Prabawa. Yet after the new CA took effect in 2001, Suez Lyonnaise des Eaux held 100% of the shares and thus GDS was renamed PT PAM Lyonnaise Jaya (Palyja).⁴⁶⁷ Suez later merged with the Czech utility group Ondeo. According to CA Art. 7 (2001), each of the international concessionaires needs an Indonesian company as a second party: PT Bangun Tjipta Sarana was allotted to Palyja and PT Tera Meta Phora to TPJ.⁴⁶⁸ Besides the fact of those companies' allocation, no reports or other announcement are know regarding those companies. Instead Suez sold 30% of shares to PT Astratel Nusantara (Indonesian) and 19% to Citigroup Financial Product Inc (U.S. American) in 2006.⁴⁶⁹ In the same year Thames water sold 91% of its shares to Acuatico, an Indonesian consortium of ReCapital Advisors and Glendale Partners.⁴⁷⁰ Henceforth, TPJ was renamed to PT Aetra Air Jakarta (Aetra). For the sake of continuity and since the majority of literature sources still uses the old name TPJ, we will continue to use TPJ. Overall, the two international PPs are holding the ownership of the operational sites.

Although PPs acquired the ownership of Palyja/TPJ and have the duty to provide water to Jakarta's citizen, there are four major issues arising from the allocated competencies. One issue is the employees of the two sites. Before the renegotiation a dualism of management of employees system was present, as all employees belong to PAM Jaya but were assigned to work with PP.⁴⁷¹ After the renegotiations in 2001, employees were either assigned to PAM Jaya or they were assigned to a PP. The company then became the actual employer and employees had to follow the company's management not PAM Jaya's. The employees receive a different salary and have different contract termination rights. For instance, while it is difficult to fire an PDAM employee (PAM Jaya), a PP's employee is unemployed at the latest in 2022 when the CA expires. PAM Jaya's employees comply to the Letter of Decree of Minister of Home Affairs No. 34/2000; and PP's employees comply with the regulations of the Department of Manpower.⁴⁷² As a consequence, employees who might work together, but are assigned to different companies, can have different rights, and can be managed by different directors in order to pursue a single management of employees, as the new CA demands.⁴⁷³ The disadvantage for the PPs of the new CA in regard to

01.12.2006), under "Press – Archive," <http://www.rwe.com/web/cms/en/113648/rwe/press-news/press-release/?pmid=4001446> (accessed: 11.07.2016).

467 Hadipuro and Ardhanie (2007), p.: 2.

468 Ibid.

469 Palyja, "Annual Report 2011," *PT PAM Lyonnaise Jaya* (2011), p.: 6.

470 C.f.: Global Water Intelligence (GWI), "Thames Continues Asian Exit Plan – Buyout firms seek to reassure regulator as PAM Jaya sale goes ahead," *GWI* Vol.7, No.10 (October 2006).

471 Hadipuro and Ardhanie (2007), p.: 16.

472 Ibid.

473 Ibid.

employee management, is that all PP's assigned employees are allocated permanently and PP cannot change their income, type of employment, or career opportunities.⁴⁷⁴

The second issue is an unbalanced payment mechanism. The basic procedure is the distinction between water tariffs and water charges. Water tariffs are paid by costumers to the PDAM – in our case Palyja or TPJ. Water charges, on the other side, are paid by PAM Jaya to the PPs. According to CA Clause 27, PP's revenue is not based on water tariffs but on water charges.⁴⁷⁵ The following is the water charge formula according to clause 27:

$$C_n = [C_o \times \{(F_n \times G_n) + (H_n \times O_n)\}] + K_{sn} + K_{in}^{476}$$

C: water charge

n and **o**: period of water charge

F: quality and capital cost allocation

H: quality of operation cost allocation

F+H=1

G: coefficient of adjustment on the private partner's capital cost of which 80% is influenced by the construction index and the other 20% by consumer price

O: coefficient of adjustment on the private partner's operational cost

K_{sn}: compensation for variation on rupiah exchange value against foreign currency

K_{in}: compensation for variation on interest level

Specifically interesting are the K components and the O variable. K secures the PPs from any monetary changes such as inflation fluctuations or interest value. The O element, is the most cunning part and has its own formula:

$$O_n = a_n (L_n)/L_o + b_n (X_n)/X_o + c_n (E_n)/E_o + d_n (M_n)/M_o + e_n (B_n)/B_o + f_n (N_n)/N_o + g_n (T_n)/T_o^{477}$$

L: index of manpower (annual average cost [basic salary, allowance, pension, insurance, income tax] for the last 12 months of an employee)

X: index of chemistry material

E: index of electricity power

M: index of material

B: index of basic water

N: index of purchasing clean water via meter inter areas

T: index of purchasing clean water

⁴⁷⁴ Ibid.

⁴⁷⁵ Ibid. p.: 9.

⁴⁷⁶ Ibid. p.: 10.

⁴⁷⁷ Ibid.

As we can see all changes in the costs of PPs are included in water charges. Hence, all risks or unknown components are transferred to PAM Jaya via water charges. Therefore, PPs do not take any risk but only gain from the CA. Moreover, a report from Supreme Audit Agency (BPK) uncovered illegal costs claiming on part of the PPs such as school fees of operators children, personal travel, house rental and flood insurance.⁴⁷⁸ As PAM Jaya has to compensate for the accrued shortfalls of PPs, employees do not receive a higher salary, because this would be followed by an increase in water charges and thus higher shortfalls. Furthermore, water charges are adjusted if there is a change in taxes for the PP, according to Clause 38.5 of CA.⁴⁷⁹ This results in a loss for the company. In case of natural disaster such as a flood, drought or other emergency, PAM Jaya is obligated to acknowledge PP's newly accumulated costs as a debt of PAM Jaya to PP, or PP provides the money in terms of a loan.⁴⁸⁰

In Article 28.1 of CA the initial water charge price was determined at 2.400 IRP/m³ on the first of April 2001, but the water tariff was at 1.700 IRP/m³ as it was in 1997.⁴⁸¹ This makes up a difference of 700 IRP/m³, which was set already in the beginning of the agreement. Semarang City, another city in Central Java, reached about the same water tariff of 1.800 IRP/m³ in 2008 – only eleven years later.⁴⁸² In 2012 Jakarta had by far the highest water tariff in Indonesia as table 27 illustrates. Since the CA in 1998 and 2015 have been signed, the water tariffs in Jakarta were raised ten times, which has led to a average water tariff of 7.800 IRP/m³. Particularly, between 2004 and 2007 water tariffs increased four times due to the *Automatic Tariff Adjustment* policy, which instructs a raise of tariffs every six months.⁴⁸³ This policy passed due to a decision letter of Jakarta's governor and prearrangement of Jakarta's legislature. This is an example of how the water charge is raised according to the above written formula; an increase of water tariffs, however, has to be approved by the governor of Jakarta. A second *Automatic Tariff Adjustment* was discussed, but not executed since people could not afford higher water prices.

478 PSI (Public Service International), “The Impact of Water Privatization in Jakarta,” PSI, TNI (Transnational Institute), AMRTA Institute for Water Literacy, SP-PDAM Jakarta (Jakarta's Water Trade Union), (01.01.2015), p.:1.

479 PSI (Public Service International), “The Unfair Cooperation Agreement on Water Privatization,” PSI, TNI (Transnational Institute), AMRTA Institute for Water Literacy, SP-PDAM Jakarta (Jakarta's Water Trade Union), (01.01.2015), p.:2.

480 Ibid.

481 Ibid. p.: 1; PSI (Public Service International), “The Impact of Water Privatization in Jakarta,” PSI, TNI (Transnational Institute), AMRTA Institute for Water Literacy, SP-PDAM Jakarta (Jakarta's Water Trade Union), (01.01.2015), p.:1.

482 Nila Ardhanie and Ifran Zamzami (2010), p.: 5.

483 PSI (Public Service International), “The Impact of Water Privatization in Jakarta,” PSI, TNI (Transnational Institute), AMRTA Institute for Water Literacy, SP-PDAM Jakarta (Jakarta's Water Trade Union), (01.01.2015), p.:1.

Table 27: Water Tariffs, NRW & Coverage of Indonesian Cities in 2015⁴⁸⁴

City	Water Tariff (in IRP/m ³)	NRW Rate in %	Service Coverage Rate in %
Jakarta	7.800	45	46
Surabaya	2.800	34	87
Medan	2.300	27	69
Palembang	3.800	30	93
Malang	4.000	30	84
Banjarmasin	4.120	26	100

Water charges were raised merely six times since the privatization, leaving water tariffs always higher than water charges.⁴⁸⁵ This leads to shortfalls PAM Jaya has to compensate for. Especially the lowest tariff group, which pays the least, has to be paid the most for by PAM Jaya – increasing its debt to PP. For instance, while the tariff was 1.050 IRP/m³ for the lowest tariff class in 2009, the water charge was at 7.125 IRP/m³ resulting in 6.075 IRP/m³ debt for PAM Jaya.⁴⁸⁶ According to Andreas Lako and Nila Ardhianie, the transfer of water charges were even higher (7.542 IRP/m³) in 2009. Table 28 displays water charges between 2004 and 2009. Water charge debt of PAM Jaya to Palyja has accumulated around 220 billion IRP by 2008 and around 255 billion IRP to TPJ.⁴⁸⁷ The total estimated debt is around 18.2 trillion IRP to PP with an additional debt of ca. 123-125 billion IRP per year.⁴⁸⁸ Yet the amount of water charge is not related to PP's performance, but to the formula. The amount of water charge has to be negotiated by PAM Jaya, because it cannot keep up with the increasing water charges while water tariffs stay low. Generally, the water tariff is about 25-33.5% higher than productions costs for the PP.⁴⁸⁹ Water charge is even higher than water tariff. The incentive to extend services and the pipe line network to poor areas of Jakarta becomes low. The performance of PPs, however, is inadequate in comparison to other cities in Indonesia. Jakarta has the highest water tariffs, the highest NRW rate, and the lowest coverage rates as shown in table 27.

484 Created by author by the means of PSI (Public Service International), “The Reliable Performance of Public Waste Water Services,” *PSI, TNI (Transnational Institute), AMRTA Institute for Water Literacy, SP-PDAM Jakarta (Jakarta's Water Trade Union)*, (01.01.2015), p.:1.

485 C.f.: Nila Ardhianie and Ifran Zamzami (2010), p.:6

486 Ibid. p.: 7.

487 Andreas Lako and Nila Ardhianie, “Jakarta Water Privatization: Financial Machination and the Impact to the Customers,” *AMRTA Institute for Water Literacy, PSI (Public Service International), KruHa (People Coalition for Rights to Water)*, (31.01.2010), p.: 7; Nila Ardhianie and Ifran Zamzami (2010), p.:7.

488 Zamzami (March 2012), p.: 2; Hadipuro and Ardhianie (2007), p.: 8.

489 Ibid. p.: 4.

Table 28: Water Charge 2004-2009⁴⁹⁰

Year	Water Charge (in IRP/m ³)
2004	4.257,6
2005	4.997
2006	5.627
2007	6.407
2008	7.003
2009	7.542

According to Lako and Ardhianie, the PPs display another pattern of behavior. Namely, the exploitation of its customers and PAM Jaya. It becomes a seemingly perfidious strategy of making debt to creditors, while PAM Jaya and customers are burdened in order to increase the PP's equity value.⁴⁹¹ As already mentioned, PPs were selected due to the concern of not having enough capacity, namely 646.235.274.767 IRP, to sustain and develop water supply in Jakarta. The PP, however, were financed by a loan from the European Investment Bank; Palyja particularly received an additional loan from Calyon Merchant Investment bank – amounting a total sum of 644.761.756.833 IRP.⁴⁹² Therefore, the PPs had merely paid with own assets. Thus, the argument that private operators were needed due to their capacity does not hold.. When the loan from Calyon bank was due in 2005, Palyja sold bonds amounting to 60 billion IRP in order to finance its corporate debt.⁴⁹³ Yet, those bonds were from public funds and not the corporation's own as PPs have a maintenance, operation and development contract. But they do not hold a proprietorship. Another 455 billion loan was issued by ADB with a condition of disbursement in 2008, which has been used to pay other matured debts in lieu of invest into development and improvement of infrastructure and service.⁴⁹⁴ Additionally, PPs keep insisting on higher tariffs. Lako and Ardhianie link the increases over the last years to matured loans or payout of bonds of Palyja.⁴⁹⁵ Since tariffs are not raised in the same frequency as Palyja would like, the PP has taken up another method to increase its income and assets. Palyja readjusts its customer cluster: low classified customers are rearranged to belong to a higher tariff group even though the service of Palyja and consumption

490 Created by author according to Andreas Lako and Nila Ardhianie, (31.01.2010), p.: 6.

491 C.f.: Lako and Ardhianie (2010), pp.: 8.

492 Ibid. pp.: 8 et seqq.; Hadipuro and Ardhianie (2007), p.: 11.

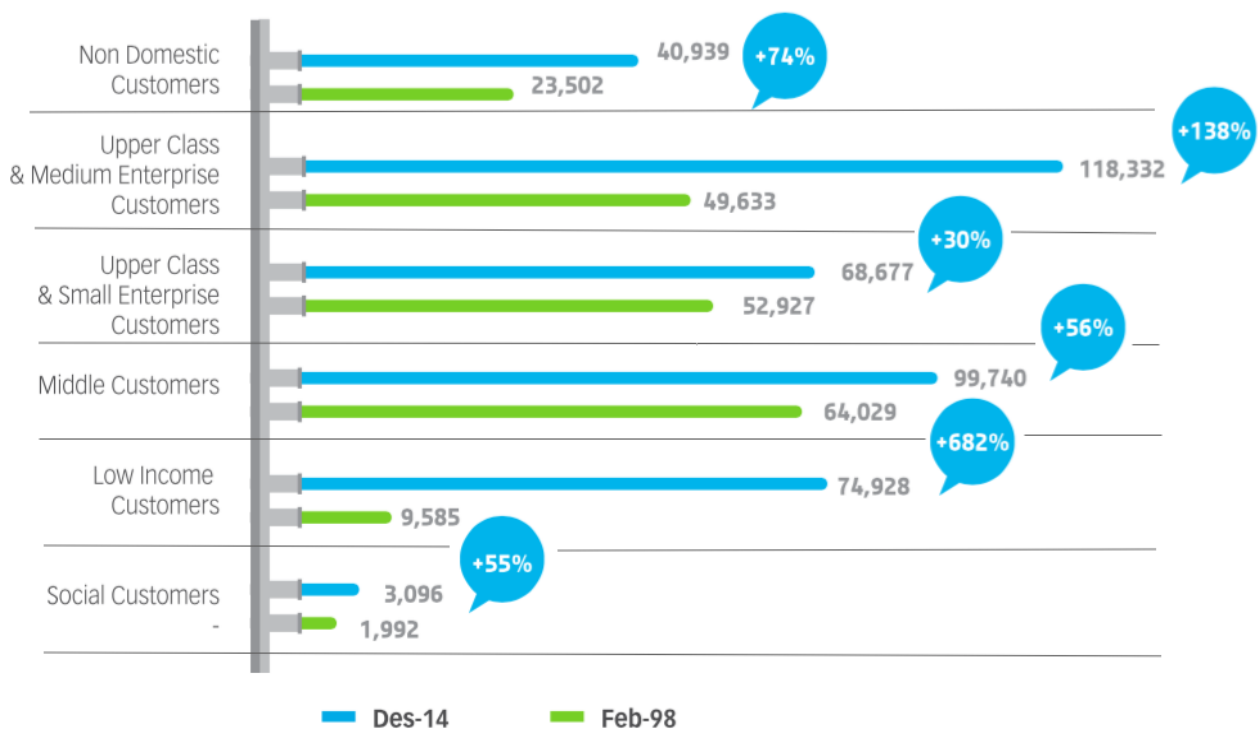
493 Lako and Ardhianie (2010), p.:9.

494 Ibid.

495 C.f.: Ibid. pp.: 8 et seqq.

does not change.⁴⁹⁶ Illustration 20 below shows the alternation of different types of customers in comparison of 1998 to 2014. The “low income customers” visibly grew the most. Still, the “upper class & medium enterprise customers” as well as “non domestic customers,” show the second and third biggest enlargement. Those tariff groups are considered to pay the highest tariffs. Illustration 21 displays the overall increase of all customers up to 2014. In those 16 years, the total number doubled and with it the company's revenue and total assets rose. Table 29 and illustration 21 depict the changes of the company's total assets, net revenue, and net income over a seven year period of time. While total assets increased by 50,5 % and net revenue rose by 38,8%, the net income increase by 62,3% between 2007 and 2014.

Illustration 20: Customer Cluster of Palyja⁴⁹⁷



⁴⁹⁶ C.f.: *ibid*, p.: 9 et seqq.

⁴⁹⁷ Adjusted by author; Palyja, “Annual Report 2014 – Committed to be the Best,” *PT PAM Lyonnaise Jaya* (2014), p.: 60.

Illustration 21: Palyja's Customers 1998-2014⁴⁹⁸

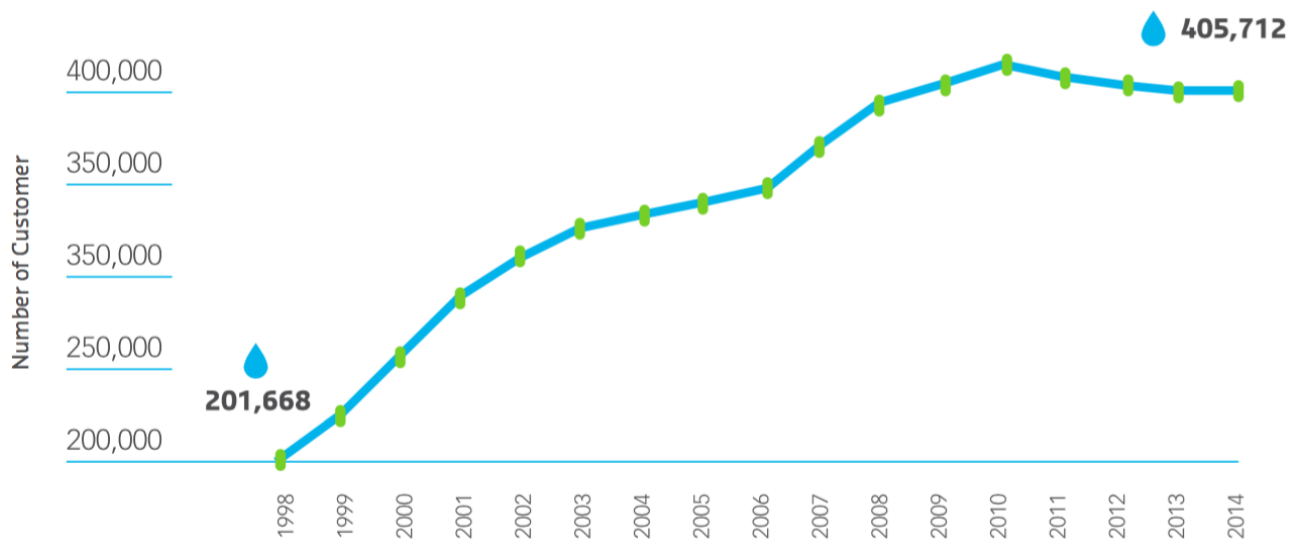


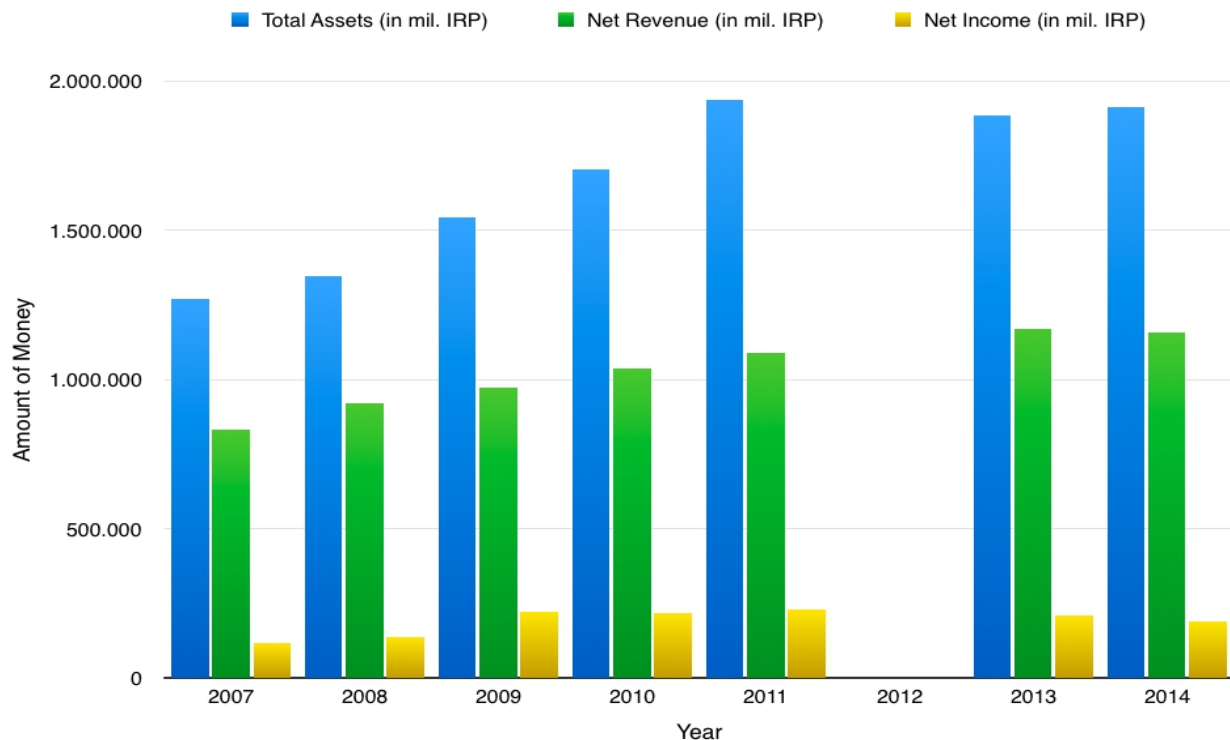
Table 29: Total Asset, Net Revenue, Net Income⁴⁹⁹

Year	Total Assets (in mil. IRP)	Net Revenue (in mil. IRP)	Net Income (in mil. IRP)
2007	1.269.019	833.271	118.104
2008	1.346.914	920.001	136.820
2009	1.541.967	974.198	222.384
2010	1.704.797	1.036.580	216.131
2011	1.936.801	1.087.887	230.548
2012	-	-	-
2013	1.883.408	1.169.425	210.386
2014	1.910.459	1.156.923	191.737

⁴⁹⁸ Palyja, "Annual Report 2014 – Committed to be the Best," *Palyja* (2014), p.: 60.

⁴⁹⁹ Created by author by the means of: Palyja, "Annual Report 2011," *PT PAM Lyonnaise Jaya* (2011), pp.: 12; Palyja, "Annual Report 2014 – Committed to be the Best," *PT PAM Lyonnaise Jaya* (2014), pp.: 12 et seqq.

Illustration 22: Total Asset, Net Revenue, Net Income⁵⁰⁰



The growth of total assets reassures debtors and investors of Palyja's enhancement in value and increase in financial performance, allowing Palyja to receive even higher loans. However, the PP's assets are largely made up of debt, which continues to increase with time as taking on more debt is the company's strategy to handle costs. After the concession ends, PAM Jaya is obliged to take over Palyja's debts. Despite the increase in revenue, the PP's contribution in form of capital did not change since 1998, it is still 200.630 billion IRP.⁵⁰¹ Consequently, PP's share of percental capital contribution diminishes every year. By 2014 it was merely 10,5% of the company's asset. According to Clause 27.1, PP's internal rate of return is fixed at 22%, meaning that the shareholders of Palyja will continuously receive growing earnings per share correlating to revenue augmentation. Indonesia's Financial and Development Supervisory Agency (BPKP = Badan Pengawasan Keuangan dan Pembangunan) advocates an internal rate of return of 14,68%.⁵⁰² Although the Presidential Regulation No. 67/2005 emphasizes that profits of CA should be mutually distributed and equally shared, PAM Jaya is in a evidently disadvantaged position, bearing all the risk of PP.⁵⁰³ The monthly revenue, however, cannot cover the water charge. Yet, PAM Jaya has paid a 55% share

⁵⁰⁰ Ibid.

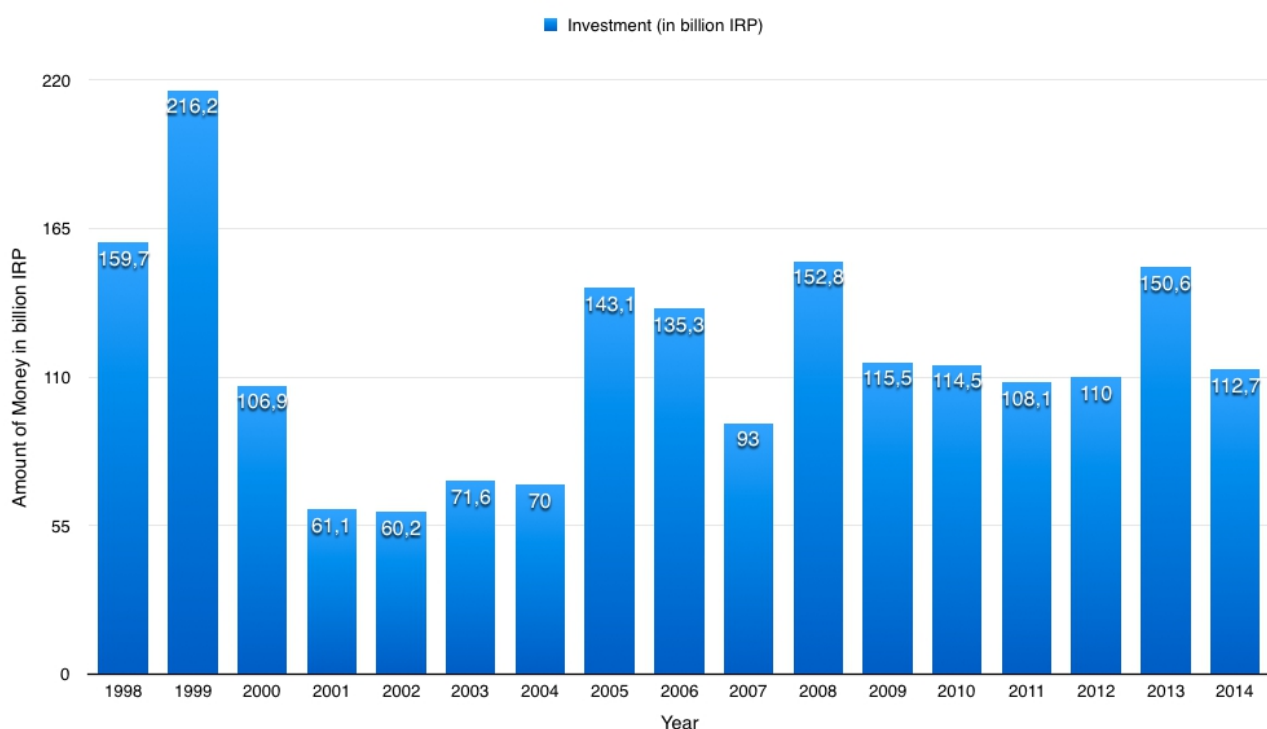
⁵⁰¹ Hadipuro and Ardhanie (2007), p.: 11.

⁵⁰² PSI (Public Service International). "The Unfair Cooperation Agreement on Water Privatization." *PSI, TNI (Transnational Institute), AMRTA Institute for Water Literacy, SP-PDAM Jakarta (Jakarta's Water Trade Union)*, (01.01.2015), p.: 2.

⁵⁰³ C.f.: Hadipuro and Ardhanie (2007), p.: 5.

of revenue to the local government of Jakarta, as it is the case for other PDAMs as well. Therefore, this regulation shows no effectiveness. Furthermore, Lako and Ardhianie have discovered that the PP has cut investments when tariffs were increased, as it was the case in 2009: from the initially planned 200 billion IRP of investment capital, the number was reduced to 100 billion IRP.⁵⁰⁴ Illustration 23 shows Palyja's total investment of 1.983,3 billion IRP over 17 years. Despite steadily increasing amount of customers, assets and income, the investments were kept comparably low, and sometimes even partially decreased.

Illustration 23: Investments 1998-2014⁵⁰⁵



The third issue of competency is the adjustments of targets/performance of PPs. According to Palyja, it was able to reach a service coverage area of 64,7% by 2010 as we can see in illustration 24 below. In 2013, according to PDAM Jaya director Sriwidayanto Kaderi, the target of 66,73% was not met by 7,72% as mere 59,01% of coverage was reached.⁵⁰⁶ Hence, 40,99% of the area does not have access to drinking water. Illustration 24, however, shows that 59% coverage was already

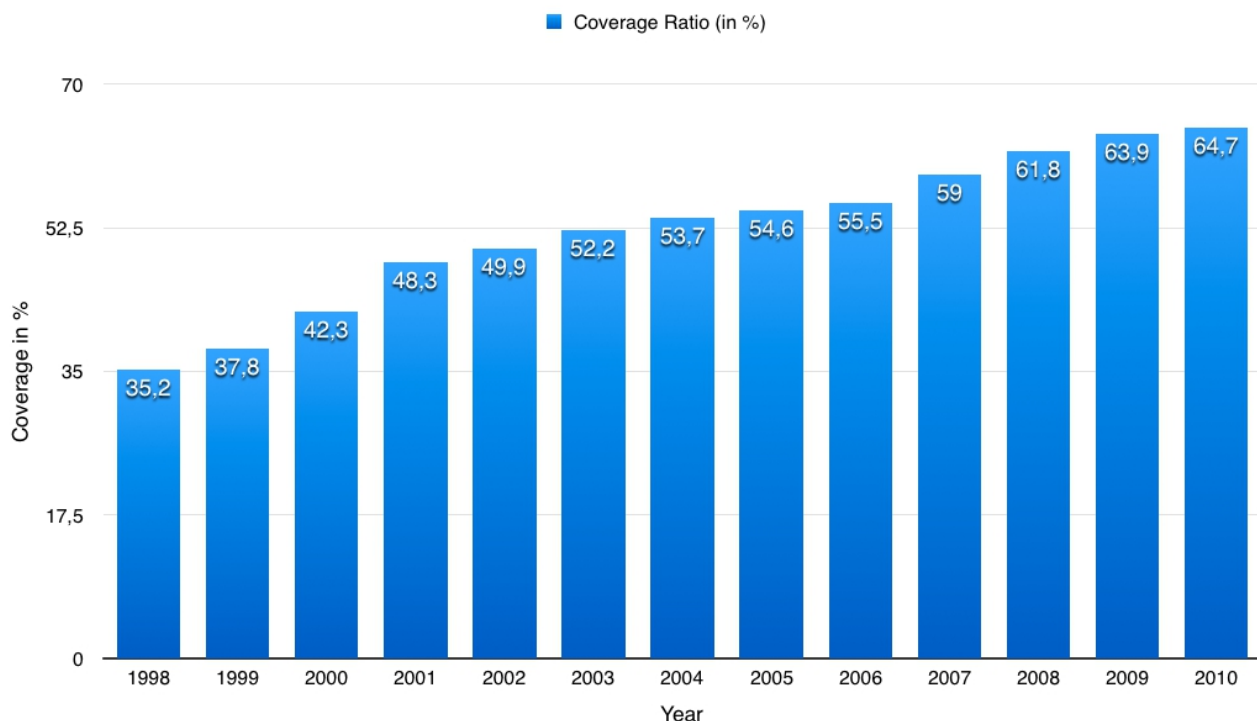
⁵⁰⁴ Lako and Ardhianie (2010), p.: 12.

⁵⁰⁵ Created by author by the means of Palyja, "Annual Report 2011," *PT PAM Lyonnaise Jaya* (2011), p.: 48.

⁵⁰⁶ JPNN, "Nearly 40 Thousand 'Dead Water' Complaints by Jakarta Residents (Hampir 40 Ribu Warga Jakarta Keluhkan Air Mati)," *PT. Jawa Pos Grup Multimedia*, (published: 30.12.2013 at 20.46 o'clock), <http://www.jpnn.com/read/2013/12/30/208221/Hampir-40-Ribu-Warga-Jakarta-Keluhkan-Air-Mati-> (accessed: 18.07.2016).

reached in 2007. The discrepancy derives from a miscalculation by Palyja. The PP uses the factor of 7.6 per household for the calculation of persons served by one unit of house connection, while Indonesia's Statistics Department states that no more than 5.0 persons per household can be anticipated.⁵⁰⁷ The actual coverage is exaggerated by 51,99% from the original coverage rate. Therefore, instead of a coverage of 64,7% in 2010 the actual coverage was 42,6%. Since it is not apparent when the Statistics department changed the person per household factor, it is assumed that at the time of concession in 1998 the coverage rate was actually at 35,2%. Therefore, the improvement of service since 1998 is meager, even if the wrongly calculated percentage is taken as point of reference.

Illustration 24: Coverage Ratio of Palyja⁵⁰⁸



The PPs, in general, have rarely reached the set targets. While Palyja reached their production targets in 2002, 2007, and 2008, TPJ was only able to reach its target in 2004.⁵⁰⁹ In 2008, for instance, the target was 287,84 million m³ for sold water volume, i.e. 234,31 million m³ for Palyja and 153,52 million m³ for TPJ. However, Palyja reached 134,509 million m³ and TPJ reached 123,44 million m³, amounting to 257,95 million m³.⁵¹⁰ The production volume increased, from 248

⁵⁰⁷ Ardhianie and Zamzami (2010), p.: 5.

⁵⁰⁸ Created by author by the means of Palyja, "Annual Report 2010," *PT PAM Lyonnaise Jaya* (2010), p.: 48

⁵⁰⁹ Ardhianie and Zamzami (2010), p.: 4.

⁵¹⁰ Ibid. p.: 5.

million m³ in 2009 to 257 million m³ in 2010 to 269 million m³ in 2014 with an average of 8.490 l/s.⁵¹¹ By the end of 2015 Palyja raised its production to 8.950 l/s, amounting together with TPJ (9.000 l/s) 17.950 l/s.⁵¹² Nonetheless, both production targets and coverage targets are not met. The cause for this inefficiency is mainly the high non-revenue water (NRW) rate, which lies at 44% average for TPJ and Palyja.⁵¹³ It should be noted that, the national average NRW is at 31%. In illustration 25 below, Palyja's course of NRW rate is depicted for the last ten years. The general NRW rate went down in this period. Still, the difference is merely 11% within a span of ten years. This results in 0,9% improvement of NRW rate per year. Even 39,5% NRW in 2014 is 8 times higher than the NRW in Singapore. This demonstrates that from the production of 269 million m³ in 2014 106.524.000 m³ are lost through leakages. Furthermore, PAM Jaya performance evaluation identified various complaints against the private operators due to broken pipes, low water quality or no water at all. Palyja, for instance has received 4.968 complaints due to a broken pipe, 15.741 complaints for no running water and 1.960 complaints for low quality of water in 2007 alone.⁵¹⁴ By 2013 the total complaint number reached 40.000 within a year.⁵¹⁵ Water outage can last for hours or even days, while other report that water runs only for about an hour from 2-3 AM in the morning; with such a low stream pressure that 2 buckets of water can be barely filled.⁵¹⁶ As a result, citizens are forced to buy water from other sources such as refilled bucket water, which has an even lower quality than PDAM water and it costs more. The suffering customers are the poor. They live in deficiently covered areas and do not have the means to take action against the private operators.

511 Palyja, "Annual Report 2010," PT PAM Lyonnaise Jaya (2010), p.: 47; Palyja, "Annual Report 2014 – Committed to be the Best," PT PAM Lyonnaise Jaya (2014), pp.: 39, 43.

512 PAM Jaya, "Production," *PAM Jaya* (28.05.2015), under "Info Service," <http://pamjaya.co.id/pages/info-layanan/produksi> (accessed: 18.07.2016).

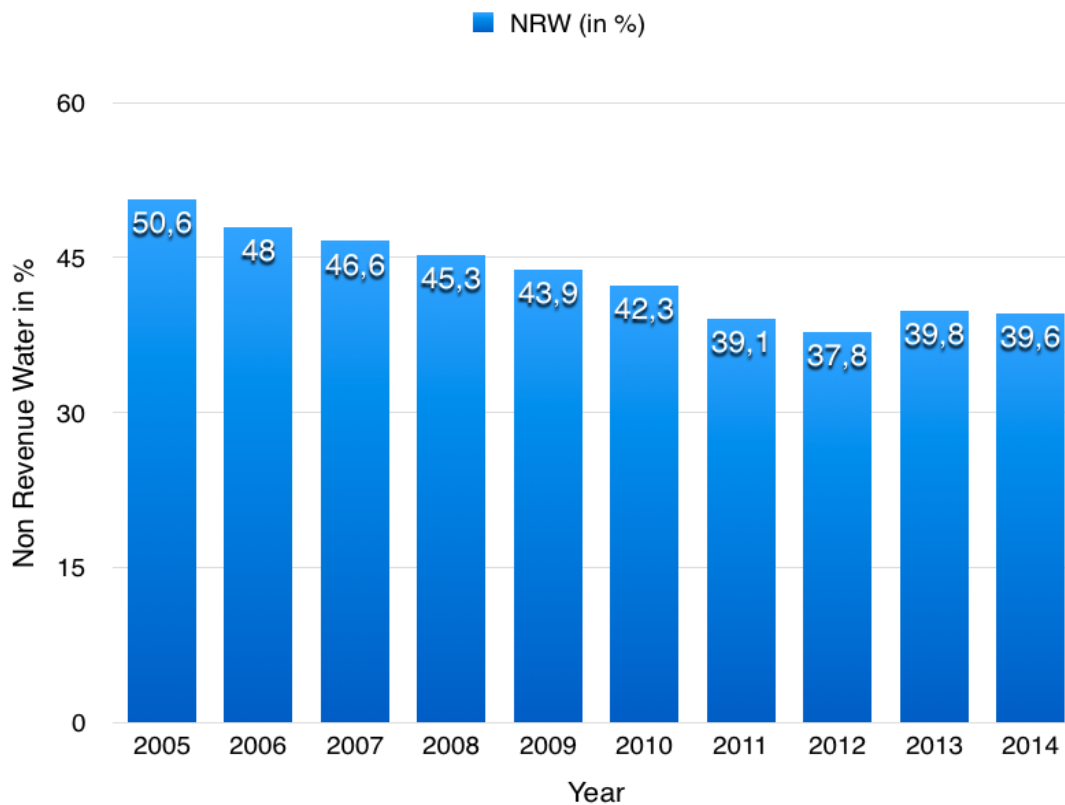
513 Tempo, "PDAM Jakarta Kehilangan 7.500 Meter Kubik Air Per Detik (Jakarta PDAM Water Loses 7500 Cubic Meters Per Second)," *Tempo.co* (published: 16.03.2013 at 18.13 o'clock), <https://m.tempo.co/read/news/2013/03/16/090467457/pdam-jakarta-kehilangan-7-500-meter-kubik-air-per-detik> (accessed: 18.06.2016).

514 Hadipuro and Ardhianie (2007), p.: 7.

515 PSI (Public Service International), "The Impact of Water Privatization in Jakarta," PSI, TNI (Transnational Institute), AMRTA Institute for Water Literacy, SP-PDAM Jakarta (Jakarta's Water Trade Union), (01.01.2015), p.:1.

516 Ardhianie and Zamzami (2010), p.: 2.

Illustration 25: NRW Palyja⁵¹⁷



Even though PPs have not reached their set targets, it is important to note that, due to the CA private operators have the power to change their targets. Hence, as the internal process of PPs lacks transparency, we cannot say how often the target was changed or how high the initial target was. Five clauses of CA allow the PP to adjust its target:⁵¹⁸

1. Clause 20: Technical and service targets can be revised in case of deviation of financial realization and projection of the PP.
2. Clause 24.1: Adjustments of technical and service targets can be made, if PP's investment plan for maintenance and operation differ from general annual financial projection.
3. Clause 11: If suppliers of raw water (e.g.: PDAM Tirta Kerta Raharja) are in any way restricted to provide their supply to PP, targets can be adjusted.
4. Clause 12c: In the case of unsuccessful closing of private wells, where a PP can provide water, technical and service targets can be adapted.
5. Clause 26.6: If retribution for customers change and their demand for water is effected, PP is

⁵¹⁷ Created by author by the means of Palyja, "Annual Report 2014 – Committed to be the Best," *PT PAM Lyonnaise Jaya* (2014), p.: 68.

⁵¹⁸ Hadipuro and Ardhanie (2007), p.: 9.

allowed to alter technical and service targets.

The fourth issue of competence is the termination peril of CA. As already mentioned before the CA will terminate in 2022. However, the conditions of the private operator's performance in comparison to their personal gain and the state loss (e.g.: shortfalls of PAM Jaya) imply to consider an early termination of the contract. The conditions of premature termination are also written down in the CA. There are five possible termination scenarios, which are described in CA:⁵¹⁹

1. **Natural termination (Clause 42.1a):** The cheapest way to end the CA is to let it end naturally since no cancellation fees are incurred. However, 18,2 trillion IDR of accumulated shortfalls will be due for payment.
2. **Force Majeure (Clause 41.2 or 49.3):** Under these clauses all unexpected events are covered, such as change of legislation, worker strikes, war, natural disaster, other environmental factors, or nationalization. In any case, if the supply of water becomes non economic, the CA will be terminated. As a consequence, PAM Jaya is obliged to pay a termination fee, which is composed of the net value of the PP's assets and the loan of PAM Jaya (accumulated shortfalls). Currently, this would amount to 5,9 trillion: 3,1 trillion IDR to Palyja and 2,8 trillion IDR to TPJ. PAM Jaya would gain, however, the opportunity costs for the years left to the natural termination, which would be about 380.000 billion IDR per year for both Palyja and TPJ.⁵²⁰ Thus, the opportunity costs for the next 6 years would possibly amount 2,280 trillion IDR.
3. **Termination by PAM Jaya (Clause 42.1 or 42.2):** Similar to the conditions of Force Majeure are the termination condition if PAM Jaya cancels the CA due to a PP's false promises resulting in illegality of CA or if a PP does not reach 70% of its yearly technical target. This cause or Force Majeure are the second least inexpensive way to terminate the CA.
4. **Termination by PP (Clause 42.5):** This termination can occur if PAM Jaya fails to pay the private operators, false declarations by PAM Jaya towards PP resulting in illegality of CA, or any activity of PAM Jaya which deprives PP of opportunities/benefits. PAM Jaya has to pay the termination fee, even though it is not the cancelling party. Furthermore, it has to pay 50% of the current net value of opportunity costs for the remaining time, which are calculated based on the average of two- year historical net profit and two-year projected net profit. This would accumulate to about 600.000 billion IDR for each PP. Thus, adding an

⁵¹⁹ Ibid. pp.: 12 et seqq.

⁵²⁰ Note: calculate with average net profit of Palyja from 2007-2014 of 190.000 billion IDR.

additional 1,2 trillion IDR to the 5,9 trillion IDR cancellation fee will result in a total cost for PAM Jaya of 7,1 trillion IDR. This option of termination is the second most expensive possibility to terminate.

5. **Buy-out of shares (Clause 43):** This option is given to PAM Jaya after 10 years of concession or from 2007 onwards. The calculation is, however, not for 50% but for 100% of the remaining time. Therefore, it would be 2,4 trillion IDR added to 5,9 trillion IDR of cancellation fee, amounting of total cost of 8,3 trillion IDR. This option is the most expensive cancellation methods.

In any case of termination, PAM Jaya is obligated to pay a significant sum of money. Besides the presented obligated costs, PAM Jaya will also need to pay the accumulated amount of shortfalls. The longer Jaya waits, the bigger this number will be. In general, these cancellation terms are not equally balanced between the parties. Whereas PAM Jaya has to pay in any case, the PP bears not costs at all, even if they would terminate the CA. The only reduction PAM Jaya would receive are the opportunity costs, which it would receive anyway without the CA.

As a consequence of low improvement rate and mismanagement, PAM Jaya and the PPs began to renegotiate the CA in 2011. However, as the negotiation process has been rather without progress, PP Suez called upon the Minister of Economic Affairs of Indonesia, the then Indonesian President Susilo Bambang Yudhoyono, and the French Prime Minister Francois Fillon.⁵²¹ In December 2011 PAM Jaya's director Maurits Napitupulu was removed from his office by the provincial government. Although there are no official statements that these two events are related to each other, it appears that the local government was pressured to intervene into the negotiation process due to pressure from higher domestic and external officials.⁵²² The negotiations were interrupted and not resumed again. However, on the 21st of November 2012 the NGO KMMSAJ (Indo.: Koalisi Masyarakat Menolak Swastanisasi Air Jakarta; English: people's coalition against water privatization in Jakarta) filed a lawsuit against the President of Indonesia, the Vice President, Finance Minister, Public Works Minister, and the Governor of Jakarta for the first time, as well as against the Jakarta House of Representatives, Jakarta Water Company's (PDAM) president director, and the two private operators Palyja and TPJ.⁵²³ They called for the termination of privatization of Jakarta's water. The complainant's explanatory statement is that the CA is violating Paragraph 33 of

⁵²¹ Zamzami, (March 2012), p.:2.

⁵²² Ibid.

⁵²³ KRuHA (Koalisi Rakyat untuk Hak atas Air; English: People's Coalition for the Rights to Water), "Taking back Public Water in Jakarta – Citizen Lawsuit Filed Against Water Privatization," *KRuHA* (21.11.2012; 17.53 o'clock), http://www.kruha.org/page/en/dinamic_detil/50/278/Press_Releases/Citizen_Lawsuit_Filed_Against_Water_Privatization.html (accessed: 03.08.2016).

the Constitution (State's ownership of natural resources), Law 7/2004 and other regional regulations of Jakarta.⁵²⁴ On the 24th of March 2015 the Central Jakarta District Court ruled the CA as null and void with the consequence of restitution of Jakarta's water to PAM Jaya following Bylaw No. 13/1992.⁵²⁵ The concessionaires are filing an appeal against the verdict, which leaves the court decision in abeyance.

Evident Rules

In Indonesia the state government pays a less significant roll than Singapore's government in regard to economic and technical entrepreneurship. Neither of the Indonesian case studies show any innovative development of technical development. Technical change is rather found in form of expansion of pipe network or leakage repair. In both case studies the government expects PDAMs and PP to provide water to Indonesia's population. Both are also legally bound by law/regulation or by contract. PDAMs are even obliged to generate profit. However, the state government has no explicit power to intervene as PDAMs are a matter of provincial government. Not all regencies have their own PDAM. Hence, they cannot make any intervention or demands towards those PDAMs responsible for their coverage area. Nonetheless, Indonesia has 57 regencies with a prospect of eight new ones. The general government has no power or overview of the water situation in each regency, as it has no competence to intervene. In case of Jakarta water, the CA was signed between PPs and PAM Jaya, which is assigned to Jakarta's local government. Therefore, PAM Jaya demands of PPs that they provide water and expand services. The CA was closed in the belief that PP were financially better positioned and thus would perform better. As we have learned from our case study, even PAM Jaya's hands are tied due to CA's thorny design in regard to target adjustments and termination terms. Consequently, the general government has not control over the overall water situation in Indonesia.

In terms of funding and financial latitude, PDAMs rely on its regency's budget while at the same time they generate their own profit. Parts of this profit are sent back to the local government. As a result the local PDAM itself has only a partial mandate over its financial capacity. In the case of Jakarta Water, the PPs have full custody of their financial situation. They receive external loans, make their own profit and are not obliged to share it, and even receive additional money through an unequal payment scheme of water charge and water tariff. PAM Jaya and thus Jakarta government

⁵²⁴ Ibid.

⁵²⁵ Corry Elyda, "Court Decision Ends Privatization of Water in Jakarta," *Jakarta Post* (24.03.2015; 22.30 o'clock), <http://www.thejakartapost.com/news/2015/03/24/court-decision-ends-privatization-water-jakarta.html> (accessed: 03.08.2016).

is depleted by the financial consequences of the CA.

PDAMs are managed by the local government. It holds ownership and thus decisional power over the PDAM. However, some cities or regions rely on the neighboring PDAM. In this cases, those cities or regions have no decision power nor ownership rights of the responsible PDAM. They are extradited to the decisions of their neighboring local government. The PPs, on the other hand, have full decision power and ownership rights for the period of the CA.

Through the case studies it becomes evident, that PDAMs as well as the PPs focus primarily on the provision of water and the extension of their network. However, low water quality signals a non-fulfillment of environmental needs. In both cases, the companies are profit-oriented and self-serving. Their planning is therefore mainly based on a short-term vision. For instance, PPs generate profit through issuing financial loans and bonds. Another example is the fact that the Bandung's local government does not consider Cimahi City in their decisions. This indicates short term thinking. Social needs are not met, as only high tariff customers are preferred, while water connections for the poor become less and less affordable as tariffs rise.

Table 30 below, summarizes the main findings of Indonesia's case study. Generally, we can say that the companies have more power than the state government. The latter is powerless in regard to the overall set of problems of Indonesia's water situation.

Table 30: Case Study Criteria – Indonesia⁵²⁶

Category	Indonesia	
Governmental Requirements	Yes/No: Yes, provide water for everyone & expand pipe network. PDAMs are additionally required to generate profit	Specification: The general government has no competence to intervene. It has not control over the overall water situation
Funding and Financial Latitude	Origin of funding: PDAMs are financially dependent on local government for its budget and controls only parts of its profit for PDAM; PP are self-funded	Financial Restriction: PDAM & PAM Jaya have to transfer part of their income to the local government; PP have no restrictions
Power of Decision (PoD) & Ownership Rights	Who obtains PoD & OR: local government has PoD over local existing PDAM; PPs have full ownership of facilities and management does not have required transparency	Limitations: Some local government have no PDAM and thus rely on others; PPs have only PoD and ownership rights for the period of CA
Sustainability Characteristics	integrating environmental needs: no, bad water quality	integrating social needs: growing coverage yet still low; poor people have less chance to have access to water
	economically sustainable: no, net profit low, not self-centred economic decisions with no response to all parties	

⁵²⁶ Created by author

5.1.8. Legal Perspective – Indonesia

Indonesia has been ruled tightly by an authoritarian centralized regime until the end of 1990s. Thus, up until the resignation of Suharto all institutions were organized in a centralized manner. As already mentioned in the history chapter, local and regional governments were not included in decision processes due to the top-down approach of the regime. Table 31 below shows the officially assigned agency and their responsibilities, according to a World Bank report in 1999. In total, twelve agencies were responsible for issues concerning water. Some of their responsibilities were overlapping such as “overall management & guidance of irrigation.” Overlaps were roughly divided by duties of an agency. However, decision processes or other collaborative activities were neither transparent nor made public. Therefore, it is not apparent to what degree the different agencies collaborated or even communicated with each other. From today's practice we can deduce that the collaborative activity must have been similar to the current situation.

Table 31: Responsibilities of Agencies in 1999⁵²⁷

Government Body	Responsibility	Water Resources Provider for concerned use	Water Resources for related purpose	Administration/ Management/ Supervision
Ministry of Public Works	Overall water resources & quality management + administration of surface water coordination policy	x	x	x
	overall management & guidance of irrigation	x		
Ministry of Agriculture	Overall management & guidance of irrigation		x	x
Ministry of Forestry	Management of catchment areas of upper river basin areas	x		x
Ministry of Mining	Water use management power generation & management of groundwater		x	x
Ministry of Industry	Water use management for industry & industrial waste water/pollution mitigation		x	x
Ministry of Transport	Water & resource use management for water transportation		x	
Ministry of Environment	Pollution control of waste water from industries (off stream pollution)			x
Ministry of Health	Water quality standard management for various purposes			x
Ministry of Defence and Security	Water & resource policy looking for security & defence of the country		x	x
National Planning Board	Budget planning & programming for Water Resource Development Management			x
Ministry of Home and Affairs	Control & coordination of Co-administration & autonomous tasks related to water resource management		x	
National Land Agency	Land provision and administration in water resources areas	x		x

The change in agencies's competencies came along with the autonomy Law No. 22/1999, which became effective in 2001 and was replaced by Law No. 32/2004 with minor changes. The

⁵²⁷ Created by author according to World Bank (1999) "World Bank Report No. P 7304-IND," in Eka Nugraha Abdi, "Water Resource Development in a Decentralizing Indonesia: A Challenge for Policy Design," (Dissertation, University Southern California, 2007), p.: 142.

shift of power to local government levels and the entailed responsibilities were not altered. The new setup of national agencies concerning water was reduced to five agencies and their subordinated departments as table 32 illustrates. PDAMs are not listed, because they refer to Public Works as is already mentioned in the history part. Nonetheless, they are governmental institutions and a governmental company at the same time. As such they are responsible for their own operations and maintenance in terms of administration. Due to Law No. 14/1987, which established local government's authority over PDAMs, they are closely intertwined with local governments, as is already analyzed in the case study above. The back and forth legislature pattern between centralization and decentralization, has had its effects on compliance of laws and clarity of competencies as local governments may simply ignore regulations made on central government's level. For instance, PDAMs and their associated local government would take no account of tariff guidelines made by the Department of Home Affairs, because if PDAMs have a higher income the local government has a higher income as well.⁵²⁸ In general, it appears that all legal products from agencies listed below do not have an impact or any influence as their *modus vivendi* is not clear.⁵²⁹

Table 32: Responsibilities of Agencies after 1999⁵³⁰

Government Body	Responsibility
Department of Public Works	Overall management of water resources, water quality and administration of surface water coordination policy
Directorate General of Water-resource Development	Regulation of raw water supply
Directorate General of Urban Development [before: Directorate General of Human Settlements]	Technical policy and guidance, construction of facilities
Department of Health	Water quality standard and public health promotion
Department of Home Affairs	Tariff guidelines and testing of water quality
Directorate General of Public Administration and Regional Autonomy [subdivision of Department of the Interior]	Managerial and administrative guidance for water provision of subnationals
Department of Finance	Financial management promotion of the government-owned water enterprises, PDAMs (local-owned enterprises for drinking water) and PD PALs (local-owned enterprises for waste water management) via equity, loans, grants or other forms of subsidies,
BAPPENAS (National Planning and Development Agency)	Coordination of development planning for the above named enterprises — incl. financing arrangement, level of service, estimation of investment, and mode of investment for different types of PDAMs
Subnationals (state and counties/ municipalities)	Overall management and accountability of all corporate or stated owned enterprises of water supply and sanitation. Regrouping of all PDAMs in Indonesia, management-consumer relations, benchmarking of objective, efficiency of operation, promote HR development, technological development
Board of Supervisors composed of ex-officio <i>Bupati</i> or Mayor (head of county or municipality)	Appoint directors of water supply and sanitation enterprises

528 C.f.: Hadipuro (2010), p.: 486.

529 C.f.: *ibid.* pp.: 479 et seqq.

530 Created by author according to: Eka Nugraha Abdi, "Water Resource Development in a Decentralizing Indonesia: A Challenge for Policy Design," (Dissertation, University Southern California, 2007), pp.: 56 et seqq.

Nevertheless, the major shift of “ideology change” of Indonesia's water supply management occurred as an aftermath of the autonomy law No. 22/1999 and due to the law on fiscal equalization of central and regional governments in form of a new water law No. 7/2004.⁵³¹ This law widened Indonesia's water supply sources as the private sector gained more opportunity to access the water market. Besides the conventional PDAMs the bottled water industry experienced a burst of growth, while refilled bottle kiosks increasingly emerged. It also changed Indonesia's *modus operandi* on the level of political entrepreneurship. While during the authoritarian regime all decision were made from top-down perspective, after Soeharto's resignation the World Bank (WB) created the WATSAL (Water Resources Sector Adjustment Loan) program in order to reform Indonesia' water sector.⁵³² Working groups, which were composed of various stakeholders from ministries and society, were formed. Owing to those groups, the law 7/2004 was actually initiated and processed. This procedure incorporated participative aspects. Nonetheless, those groups were dissolved by 2003 as the program expired along with the loan. Afterwards the process changed to a three step procedure. First, an internal draft is made within the concerning agency/ministry. Second, an interdepartmental discussion is initiated. In the last step, a public consultation is made. The Dutch water expert, Bart Teeuwen, criticized, that although representatives of those ministry working groups are supposed to meet up in additional working groups to discuss processes and foster collaboration between the agencies, the meetings do not occur frequently and coordination is “weak.”⁵³³ Teeuwen points out four major reasons, why the current policy process is not effective.⁵³⁴

1. Lack of mutual consistency
2. Lack of input from legal specialists,
3. Little experience with multi-dimensional legal issues
4. Long duration of drafting process, due to
 - frequent personnel changes in working groups
 - discordance between the ministries
 - before a new policy or decision process is started an academic paper of the concerning topic must be written, which is outsourced and thus takes up to a year until the actual process begins.

It is questionable that this approach is much different from the previous top-down approach since

531 Hadipuro (2010), p.: 480.

532 Teeuwen (2011b), p.: 8.

533 Ibid. p.: 18.

534 Ibid. pp.: 18 et seqq.

public consultation is done after the drafting process.

Besides the WATSAL program, the WB has been influencing Indonesia's water politics since 1980s through various other water projects – amounting to 2.921,25 billion USD within 20 years (1983-2013).⁵³⁵ The WB, however, has a certain outlook on water policies and water itself. In particular, water is seen as an economic good.⁵³⁶ Hence, the conditions that the WB is posing upon Indonesia's loan contain certain connotations and demands, which the WB officially refers to as: “Adoption of a national water resources policy and related implementation plan, acceptable to the bank [...]”⁵³⁷ Consequently, the WB has been criticized for pressuring Indonesia towards opening its water market for the private sector and therefore also its revision of current water laws. An example can be found in the enactment of law No.7/2004 through which the WB issued a 300 billion USD loan.⁵³⁸ Therefore, although it is not officially stated by the WB nor by Indonesia's officials, we can assume a connection between Indonesia's change in water policy and the WB's loan issuance.

In order to understand why No. 7/2004 made such an impact on Indonesia's water sector, we need to take a look at the previous water resources Law No. 11/1974. This particular law is rather concise in its design with merely 17 articles, which compose a framework for Indonesia's water sector. The law focused on the regulation of surface water, while groundwater is defined as mineral resource and thus falls under the scope of the Ministry of Energy and Mineral Resources.⁵³⁹ Management, operations, or maintenance were not paid much attention to; instead the quantity of water extraction played a significant role due to the importance of rice cultivation and its entailing irrigation issues.⁵⁴⁰ However, the common practice in Indonesian law system is that enacted laws do not necessary cover every headline stated within the law itself. Hence, laws are merely frameworks and need other surrounding regulations in order to make the enacted law effective. Law No. 11/1974 has merely four surrounding laws; they are listed below. The span of eight years between 11/1974 and the first surrounding regulation in 1982 is striking. The second one came nine years later while the last two regulations were passed 17 years after the initial law. The extended period of implementation and the small number of surrounding implementations make it questionable if the law No.11/1974 was actually fully established or if it played a little role in Indonesia's water

535 Wijanto Hadipuro, “Restructuring Regional Water Utility Companies in Indonesia,” International Conference on Environment and Urban Management. Semarang: Post Graduate Program on Environment and Urban Studies Soegijapranata Catholic University (2003).

536 Dublin Statement on Water and Sustainable Development. (Principal 4). International Conference on Water and the Environment. Adopted 31.01.1992 in Dublin.

537 Hadipuro (2010), p.: 481.

538 Mohamad Mova Al’Afghani, “Constitutional Court’s Review and the Future of Water Law in Indonesia,” *Environment and Development Journal LEAD* 2/1 Law (2006), p.: 3.

539 Teeuwen (2011a), p.: 36.

540 Ibid.: 35.

sector.⁵⁴¹

Table 33: Surrounding Regulations of No. 11/1974⁵⁴²

Government Regulation on	Regulation Number
Water Resource Management	No. 22/1982
Irrigation	No. 23/1983
Lowland Water Resources Management	No. 27/1991
Rivers	No. 95/1991

The new law on water No. 7/2004 has a rather broader scope as it is comprised of 98 articles. It takes surface water as well as groundwater into account, whilst also focusing on both qualitative and qualitative aspects of Indonesia's water sector. The critical difference to the previous water law is the opening of the water market to the private sector. Particularly, Art. 9 of 7/2004 gives more room for the private sector in regard to commercial water rights, while Art. 40 Clause 3 makes the water supply market accessible.⁵⁴³ Nonetheless, water supply is officially still in the hands of the public. Like the past law, the new water law is also a framework, which needs be further elaborated and only once it is surrounded implementation regulations can the law fully come into effect. Below table 34 and 35 show the overview of the already implemented regulations, which are based on No.7/2004. Notably, the number and frequency of enacted regulation surmount the regulations based on 11/1974. This, on the one hand, indicates law's No.7/2004 firm establishment, and on the other hand, a faster decision process on the part of the government. Nonetheless, there some regulations which are still being processed and have not yet passed, like those regulations concerning lowland management or natural lakes.⁵⁴⁴ Although these regulations are neatly listed, some of them are duplicated from the old law, or simply made twice without any major change such as the Ministry of Public Works Decrees No.438/KPTS/M/2006 and No.432/KPTS/M/2007 regarding an establishment of an National Water Board, which overviews the water sector. Similarly, the laws on regional autonomy No.22/1999 and No.32/2004 are almost identical except for some minor changes, which are of no consequences. Other regulations overlap or even contradict previous laws or existing laws. For instance, Presidential Decree No.96/2000 and No.118/2000, which allows foreign investors to own up to 95% of shares of a water supply

541 Ibid.

542 Created by author by the means of Teeuwen (2011b).

543 C.f.: Hadipuro (2010), p.: 480.

544 Cf.: Bart Teeuwan (2016), p.: 37.

company, is based on Art. 9, Art. 40 Clause 3 of 7/2004. Those regulations contradict the constitution from 1945 Art.33, which states that water is a public commodity and shall be in the hands of the government. Not only is the process of enacting new regulations time consuming, the results are not transparent or effective either.⁵⁴⁵ Because of the lack of transparency and the partial incapacity of the municipalities and regencies to comply to the regulations and laws, distribution of competencies, rights, and duties is not clear.

Table 34: Surrounding Regulations of No.7/2004⁵⁴⁶

Government Regulation on	Regulation Number
Drinking Water and Sanitation	No. 16/2005
Irrigation	No. 20/2006
Water Resource Management	No. 42/2008
Groundwater Management	No. 43/2008
Dams and Reservoirs	No. 37/2010
Rivers	No. 38/2011
Water Resources Low Land Management	No. 73/2013
Water Use Right	No. 69/2014
Water Resource Management	No.121/2015
Drinking Water and Sanitation	No.122/2015

⁵⁴⁵ C.f.: Ibid. p.: 37 et seqq.

⁵⁴⁶ Created by author based on Bart Teeuwan (2016).

Table 35: Crucial Surrounding Regulations of No.7/2004⁵⁴⁷

Area of Implication	Law	Issued by	Regarding	Impact
General Water Supply	No.96/2000	Presidential Decree	Private Sector Participation in Urban Water Supply Delivery	Foreign Investors participation allowed in urban water supply
	No. 118/2000	Presidential Decree	Direct Foreign Investment	Foreign Investors can own 95% of water supply companies
	No. 16/2005	Government Act	Development of Water System Supply	water = profit-making commodity
	No.438/KPTS/M/2006	Ministry of Public Works Decree	Establishment Process of National Water Board	Overview of water sector (efficiency questionable)
	No.432/KPTS/M/2007	Ministry of Public Works Decree	Establishment Process of National Water Board	Overview of water sector (efficiency questionable)
	No.23/2006	Ministry of Home Affairs Decree	Guidelines for PDAM Tariff Setting	water tariff should guarantee full cost recovery; rate of return should be at 10%
Regulation on PDAMs	No.47/1999	Ministry of Home Affairs Decree	Guidelines for PDAM Performance Evaluation	decreasing power due to autonomy law
	No.22/1999	Government Act	Autonomy Law	local governments receive more power → Water are now local government's issues
	No.32/2004	Government Act	Autonomy Law	no major change
Regulation on Bottled Water Companies	No.705/MPP/Kep/11/2003	Ministry of Industry and Trade Decree	Quality of Bottled Water Products	1) yearly inspection of bottled water company (Indonesian National Standard No. 01-3553-1996); 2) meet requirements of Ministry of Health Decree No.907/MENKES/SK/VII/2002; 3) Producer need an identification number from the Medicine and Food Watch Office; 4) all used material should be suitable for food → differentiation between bottled & refilled bottled water
Regulation on Refilled Bottled Water Kiosks	No.651/MPP/Kep/10/2004	Ministry of Industry and Trade Decree	Technical requirements for water kiosks & position in water trade	1) no Indonesian National Standard; 2) meet requirements of Ministry of Health Decree No.907/MENKES/SK/VII/2002 but tests a not often & not strictly binding; 3) inspection by jurisdiction 1x per year in a sampling method; 4) drinking water report every 6 months; 5) no stack allowed
Groundwater Wells	No.43/2008	Government Act	Regulation of Groundwater	groundwater extraction issued by provincial government → shift of authority (cities & municipalities do not comply)
	No.6/2002	Central Java Province Act	Groundwater extraction	drinking & domestic usage below 100m ³ /month → no groundwater extraction permit required
	No.7/2002	Central Java Province Act	Groundwater extraction tax	extraction for domestic purpose is not groundwater extraction tax

547 Created by author by the means of Hadipuro (2010), pp.: 479 et seqq.

In the following, we will proceed according to table 35 starting at regulations concerning the whole water sector and then go through each water supply source: PDAMs, bottled water, refilled bottled water and groundwater wells. Surrounding regulations on general water supply, are based on Art. 9 and Art. 40 Clause 3 and thus deepen the understanding of private sector rights on Indonesia's water supply.

Besides the presidential decrees, the national government enacted the regulation No. 16/2005, which states that water is a profit-making commodity and that thus water tariffs should comprise those profits.⁵⁴⁸ The Ministry's of Home Affairs Decree regulation No. 23/2006 on water tariff guidelines goes even further and declares that water tariffs should result in a full cost recovery for the supplier, and Art.5 Clause 4 declares that the rate of return should be 10% of profit.⁵⁴⁹ As a consequence of these regulations, the position of private sector agents are quite advantageous and deep-seated in Indonesia's legislature. Indonesia's water sector tends towards commercialization or privatization of water, especially if we consider that PDAMs are obliged to make a profit and that Jakarta's water has been privatized before those regulations. Hence, these regulations in combination with 7/2004 make a solid foundation for the private sector. Yet with the same regulation (23/2006) and with combination of the old law No. 2/1988, which is based on No. 11/1974, the Department of Home Affairs tried to tackle the low water coverage of the poor via a cross-subsidy mechanism.⁵⁵⁰ Through a cross-subsidy mechanism the low income tariffs would be subsidized with the incoming capital from high tariff category. However, PDAMs themselves and accordingly the local governments are responsible for making tariffs and implementing them. Although PDAMs used No.23/2006 to raise their tariffs, there is no evidence that the suggested cross-subsidy mechanism is implemented.⁵⁵¹ On the contrary, since the PDAMs have to generate revenue, their strategy is rather to focus on the tariff groups, which pay the full tariff costs and increase the PDAMs capacity for those connections.⁵⁵² In table 36 we can see the rough scheme of how PDAMs generally charge their costumers. Group 1 is considered as net loss as this tariff group brings no added revenue. It is expected that group 2 and group 3 connections would use more water if water would always be available. This would lead to a higher revenue. Even group 2 would pay a full-cost tariff. The Department of Home Affairs has no competency to intervene to enforce those guidelines, so the regulation No.23/2006 is redundant.

548 Hadipuro (2010), pp.: 480 et seqq.

549 Ibid. p.: 488.

550 Ibid. p.: 482.

551 Ibid. p.: 481 et seqq.

552 Ibid.

Table 36: General Scheme of PDAM tariffs⁵⁵³

Consumer Classification	Minimum Basic Tariff (10 m ³ /month)	>10 m ³ /month
Group 1	Subsidised tariff	Break-even tariff
Group 2	Break-even tariff	Full-cost tariff
Group 3	Full-cost tariff	Full-cost tariff
Special Group	Based on agreement	Based on agreement

As already mentioned previously, PDAMs are government companies since the 1960s and they already belonged to Public Work Offices since Indonesia's independence. Notwithstanding, regulation No. 23/2006 positions PDAMs as perpetual source of income. Although regulation No.47/1999 by Department of Home Affairs sets guidelines for evaluations of PDAMs, this regulation lost its viability due to the following autonomy laws: No.22/1999 and No.32/2004. Therefore, even though guidelines for evaluation exist, Department of Home Affairs does not have the power or ability to evaluate PDAMs since those are a matter of local regencies. Home Affairs also takes probes of PDAM water in order to identify its quality without publishing the results.⁵⁵⁴ Peculiarly, the Ministry of Health sets the requirements of water quality, but does not test the water itself. As a consequence, a mistrust towards PDAM water is a common norm in Indonesia, because the government's activity and data in regard to water seem in-transparent.

The bottled water industry is regulated mainly by regulation No. 705/MPP/Kep/11/2003 issued by the Ministry of Industry and Trade, whose central point is the quality of bottled water. It requires a yearly inspection of each bottled water company. During this inspection it needs to pass the norms of No.01-3553-1996 set by Indonesian National Standard of products as well as the regulations concerning drinking water quality of No.907/MENKES/SK/VII/2002 set by Ministry of Health.⁵⁵⁵ Furthermore, bottled water producers are obliged to have a identification number from the Medicine and Food Watch Office and all used materials in the production process have to be suitable for food.⁵⁵⁶ Due to such precaution, people's trust in bottled water excels the confidence in piped PDAM water.

Refilled bottled water is similarly regulated as bottled water, but less strictly. For instance, refilled bottled kiosks, which are registered as small businesses, are required to meet up the

⁵⁵³ Created by author according to Hadipuro (2010), p.: 482.

⁵⁵⁴ C.f.: Hadipuro (2010), p.: 476.

⁵⁵⁵ C.f.: Ibid. p.: 483.

⁵⁵⁶ Ibid.

regulation No.907/MENKES/SK/VII/2002 by Ministry of Health.⁵⁵⁷ However, they are not compelled to meet the Indonesian National Standard No.01-3553-1996, as they are not allowed to keep a stock of refilled bottled due to hygienic reasons. Furthermore, the testing of those kiosks are sporadically done by appurtenant regencies once a year, meaning that only few get tested.⁵⁵⁸ Overall, this business is less regulated due to insufficient budget of regencies to conduct more frequent testing on every kiosk. Furthermore, associations for refilled bottled water, which would keep a certain standard and an intrinsic norm of conduct, are small and not widely spread.

The third form of water access are groundwater wells. On a national level we can find merely one regulation (No.43/2008 Government Act), which states that licenses for groundwater extraction are issued by the associated regency.⁵⁵⁹ Otherwise, only the government of Java Province has issued regulations on groundwater extraction, namely No.6/2002 and No.7/2002. The former regulation allows groundwater extraction up to 100 m³ per month for domestic use without any permission, while the latter excuses such extraction from taxation.⁵⁶⁰ Problems arise when small refilled water businesses, such as Tanjung Mas, pump groundwater due to the high quality of the water and use this feature to attract customers, while overexploiting groundwater far beyond 100 m³ per month.⁵⁶¹ The danger lies in prohibited extraction for commercial use, because this sphere is not sufficiently regulated. If one groundwater source has been exploited, the extractors move to a different one. However, this *modus operandi* is not sustainable, as groundwater cannot be easily refilled and the lack of it drives more seawater into the soil, which again results in unusable soil for agriculture. Furthermore, the groundwater level decreases. According to a report by the Amrta Institute, 60.000 m³ of groundwater alone are subtracted daily in Jakarta.⁵⁶² It is comprehensible that the costs to pump up groundwater are far below the costs of building a treatment plant for water. Thus, commercial businesses misuse their right to water because of ill-defined regulations around groundwater. Those left behind are the common people who cannot afford a PDAM connection nor bottled water and thus depend on refilled water, of which the quality is not guaranteed. But also those who have a connection or can afford bottled water are subjected to price changes. Water is an inelastic good, meaning no matter how high the prices for water are it will be always in demand, since there is no substitute. Those, who have the means to produce water, have automatically a monopoly like advantage. According to Hadipuro, Indonesia is at a crossroads to have public water

557 Ibid.

558 Ibid.

559 Ibid. p.: 484.

560 Ibid.

561 C.f.: Hadipuro and Indriyant (2009), pp.: 57 et seqq.

562 Amrta Institute and Tifa Foundation. "Pendapatan dan belanja sektor air – Water resources sector revenues and spending," *Amrta Institute and Tifa Foundation* (2009), p: 1.

supply or its commercialization, which entails high water tariffs for larger profits and a slow development process of infrastructure and a certain “cherry picking” attitude towards coverage areas.⁵⁶³

Despite the various implemented regulations for establishing the law No. 7/2004, the constitutional court declared No.7/2004 as null and void on the 18th of February 2015.⁵⁶⁴ This decision entailed that also all the above mentioned regulations are not effectual anymore either, since those were based on law 7/2004. And so, theoretically the new law on water would be again No. 11/1974. It is unclear though, if regulations which did not exist before and are based on 7/2004 are still valid or not. The new legislature is even less transparent than the previous. According to Bahar and Partners, an attorney company, which specializes in legal services and corporate law in Indonesia, most of the surrounding regulations can still be applied and licenses remain valid until their expiration.⁵⁶⁵ Two new regulations were made in 2015: No.121/2015 concerning water resource utilization, which substitutes No.42/2008, and No.122/2015 concerning the water supply system, which substitutes No. 16/2015.⁵⁶⁶ Nevertheless, 122/2015 still emphasizes that the government should have government enterprises handling Indonesia's water supply.⁵⁶⁷ This approach, however, will not direct Indonesia away from commercialization, on the contrary: the idea of a managing water supply in a corporate manner indicates that the notion of water as a profit generating commodity is still present.

In summary, we can say that Indonesia's legislature is rather in-transparent and confusing. Although Public Works has officially the competency over water supply, the actual decision power lies with PDAMs and their associated local governments. National agencies such as the Ministry of Home Affairs or Public Works have the power to issue regulations, but they cannot intervene due to the autonomy of local governments. The responsibilities of agencies are uncertain, since the back and forth between centralization and decentralization left regulations in abeyance. Additionally, the constitutional court decision, overthrew the latest law on water (No.7/2004) along with its surrounding regulations. As a consequence, today's final responsibilities of agencies are unsettled, since after 1999 less agencies have been involved in the water sector. The legal basis for water issues is theoretically law No.11/1974 again. However, it is highly questionable that Indonesia will reverse the agency structure. Therefore, it is not clear if responsibilities are overlapping. But if we

563 C.f.: Hadipuro (2010), pp.: 485 et seqq.

564 Eurocham (European Business Chambers of Commerce in Indonesia), “Constitutional Court Declares Water Resources Law No. 7/2004 Null and Void,” *Eurocham* (26.02.2015), <http://www.eurocham.or.id/index.php/about-us/news/128-constitutional-court-declares-water-resources-law-null-and-void> (accessed: 16.08.2016).

565 Bahar and Partners, “New Water Regulations in Indonesia,” *Bahar and Partners* (2015), p.: 9.

566 Ibid. p.: 4.

567 C.f.: *ibid.* p. 12.

assume that the situation of the agencies' responsibilities of the past years remains the same, then responsibilities would not overlap. Interestingly, agencies would need to depend on each other, as for example the Ministry of Health makes up the guidelines for water quality, but the Ministry of Industry and Trade executes the examination⁵⁶⁸. In spite of the fact that agencies rely on each other for guidelines or setting standards, the failure of bringing representatives of each agency's working group together indicates a general lack of collaboration between agencies. Furthermore, the case study of Tirta Raharja showed, that even the local governments are in conflict or even in competition for power. Regardless of the back and forth pattern, Indonesian water legislature was always coherent with its surrounding regulations in regard to the current water law (centralized or decentralized). However, the first drastic change came along with law No.7/2004 and the second one, which left all water legislature in abeyance, was the annulment of the same law. Indonesia is not just at the crossroads of public water supply or commercialization, as Hadipuro puts it, but it needs to decide which of the two roads it wants to take for the final construction of its water sector.

Table 37: Legal Criteria – Indonesia⁵⁶⁹

Category	Indonesia	
Allocation of Competencies	Competencies of agencies: 1. Public Works (oversight of water supply), 2. Ministry of Home Affairs (tariffs & evaluation guidelines), 3. Ministry of Industry & Trade (quality & technical examination), 4. PDAM & associated local government (most decision power & authority to intervene)	Crossing sectors: no
Transparency and Overlapping of Responsibilities	Clear responsibilities: No, due to back & forth between centralization and decentralization, plus annulment of last water law	Overlapping responsibilities: Not clear.
Interagency collaboration	Collaboration: No	Competition: Yes, between local governments
Logic coherence of legislature	Coherence: yes	Discontinuity: Yes

5.1.9. Tacit Norms & Conventions – Indonesia

In terms of campaigns or other forms of promotion concerning water, the Indonesian government has been fairly active. In 1992 Indonesia became part of UN's Agenda 21, a self-declared comprehensive plan of action on Environment and Development, which requires action to

568 C.f.: Hadipuro and Indriyant (2009), pp.: 58 et seqq.

569 Created by author.

be taken globally and locally by its participants. This entailed a formation of Indonesia's own Agenda 21. Among other issues, Indonesia identified the water sector as an area that needs to be improved, focusing on these four main spheres:⁵⁷⁰

1. Encouragement of reducing water usage
2. Provision of save potable water (availability, quality, and distribution of water)
3. Integrated water management via additional laws, regulations and water control policies for water resource management.

The crucial essence of Indonesia's Agenda 21 is that the government takes more action in regard to water. However, the co-notation of an improved water management was also that water resources management measures should be paid – another indication towards commercialization of water on the part of the government.⁵⁷¹ Additionally, Indonesia signed the Millennium Development Goals (MDG) in 2000 at the Millennium Summit of the United Nations and it thus committed to fulfill those until 2015. The eight MDGs are:⁵⁷²

1. Eradication of extreme poverty and hunger
2. Achievement of universal primary education
3. Promotion of gender equality and empowerment of women
4. Reduction of child mortality
5. Improvement of maternal health
6. Fighting HIV/AIDS, malaria and other deadly diseases
7. Assurance of environmental sustainability
8. Development of global partnership for development

To have clean drinking water and access to sanitation falls under the seventh goal of environmental sustainability. Under these premisses Indonesia is expected to take action.

The first program Indonesia launched was the so called Prokasih program on the 19th of June in 1989 aiming to reduce river pollution and so increase water quality.⁵⁷³ Behind this “Clean River” program stood BAPEDAL (Badan Pengendalian Dampak Lingkungan), an Agency of Environmental Impact Management. The goal was to put several control regulations into action,

⁵⁷⁰ Abdi (2007), p.: 59.

⁵⁷¹ Idid. p.: 60.

⁵⁷² C.f.: United Nations, “The Millennium Development Goals Report 2015,” *UN* (2015), pp.: 14 et seqq.

⁵⁷³ Shakeb Afsah, Benoît Laplante and Nabel Makarim, “Program-Based Pollution Control Management – The Indonesian PROKASIH Program,” *World Bank. Policy Research Working Paper* 1602 (May 1996), p.: i.

namely Presidential Decree 20/1990 on Water Pollution Regulation as well as Ministerial Decree on Effluent Discharge KEPMEN/03/1991.⁵⁷⁴ The difficulty behind this program is its ambiguity. On the one hand, the program is not voluntarily and a contract needs to be signed. On the other hand, the agreement is not legally binding.⁵⁷⁵ Consequently, industry plants' abidance is rather low as a report of WB shows.⁵⁷⁶ Since monitoring was the major issue in non-compliance, Indonesia established a second program named PROPER PROKASIH in 1994, which is an evaluation program for "public disclosure of polluters' environmental performance."⁵⁷⁷ The evaluation is categorized in five colors (gold, green, blue, red and black) with associated type of performance ranging from "excellent" (gold) to "very poor" (black).⁵⁷⁸ By 1995 the PROKASIH program managed to involve 187 plants within 31 watersheds in overall 13 states with an increasing improvement of water quality in the rivers.⁵⁷⁹ According to WB reports, merely five plants were classified under "good" performance, while the majority (115) was categorized as "poor".⁵⁸⁰ Those few plants seem also to lead performance of water quality improvement.⁵⁸¹ Despite the fact that public denunciation of water polluters had a positive effect on water quality, no further reports or news were made. It is uncertain if such a program still exist. However, it is more likely that those two programs were not continued or revived again due to the lack of evidence such as publications, websites or other media.

Besides the "Clean River" program, Indonesia engages in a sanitation development acceleration program, the so called *Sanitation Portal Indonesia*. Its main mission is to improve Indonesia's sanitation behavior via campaigns, education, advocacy and assistance of its participants (local regencies and municipalities).⁵⁸² This four year Program has been carried out twice. The first had one cycle and 443 participants, while the second program has been divided into two cycles with 427 participants (1st cycle: 2010-2014 and 2nd 2015-2019).⁵⁸³ Overall, 273,7 trillion IDR have been invested into this sanitation program with 202,4 trillion IDR into waste water management, 57,7 trillion IDR into waste management, and 13,7 trillion IDR into drainage system.⁵⁸⁴ Although this

⁵⁷⁴ Ibid.

⁵⁷⁵ Ibid.

⁵⁷⁶ C.f.: *ibid.* pp.: 12 et seqq.

⁵⁷⁷ Shakeb Afsah, Benoît Laplante and David Wheeler, "What is PROPER? Reputational Incentives for Pollution Control in Indonesia," *World Bank*. Working Paper (November 1995), p.: 1.

⁵⁷⁸ Ibid.

⁵⁷⁹ C.f.: *ibid.*; Abdi (2007), p.: 61

⁵⁸⁰ C.f.: Afsah, Laplante and Wheeler (November 1995), p.: 19.

⁵⁸¹ C.f.: Afsah, Laplante and Makarim, (May 1996), p.: i.

⁵⁸² Portal Sanitasi Indonesia (Sanitation Portal Indonesia). "Organisasi (Organization)," *Portal Sanitasi Indonesia*, http://www.sanitasi.or.id/?page_id=10 (accessed: 18.08.2016).

⁵⁸³ Portal Sanitasi Indonesia (Sanitation Portal Indonesia). "Peta Jalan (Roadmap)," *Portal Sanitasi Indonesia*, http://www.sanitasi.or.id/?page_id=15 (accessed: 18.08.2016); Portal Sanitasi Indonesia (Sanitation Portal Indonesia). "Peta Jalan (Roadmap)," *Portal Sanitasi Indonesia*, http://www.sanitasi.or.id/?page_id=191 (accessed: 18.08.2016).

⁵⁸⁴ Ibid.

program receives its financial sources from state government's budget, foreign countries participate in the funding of this program as well. For instance, the Netherlands are involved via the so called *Urban Sanitation Development Program* assisting in technical area of the program, while the U.S.A. engages via USAID through the *Indonesia Infrastructure Initiative* in the area of waste water implementation of the program.⁵⁸⁵ The Indonesian government also employs a coordination platform, which consists of a coordination team. Examples for such coordination platforms are water council (Dewan SDA), watershed forum (Forum DAS, and TKPSDA (Water Resources Management Coordination), which are initiated on the level of regencies, province, and state.⁵⁸⁶ The duties of these coordination platforms are:⁵⁸⁷

1. coordination, consultation, and integration to achieve policy coherence and common understanding among stakeholders
2. monitoring and evaluation of the implementation of IWRM
3. advise to governors, regents, or ministers on potential issues that emerge in regard to IWRM implementation or river basin policies.

Usually these coordination platforms are composed of multi-stakeholder members from private sector, the government, communities, and NGOs. However, each ministry or agency has their own concept and program of how to visualize IWRM and thus do not coordinate with each other, but work rather isolated.⁵⁸⁸ Consequently, these coordination platforms function as information platforms as they can only provide information through the participants. The participating governmental personnel is known to have no decision power within their agency, but they are assigned to visit these meetings due to formality.⁵⁸⁹

Apart from these two programs, Indonesia's agencies do not partake in social media as the ones in Singapore do. The equivalent agency to PUB is the Ministry of Public Works in Indonesia. Public Works is merely represented on two media channels: 1. Facebook with five likes in total, no description of the page or the agency itself and no postings; 2. LinkedIn with 3.155 followers.⁵⁹⁰ It is clear that Indonesia's government does not use social media, a contemporary form of

585 Portal Sanitasi Indonesia (Sanitation Portal Indonesia). "Organisasi (Organization)," *Portal Sanitasi Indonesia*, http://www.sanitasi.or.id/?page_id=10 (accessed: 18.08.2016).

586 Riska Darmawanti, interview by author, Jakarta-Vienna, 29-31.08.2016.

587 Ibid.

588 Ibid.

589 Ibid.

590 Ministry of Public Works and Housing, Republic of Indonesia [pseud.], Ministry's of Public Works and Housing Facebook page, <https://www.facebook.com/Ministry-of-Public-Works-and-Housing-Republic-of-Indonesia-867181076693505/> (accessed: 20.08.2016); Ministry of Public Works [pseud.] Ministry's of Public Works and Housing LinkedIn page, <https://www.linkedin.com/company/ministry-of-public-work> (accessed:20.08.2016).

communication to promote its program or to raise public awareness.

Foreign governments such as the Netherlands actually play a significant role in Indonesia's cooperations in regard to water. Until the end of 2015, the Netherlands realized 91 water related projects in Indonesia with a focus on water technology (38% of projects).⁵⁹¹ Other projects are in water and urban development, delta technology, water and food as well as ports, environment, and energy concerning water. The work is primarily in form of consultancy and advise, or education and knowledge transmission.⁵⁹² From all 91 projects 34% were financed by the Dutch government, 17% by donation from private sector, 10% by local governments in Indonesia, 8% by Indonesian central government, 8% by International Friendship Institutions (IFIs), 7% by NGOs, 6% by philanthropic organizations, 5% by stated owned companies, and 5% by knowledge institutes.⁵⁹³ Hence, 51% of those projects are financed by a foreign country and the private sector of Indonesia, while the local and central government compound 18% of overall financing. This leads us to conclude that Indonesia's governments invest less than one-fifth into projects of a cooperation between two governments.

USAID is an other foreign entity heavily engage in Indonesia's water sector. Its participation is categorized in three sectors: 1. water supply sector, 2. sanitation sector, and 3. cross-cutting sector. In the water supply sector USAID specializes on improving PDAMs performance, reduction of NRW, expansion of water coverage for the poor, planning climate change adaptation, and financing capital investments.⁵⁹⁴ Those goals are set under eight smaller projects. All actions run via the so called IUWASH (Indonesian Urban Water Sanitation and Hygiene). It is a specifically designed five year program to help Indonesia achieve its MDG of safe water and sanitation.⁵⁹⁵ In this area IUWASH collaborates with other domestic and international agencies along with private companies such as Ministry of Public Works, BPPSPAM, Ministry of Finance, PERPAMSI (association of PDAMs), WB, ADB, KFW (German Development Bank), Coca-Cola Foundation Indonesia, and Water.org.⁵⁹⁶ In the sanitation sector IUWASH has five projects and is mainly active through hygiene education, workshops for staff, teacher trainings, and micro-financing.⁵⁹⁷ In the cross-cutting sector IUWASH has five projects of diverse nature in total. Project 1 concerns

591 Bauke ter Braak, "Indonesia – The Netherlands Integrated Approach of Future Water Challenges," *Netherlands Water Partnership (NWP)*, (December 20015), p.: 10.

592 Ibid.

593 Ibid.

594 USAID Indonesia Urban Water Sanitation and Hygiene (IUWASH), "Quarterly Progress Report 19 – October-December 2015," *USAID Indonesia Office of Environment* (January 2016), pp.: 16 et seqq.

595 USAID Indonesia Urban Water Sanitation and Hygiene (IUWASH), "What we do," USAID (IUWASH), <http://iuwash.or.id/US/what-we-do/> (accessed: 19.08.2016).

596 USAID Indonesia Urban Water Sanitation and Hygiene (IUWASH), "Quarterly Progress Report 19 – October-December 2015," *USAID Indonesia Office of Environment* (January 2016), p.: 17.

597 Ibid. pp.: 47 et seqq.

implementation of sustainable policies, project 2 efficient budget allocation, project 3 citizen engagement, project 4 gender mainstreaming, and project 5 mobilization of CSR fundings.⁵⁹⁸

While USAID is active in water supply and sanitation service, other governments such as Japan's International Cooperation Agency support Indonesia in the sphere of sanitation infrastructure, named Denpasar.⁵⁹⁹ Australia finances through AusAID the so-called Indonesian Infrastructure Initiative (IndII), which particularly pays attention to amplify policy's infrastructure, planning, and investment.⁶⁰⁰

Not only countries, but also international financial institutions support Indonesia in achieving its MDG and to overcome hinderances in its water supply. In 2001 the WB started its own promotion program called WATSAP, which aims to modify water supply regulations.⁶⁰¹ It selected six areas in which the WB applies its impact:⁶⁰²

1. Sustainable treatment of water and its environment in order to achieve intergenerational equality.
2. Alternation of Indonesian government's role from "provider" of water to a "facilitator."
3. Distribution of authority in a manner of decentralization with an involvement of all three levels – local, regional and national.
4. Raise awareness of unequal access to clean water, which in fact is a human right.
5. Promotion of democratization with various approaches to handle water policy, from top-down approach, bottom-up approach to participation of shareholders during the entire policy decision process.
6. Reformation of law No. 4/1974 in order to implement the globally agreed features of the contemporary water resources policy during the course of the Second World Water Council in Den Haag in 2000: a) fulfillment basic needs of water, b) continuous food supply, c) protection of ecosystems, d) sharing water resources, e) flood risks and drought management, f) value of water, and g) appropriate water management.

For instance, the WB supports the Indonesian government through a program called *Global Partnership on Output Based Aid* (GPOBA). Its basic function is to subsidize piped water

598 Ibid. pp.: 79 et seqq.

599 Asian Development Bank (ADB), "Sector Assessment (Summery): Water Supply and other Municipal Infrastructure and Services," ADB, County Partnership Strategy: Indonesia (2012-2014), p.:4.

600 Ibid. pp.: 3 et seqq.

601 C.f.: Abdi (2007), p.: 61.

602 Ibid. p. 62.

connections and thus expand water accessibility to the financially disadvantaged. Low income households pay a connection fee of 120.000 IDR instead of 627.500 IDR and middle income pay 627.500 IDR instead of 961.500 IDR.⁶⁰³ The WB, however, repays the costs to the private party if everything works technically.⁶⁰⁴ Ergo, a customer might have to pay the full price in the case of malfunctions. Overall the actual “activity” of the WB is characterized by loan allowance with conditions the WB perceive as legitimate. The ADB is also involved in Indonesia's water sector development with the goal to raise awareness. Their primary forms of assistance are loans, transmission of knowledge and consulting assistance to the government.⁶⁰⁵ They do not only conduct research and analysis within water supply and sanitation sector, which serves Indonesia as useful knowledge, but also initiated a “peer-to-peer knowledge exchange” program, the so-called *Indonesian Water Operators Program*.⁶⁰⁶ Another way ADB contributes to Indonesia's water sector is through consulting assistance to the Indonesian government. The ADB announce its objectives to be:⁶⁰⁷

1. Improvement of safe water supply and sanitation
2. Promotion of sustainable water supply in urban areas
3. Amplification of efficiency of water suppliers
4. Expand capacity of institutions entitled to operate and/or maintain water supply
5. Formation of an institutional framework water waste management in urban areas.

ADB does not provide any particular actions except for the willingness to issue loans of investing capital. Both international financial institutions are inclined to provide financial means to support Indonesia in ameliorating its water sector. However, each agency has their own agenda they follow and thus their support comes with strong conditions attached.

The water supply companies do not differ much from Indonesian government in terms of engagement and promotion of values and norms. Besides the fact that PDAMs generally do not partake in any “extracurricular” activity outside the necessary, some PDAMs allegedly include the opinion of consumers. For instance, PDAM Tirta Raharja set up a poll of how subscribers assess the water quality. Illustration 26 below shows the original and the translation of a polling question. Evidently, the options of answers are limited to positive to neutral assessment. Not only is there no negative assessment option, there is no opportunity given to provide more details upon water

603 Ardianie and Zamzami (2010), p.: 8.

604 Ibid.

605 ADB (2012-2014), p. 4.

606 Ibid.

607 Ibid.

quality or customers judgement. Engagement such as in Singapore's private sector in form of education or awards are not given. Notwithstanding, that some PDAMs take part in social media activities, their reach is quite limited. In particular, PAM Jaya has an Instagram account with merely 257 followers yet with maximum one like per picture, which signalizes that there is almost no engagement on this channel.⁶⁰⁸ PAM Jaya has also a Facebook account with 16 likes total, no posting and only 175 visits on the channel.⁶⁰⁹ Furthermore, Jaya is active on Twitter. Its postings, however, are of informational nature.⁶¹⁰ There are no signs of promoting new norms such as cautious water consumption or any other attempts to change people's behavior towards water.

Illustration 26: Polling Question Tirta Raharja⁶¹¹

POLLING	POLLING
How is the quality of service taps this time? ☐ Very good ☐ Nice ☐ Enough	Bagaimana kualitas pelayanan pdam saat ini? ☐ Sangat Bagus ☐ Bagus ☐ Cukup

Private water supply companies operate in regard to promotion or norms and conventions in a similar manner. However, one campaign regarding water consumption has been issued by Danone, which owns currently part of Palyja. The campaign was actually designed by the marketing company VML Qais Indonesia and was launched in 2014 via the Instagram channel of Danone.⁶¹² The aim was to raise attention to hydrate oneself in order to be able to focus and concentrate well via a scavenger hunt on social media.⁶¹³ On Instagram the range of a campaign is attain through the usage of hashtag with the slogan. Danone used *#adaaqua*, which means “there is water”. At the

608 C.f.: pam_jaya PAM JAYA [pseud.]. PAM Jaya's Instagram page. https://www.instagram.com/pam_jaya/ (accessed: 22.08.2016).

609 PAM Jaya [pseud.], PAM Jaya's Facebook page. <https://www.facebook.com/pages/PAM-Jaya/429945093731252?ref=ts> (accessed: 22.08.2016).

610 @pamjaya_id [pseud.], PAM Jaya's Twitter account. https://twitter.com/pamjaya_id?ref_src=twsrc%5Etfw (accessed: 22.08.2016).

611 PDAM Tirta Raharja, “Polling,” *PDAM Tirta Raharja*, under “News,” <http://www.tirtaraharja.co.id/berita> (accessed: 21.08.2016).

612 Rezwana Manjur, “Danone AQUA Water launches Instagram campaign,” *Marketing*, (01.12.2014; at 17.52 o'clock), <http://www.marketing-interactive.com/danone-aqua-water-launches-instagram-campaign/> (accessed: 22.08.2016).

613 Ibid.

time of writing this thesis total number of posts using #*adaaqua* has reached 43.657.⁶¹⁴ The postings with this hashtag continue up to this date and thus users proceed spreading this campaign. Although the message of the campaign is to drink enough water, it also promotes the consumption of safe water – particularly bottled water from Danone. This amplifies even more the perception that bottled water is safe to drink, leaving conventional PDAM water behind also on social media channels.

In terms of civic engagement, there are no institutionalized public fora for shareholder's view and no possibility to intervene into a decision making process concerning water supply.⁶¹⁵ Therefore, some researchers claim that there are no bottom-up initiatives.⁶¹⁶ However, we can find several Indonesian NGOs and volunteers dedicated to water related problems. In several areas in Indonesia a form of community participation water management called HIPPAM (Himpunan Penduduk Pemakai Air Minum) has been established. About 10 million people nationwide have joined local HIPPAMs for water supply organized by the community.⁶¹⁷ The concept is that households can become members. They are obliged to pay a small member fee of 5.000 IDR per month and then receive a reliable water connection regardless of usage level.⁶¹⁸ The study of Dwi Ari et al. shows that those participating in HIPPAM share a stronger bond within the particular community. Furthermore, they change their behavior to a positive remark towards water and their surrounding environment – they treat water and the environment with more respect.⁶¹⁹ The results of communal organized water supply has an impact on the cohesion of an area as well as the individual behavior towards its environment and water itself.

Other than HIPPAM, several NGOs engage around preservation of water or its expenditure. Due to the limited scope of this thesis we will briefly address a number of NGO to give the reader an overview of NGO scene in Indonesia. Yayasan Mitra Insani, established in 1998, is one of the oldest environment dedicated NGO in Indonesia. Mitra Insani's objectives are to engage people to be active in their own area by identifying problems, finding solutions by using their knowledge and

614 #*adaaqua*, *Instagram*, <https://www.instagram.com/explore/tags/adaaqua/> (accessed: 22.08.2016).

615 C.f.: Abdi (2007), p.: 70.

616 C.f.: *ibid.*

617 C.f.: Ismu Rini Dwi Ari, Kenshiro Ogib, Kakuya Matsushimac, and Kiyoshi Kobayashid, “Community participation on water management; Case Singosari District, Malang Regency, Indonesia,” *Procedia Environmental Sciences* No. 17 (2013), p.: 805.

618 Ismu Rini Dwi Ari, Hayeong Jeong, Kakuya Matsushima and Kiyoshi Kobayashi, “Network Analysis of Community Based Management,” in *Community Based Water Management and Social Capital*, edited by Kiyoshi Kobayashi, Ibnu Syabri, Ismu Rini Dwi Ari and Hayeong Jeong, pp.: 197-217, London: IWA Publishing, 2014.

619 *Ibid.*, p.: 216.

skills and simultaneously build up additional competencies.⁶²⁰ Their approach is via education, skill enhancement, research and development, advocacy, and collaboration with other NGOs.⁶²¹ Although most of their projects focus on forestry such as prevention of forest fires, they also work on projects concerning soil, irrigation and installation of water canals.⁶²²

Similar to Mitra Insani is Ulayat, which was established in year 2000, and is also primarily dedicated to forestry and plantation.⁶²³ Their social component lies as well in the promotion of behavioral change towards sustainable ecosystem management in order to preserve the biodiversity of the environment.⁶²⁴ Furthermore, Ulayat advocates community based management and self-reliance. In practice, Ulayat co-organizes annually the *Clean up Jakarta Day* in order to raise awareness in regard to littering and engage individuals in physical clean up.⁶²⁵ With over 10.000 participants reach and an overall collection of 100 tones of garbage, this campaign signifies a notable impact on the environment as well as on the individual behavior.

A another NGO, which actively organizes river clean ups, is the Community Care Ciliwung Bogor or KPC Bogor as it is called by the locals. It was found in 2009 and has a mission to raise awareness of the harmful effects of waste in water and recruit the community to take action.⁶²⁶ KPC Bogor arranges river clean ups every Saturday, waste collecting scavenger races for students, and environmental education for elementary school children. But they also conduct research on water quality and biodiversity of the Ciliwung River and plant trees in the river's surroundings. Through their activity and collaboration with the Ministry of Marine and Fisheries and Bogor's Agricultural University the NGO managed to attract the attention of the Bogor's city government, which now supports the NGO financially.⁶²⁷ Furthermore, KPC's activities revealed bad habits in the community regarding waste and water, as well as a lack knowledge concerning wholesome water.

620 Yayasan Mitra Insani, "Profil Organisasi (Profile Organization)," *Yayasan Mitra Insani* (15.09.2010), under "About us," <http://mitrainsani.or.id/about/> (accessed: 23.08.2016).

621 Ibid.

622 Yayasan Mitra Insani, "Memasahi tanah cara mencegah kebakaran hutan dan lahan (Moisten the Soil – How to Prevent Forest Fires)," *Yayasan Mitra Insani* (19.06.2016), under "Featured," <http://mitrainsani.or.id/membasahi-tanah-cara-mencegah-kebakaran-hutan-dan-lahan/> (accessed: 23.08.2016); Yayasan Mitra Insani, "Membuat cadangan air untuk kemudahan pemadaman. (Engl.: Proposal of How to Ease Water Blackouts)" *Yayasan Mitra Insani* (19.06.2016), under "Featured," <http://mitrainsani.or.id/membuat-cadangan-air-untuk-kemudahan-pemadaman/> (accessed: 23.08.2016)

623 Ulayat's Webblog, "Tentang Kami (Engl.: About us)," *Ulayat*, <https://ulayat.wordpress.com/perihal/> (accessed: 23.08.2016).

624 Ibid.

625 Clean up Jakarta Day, "Introduction," *Indonesia Expat*, <http://cleanupjakartaday.org/en/> (accessed: 23.08.2016).

626 Een Irawan Putra, "How FrontlineSMS Helped an Indonesian Community Clean Up a River," *Mediashift* (14.05.2013), <http://mediashift.org/2013/05/how-frontlinesms-helped-an-indonesian-community-clean-up-a-river133/> (accessed: 23.08.2016); Community Care Ciliwung Bogor, "Ketang Kami (Engl.: About us)," <http://tjiliwoeng.blogspot.co.at/p/tentang-kami.html> (accessed: 23.08.2016).

627 Ibid.

ECOTON (Ecological Observation and Wetlands Conservation) is another NGO. It is dedicated to educational programs such a *Environmental Detective* for school children, scavenger activities and research.⁶²⁸ However, ECOTON is also active in policy advise. Through field studies in the Surabaya River within the context of *Environmental Detective*, ECOTON discovered a degradation of fish in the Surabaya River. Hereupon, they started to promote fish sanctuaries and collaborate with the Ministry of Environment until appropriate policies were established and ECOTON was appointed as national coordinator for NGO collaboration for watershed conservation in Indonesia.⁶²⁹ On account of ECOTON's engagement in student's education, numerous schools established own extracurricular water projects.⁶³⁰ This illustrates how NGO's and their pursuit in environment activities have spillover effects even outside their projects.

BothENDS (Environment and Development Service) is a Dutch NGO founded in 1986 for environmental and poverty-related issues.⁶³¹ BothENDS mainly engages in developing countries in order to support people and organizations, who/which work on the local level. The strategy is to first to identify civil society groups and then make those stronger by building up networks, which promote social and environmental interest.⁶³² Due to those networks the NGOs and civil groups are able to have an impact on policies and cross-pollinate ideas.

These five NGOs joined forces in a new construct of IndoWater CoP (Indonesia Water Community of Practice) in 2014. Although shortly after, Ulayat left the association. IndoWater aims to go beyond of raising awareness. Their key agenda is to integrate a continuing dialogue of shareholders from different levels and to change Indonesia's communities towards more participation in water policy decision processes.⁶³³ Therefore IndoWater organizes platforms and facilitates the process of negotiation between the different parties such as water users, NGOs, governmental water related institutions and communities. This participatory approach is also in accordance with the IWRM approach, which the NGO advocates. IndoWater actually has analyzed Indonesia's framework and catalogued all water related initiatives in Indonesia by their performance.⁶³⁴ Within this NGO BothENDS plays an important role in terms of data and

628 ECOTON (Ecological Observation and Wetlands Conservation), "About us," *ECOTON*, <http://ecoton.org/about-us/> (accessed: 24.08.2016).

629 Institute for Global Environmental Strategies (IGES), "Asia-Pacific Environmental Innovation Strategy Project (APEIS) – Research on Innovative and Strategic Policy Options (RISPO)," *IGES*, 2nd Progress Report, (March 2004), pp.: 338.

630 Ibid, p. 362.

631 BothENDS (Environment and Development Service), "Mission & Strategy," *BothENDS*, under "Our work," <http://www.bothends.org/en/Themes/Mission-Strategy/> (accessed: 25.08.2016).

632 Ibid.

633 IndoWater CoP (Indonesia Water Community of Practice), "About Us," *IndoWater CoP*, <http://indowatercop.org/laman-contoh/> (accessed: 25.08.2016).

634 BothENDS (Environment and Development Service), "IndoWater Community of Practice," *BothENDS*, <http://annualreport.bothends.org/index.php/2016/07/28/indowater/> (accessed: 25.08.2016).

connection capabilities. IndoWater was able to use BothENDS' *Livelihood Analysis* as well as its *Activity Analysis Guide* in order to comprehend particular local problems, how they are intertwined with economic pursuits, and ultimately to go a step further and place those local problems into a geopolitical and economic circumstances.⁶³⁵ This approach makes IndoWater unique in terms of NGO activity.

Notwithstanding, we can find many more NGOs in Indonesia, which are engaged in preservation of environment or water. The usage of social media as well as other media is remarkable, all the NGOs above have a Facebook and/or Twitter account through which they communicate to their communities and organize events. Other programs use conventional media such as the radio for their projects. The NGO Institute for Forest and Environment, for instance, established the SIKLUS (Indo.: Siaran Khusus Lingkungan Sekitar – Engl.: Special Program on Our Surrounding Environment) radio program.⁶³⁶ Others like Yayasan Pengembangan Biosains dan Bioteknologi (Engl.: Foundation for Development of Bioscience and Biotechnology) organize outdoor activities such as the *Nature Immersion Camp Program* – a five day program in the forest for urban people, a short one day version of it, and the *City Park Program* – also for people from urban area in order to get close to the natural environment via city parks.⁶³⁷ But also civic initiatives, such as petitions to end privatizations or demonstrations against privatization, add to the diversity of common people who fight for water.⁶³⁸

Notwithstanding, Indonesia has also a magazine about water supply and sanitation, namely *Percik*. Its first edition was in August in 2003.⁶³⁹ Usually *Percik* is released in English and Indonesian. However, the past couple of years it was merely released in Indonesian, which might be a sign for a declining demand. The frequency of publishing is nevertheless irregular, as there is no specific pattern. It is published by a working group for water supply and sanitation and has an advisory board assembled by the Director General for Urban and Rural Development and Department of Public Works.⁶⁴⁰ Furthermore, the magazine acknowledges several directors from various governmental institutions as “Board of Trustees,” for example Director of Water Supply Development – Department of Public Works, or Director General on Village and Community

⁶³⁵ Ibid.

⁶³⁶ Institute for Global Environmental Strategies (IGES), (March 2004), p.: 338.

⁶³⁷ Ibid. p.: 339.

⁶³⁸ Indonesia. Public Petition – Demanding Cessation of the Concession Contract of Jakarta Water Supply Services, (submitted on 06.06.2011), <http://www.waterjustice.org/uploads/attachments/PUBLIC%20PETITION-eng-June%202011.pdf> (accessed: 23.08.2016); Dameria Hasibuan, “Jakarta Water Privatization – Workers Campaign to Bring Back Water in Public Hands,” *Municipal Water Supply Workers Union of DKI Jakarta*, (April 2007), pp.: 1-3.

⁶³⁹ *Percik* – Information Media for Water Supply and Environmental Sanitation, “WASPOLA: Giving Birth to National Policy for Development of Community-Based Water Supply and Environmental Sanitation,” *Percik* (August 2003), pp.: 1-16.

⁶⁴⁰ Ibid. p.: i.

Empowerment.⁶⁴¹ We can conclude that at least part of the financial means derive from those agencies. But unlike *PURE*, *Percik*'s financial resources are not clear. Generally, *Percik* focuses on gender issues and water related issues as we can see in illustration 27 below. Thus, *Percik*'s topics are broader than the Singaporean magazine *PURE*. The magazine itself provides different types of information, such as new policies, or initiatives in distinct areas of the country.⁶⁴² The magazine itself is multifaceted. It features scientists to incorporate academic views on the issues' topics.⁶⁴³ However, also minor celebrities are included, such as a winner of a beauty pageant as star guest, particularly the *Queen of Environment Indonesia* in the 2007 issue.⁶⁴⁴ This can be seen as an attempt to appeal also to particularly women/girls and younger generations. Caricatures are also incorporated into each edition for loosening the text and serious content of the topics.⁶⁴⁵ Further, the magazine attempts to involve readers through a "letters to the editor" section and by making open calls for different projects participation.⁶⁴⁶

Illustration 27: Percik Magazine Cover 2007⁶⁴⁷



641 Ibid.

642 Ibid. p.: 25, 28.

643 C.f.: ibid. p.: 8.

644 C.f.: ibid. pp.: 26 et seqq.

645 C.f.: ibid. p.: 2.

646 C.f.: ibid. p.: 2, 30 et seqq.

647 Ibid, cover page.

As elucidated above Indonesia has many domestic NGOs and civic initiatives, which we cannot discuss due to the limited scope of this thesis. Nevertheless, as already touched upon,, many international aid organizations and foreign NGOs such as AusAID, USAID and the Dutch government, are involved in Indonesia's water sector development. Certainly, there are many more partaking measures to bring Indonesia forward like UNICEF, Red Cross or MerciCrops. Again, due to the limited scope we cannot reflect on the activities of the latter organizations. However, the core NGOs and their distinctive pursuits are covered here.

In summary, it appears that Indonesia's activity in the social sector is quite diverse – especially if we take a look at table 38 below. In spite of that, there is a distinction between governmental activity and civic sector activity. The latter take a predominant role. For instance they organize mainly clean ups, go into schools for education, build up networks between NGOs and scientists, and they are also active on social media, while the government “merely” collaborates with other states and international banks in order to receive subsidies.

Table 38: Norms & Conventions Criteria – Indonesia⁶⁴⁸

Category	Indonesia	
Activities & Campaigns	Activities: clean ups, education, network build ups, workshops	Campaigns: “Clean River,” “#adaaqua,” demonstration against water privatization
Nature of Content	Change of behavior: raise awareness, not littering, safety precaution	Change of opinion: take responsibility for pollution
Media & Form	Channels of Communication: magazine, radio, social media	
Origin of campaigns	Sector: mainly social sector (NGOs) with some support from government	Foreign: yes

5.1.10. Core Meso Configuration – Indonesia

Overall, Indonesia's meso rules differ significantly from Singapore's meso rules. The history of Indonesia is marked by a back and forth pattern of decentralization and centralization, which had it effects on the economic and legal sphere. Furthermore, the government does not appear to have a

⁶⁴⁸ Created by author.

particular interest in the development of water or the infrastructure for water supply. On the one hand, the work on the legal structure of Indonesia's water management was significantly slow. And on the other hand, a comprehensive legal structure for water was only began establish since the Law No. 7/2004. Furthermore, there is no evidence of governmental investments into research and development concerning water or water technologies, as it was/is the case in Singapore. The oscillating pattern left a chaos of laws and competencies in the legal area. But also individuals and companies are not well informed who is responsible for what and who has the authority. One of the crucial developments in the history is the final decentralization, when the government gave all the authority to the local level. Currently, the general government does not have the authority to intervene in water development or water pricing. Therefore, the national government lost oversight and control over Indonesia's water situation. The driving force of the water development is on the local level.

The supply of water in Indonesia is either done by semi-stated owned companies, called PDAMs, or by private companies as is the case in Jakarta. PDAMs face a clash of norms: they have to generate profit and they are obliged to supply water to everyone. Both, PDAMs and private companies show a preference to generate profit through high paying customer. Thus, the poor are left behind because expending services into poor areas is not lucrative for the PDAMs/ private company. Furthermore, PDAMs and the private companies show self-serving patterns, such seeking a high internal interest of return. Additionally, the water quality of PDAMs and private companies's is beyond standard. This forces the people to look for different accesses to water. The hands of government are tight if it wants to intervene on the level of PDAMs and the two private companies in Jakarta (local level).

The mistrust and non-collaboration continues in the legal sphere – a pattern, which seems to go through all spheres of Indonesia's societal construct. The agencies work for themselves, trying to implement the IWRM approach. Therefore, we can find overlapping structures, overlapping decisions or even contradicting decisions. The coherency of legislature is characterized by the lack of continuance of law making. Even the currently legal situation is unclear due to the annulment of the Law No. 7/2004. Consequently, people and the private sector are in an unknown state of water supply.

The NGOs take over the work, which usually in other countries the government does, namely promoting to values and collaboration in concern to water. The government actually shows little involvement in changing people behavior and opinion, whether it is the engagement with other countries or own initiatives.

5.2. Micro Level

For the analysis of the micro level the goal was to conduct three interviews for each country. One with an expert in the political sphere, one in the economic sphere and one in the social-cultural area. However, the outcome of this attempt are two interviews for Singapore and one for Indonesia. The first interview is with two persons from the NGO called Waterways Watch Society, while the second is with a government official from 3P Network department of PUB. Although, I have not received any answer from the private sector, I was able to ask the official some questions regarding New Water and desalination due to his position. The interview for Indonesia is with the director of the NGO IndoWater Cop. Unfortunately, all inquiries to the other sectors are still unanswered. There were also differences in technological methods of conducting the interviews. The interview with Waterways Watch Society was carried out via *Zoom* with a video, while the 3P Network official was only reachable via landline. Furthermore, the latter requested all questions in advance. The connection with all interviewees from Singapore was high quality. Whereas the connection of the landline and the internet with the interviewee from Indonesia was constantly breaking up. Therefore, the transcription was constructed through all the different media which was in use over a three-days period of time: e-mail, *Zoom*, *Skype*, landline, and voice messages. As a consequence, merely the content was subject of the interview analysis. These interviews are underlining previous results and function as indicators for how individual opinion/micro rules may be constructed. Nevertheless, they are not representative and must be seen as an accent on the critical meso findings. The key points of the interviews are presented below.

5.2.1. Singapore

The two interviews ensue similar aspects on Singapore's water situation. From the NGO perspective as well as from the PUB official side it is certain that the public needs to be educated to care for water and change its behavior towards sustainable habits. The interviewees Eugen Heng and Muhammad Fariz bin Abdul Kader from Waterways Watch Society (WWS) point out that the people would theoretically know how to behave but do not act in such manner. Nevertheless, a slow process of change in people's opinion and behavior does occur even though the government seemingly “spoiled” its citizens by always providing to clean the water now matter how dirty it initially was. At this point the NGO takes on the citizens' environmental education in order to pursue its the overall goal. Since WWS' opinion is that a minority group of Singapore's inhabitants is aware of its water problem, they try to expand this group until it becomes the majority, which takes care of water and acts upon its beliefs. The goal of WWS is to have a deep impact on individuals. Thus, they work only in small groups with a hands-on method in order to transmit the

message of how precious water is and that especially in their geographical area clean drinking water is rarity. Both, WWS and the government official, concur that it is the government's obligation to manage Singapore's water supply at any costs. WWS perceives the role of NGOs as not tangible due to the “soft” educational component, while the government holds a rather tangible role because it physically constructs infrastructure and provides drinking water. However, this is indeed a crucial point in an NGO's work. As the government cannot “paint a bad picture” the NGOs need to take this duty upon themselves to show physically and in details all the “ugly” sides of water pollution. This type of engagement requires everyday commitment, which they try to transmit to the people. Therefore, the governmental campaigns are perceived as PR for political agenda which merely last for a day or a week. WWS propose to go even further and to evaluate everyone's actions throughout the year. Consequently, the government would need NGOs in order to fulfill the necessary task of communicating the water preservation message to the people. On the other hand, WWS stresses that NGOs cannot challenge people's attitudes and their behavior without the backup of the government on the legislative level. Therefore, they need to work together. Heng explains that due to the size of Singapore the country can not bear the expenses of radical opinions. As a consequence, NGOs display negative aspects of Singapore's water situation in order to remind the inhabitants of the faulty occurring matters, while at the same time working in partnerships with the government.

The government, on the other side understands NGOs not as crucial but rather as helpful, due to their feedback and external input of new ideas, which the government can use to build their policies around. For instance, a group called Water Network meets up about three to four times a year to discuss current issues. This group consists of journalists, NGOs and private sector agents. Hence, the social-cultural components are beneficial for one of three categories the government is active in order to manage the demand side. The second category is concerned with mandatory measures such as taxes of technical standard, which can be achieved through policies. The third classification is the pricing through which the government aims to express the value of water. Therefore, the Singaporean government does not subsidize water. As stated by, 3PN official Gorge Madhavan, subsidies would actually penalize customers since companies cannot produce water at a high quality level for a low price. The government helps low-income households through vouchers, so the revenue for producers stays the same. Therefore, the government regards the water pricing system as financial sustainable. WWS sees water as heavily subsidized by the government.

The emphasis of the government lies on the development of water supply because two out of four water taps (water from Malaysia and reservoirs) suffer from climate change. Thus, the government regards their planning and development in technological area (New Water and

desalination) as longterm sustainable planning. They continue to invest in R&D and further technology. At this point WWS disagrees, stating that government's behavior is actually short- or middle-term minded, because they are looking for new sources of how to provide water. Hence, the focus is on usage of water not changing attitudes and behavior of people, which the NGO regards as sustainable in the longterm. The government, however, does see its actions as long term because they plan how to provide water 15-100 years ahead. In regard to economic sustainability, Madhavan sees that the modus operandi Singapore has chosen is the most sustainable one. Because the private sector would not be able to manage the whole water cycle due to differences in values and efficiency. Furthermore, they would have to coordinate with other companies, which manage drainage or water treatment plants. As a result, disagreements disrupting the cycle might occur as can be observed in other surrounding countries (eg.: Indonesia). Hence, Singapore has decided to manage its water cycle via one agency with its primary goal to supply water and not generate profit. Both sides focus on two different points in terms of their perspective on what longterm sustainability is. The one side says, yes, you need to provide water but you also need to change people opinion about it, so you do not have to look so much for alternative water resources. While the other side says, we have to look for alternative water resources and we have to provide cheaper, faster and more efficient technologies in order to sustain ourselves in a longterm perspective. Interestingly, WWS regards the governmental policies as very consistent, because water was always viewed as a precious resource, which need to be conserved and taken care of. The government worked continuously on expanding its services. As a consequence, Singapore has not experienced shortages since the sixties. The government went so far, that even the rainwater is owned by the government in order to guarantee an equal distribution of water. As water is a common good and nobody should have an advantage. Everybody pays the “same” price for water and has access to water. Overall, all interview partner s summarize Singapore's water situation in quite similar manner. Both think that Singapore has water due to the extended supply, but people should still not take it for granted or be satisfied with their water situation.

5.2.2. Indonesia

In comparison to Singapore, the image of Indonesia's water situation is painted in darker shades. The government and NGOs stand at a discordance in regard to water. IndoWater's perception is that the government is not taking care of the water properly, and that it is even not capable to manage its water at all. Thus, the NGOs are taking over the role, which the government should actually play. Indonesia's problem is its continuous deteriorating water quality without seemingly any intervention from the governmental side. However, coordination platforms were

installed in order to communicate between different water management levels. The intention was a top-down approach. Nonetheless, those platforms actually work as information platforms and participants, which are sent by the agencies, usually have no decision power. They are merely there for the formalities. Hence, those platforms are not functioning the ways they are supposed to work. Furthermore, decision and measures taken by the government are not effective since they are also not holistic. They think only from one project to the next and do not plan far ahead, which leads to unsustainable consequences. Overall, IndoWater perceives the government as not able to learn from its mistakes. In addition to the governments little activity and unwillingness to react to critics or other forms of feedback in regard to water, Indonesia's legislation is unsettled and leaves many legal loopholes. As a consequence, NGOs engage heavily in litigation and sues the government and its agents such as a governor for not paying attention to environmental effects. The NGO focuses on implementing IWRM through their communication platforms, manifesting a bottom-up negotiation approach with range of participants. Another difficulty is the withholding of information on the part of the government such as water quality data, even though such information is regarded as public. The government works only with NGOs, which are not critical of the government but rather comply with it. The rest of the NGOs are the ones which take legal actions against the government in order to initiate an opening-up process until the government eventually admits that it made a mistake. Nevertheless, the goal of IndoWater is to support the governmental agencies. Although it appears that IndoWater is fighting the government, they actually want to support it and to advance the country's water development faster than through law suits and court decisions, which is a much slower ways. IndoWater wants to assist the government on different levels. They also attempt to assist governmental decision processes through community participation at all states of water management, by implementing IWRM a bottom-up approach. Notwithstanding, the private sector such as PDAMs, smaller third private parties, and particularly Jakarta's water companies, which is endued of all of Jakarta's water, are regarded as not economically sustainable. A few PDAMs, which are known to IndoWater, are actually economically sustainable and generate profit with low water tariffs. Thus, the NGO presumes that other PDAMs and operators can do it as well. The hinderance would merely be in the mindset and goals, which lie behind operators motivation. The overall perception of Indonesia's water situation is that is it quite a mess and NGOs had to play the roles which should be government responsibility in managing water resources.

6. Conclusion

The two neighboring countries, Singapore and Indonesia, are geographically so close, yet so different in their approach to handle their water situation. The goal of this thesis was to identify the dynamics of each country's approach to water management. The chosen framework is the co-evolutionary theory of economics in combination of the sustainability driven entrepreneurship approach. The result was inter an interdisciplinary analysis on three spheres: economic, political and social-cultural. The major findings of the analysis within the frame of three types of entrepreneurship in Singapore and Indonesia are summarized in table 38 below.

Table 39: Major Findings

	Singapore	Indonesia
Economic Entrepreneurship	- artificially created water supply market via temporary contracts - government oversees finances of contractors (private companies) - water tariffs cover production costs of water - extensive investments into R&D - substantial technical development	- semi-private companies (PDAMs) or private companies responsible for water supply - national government has no authority to intervene - water tariffs do not cover production costs - no particular investments into R&D - no substantial technical development
Political Entrepreneurship	- government continuously engaged with water problems - laws are constitutive - agencies collaborate with each other - no competition between agencies	- government has no particular focus on water problems - laws change and are not fully established (back and forth between centralization & decentralization) —> law situation is not clear - no collaboration between agencies - competition between agencies
Social-cultural Entrepreneurship	- government heavily engaged in water education and promoting water ownership - a few domestic NGOs - NGOs support the government with their work - government & NGOs are very active on social media	- government almost no engagement - many domestic and international NGOs - NGOs take over government's role, and sometimes even work against the government - government is not active on social media, NGOs are very active on social media

The economic entrepreneurship in Singapore is characterized through an artificially created water supply market. The government creates those through temporary contracts of 20-25 years time period. Indonesia, on the other hand, has semi-private companies called PDAMs. In Jakarta only private companies are accountable for the water supply. Singaporean government oversees the finances of the contractors, while Indonesian government has no power to intervene. All the power lies within the local government like regencies, cities or municipalities. Singapore's water tariffs are also set by the government. However, the conditions for the water tariffs demand the coverage of the water production costs so water producing companies are still motivated to continue their work. The water tariffs in Indonesia usually do not cover production costs. In the case of Jakarta, there is

even a misuse of water tariffs and water charges which are claimed production costs by the private companies. Instead, the country is getting more in debt. In Singapore we see an extensive investment in R&D from the governmental side. But also the private sector is interested in the developing new technologies due to the *Hydro Hub*. Throughout our analysis, we cannot identify any extensive investments into R&D in Indonesia – neither from the general governmental sites, nor from PDAMs nor the private contractors. Therefore, we also see no substantial technical development in Indonesia. While in Singapore the existing technology for water production is in constant development.

We found also great differences between Indonesia and Singapore in the field of political entrepreneurship. In Singapore, the government continuously engages in water problems. As from the beginning it was clear that the government will overtake the problems of water supply – either through cleaning its waterways or making momentous decisions of moving businesses. The government in Indonesia, however, shows no particular focus on water as the Singaporean government does. Basic water laws change or they are not fully established, as it was the case with the first water resource law in 1974. It took 30 years to make a new basic water resource law (2004) and because in order to be fully established the basic water law needs surrounding laws. The design and enactment of surrounding law still continues today. Furthermore, the back and forth between decentralization and centralization made the application of laws difficult. Until today the law situation in Indonesia is unclear, specifically due to the annulment of the last water resource law in 2015. The Singaporean water legislature builds up and goes more in depth of previous water laws. In Singapore we see collaborations between agencies and no competition. However on the Indonesian side, the agencies do not collaborate as we saw with the working groups of different agencies. Even more, there is a certain competition between agencies. Again we see the pattern of aligned work of involved parties in Singapore, and chaotic and unclear activities in Indonesia.

In terms of social-cultural entrepreneurship, the government in Singapore heavily engaged in educating and promoting water ownership and water provision. Yet in Indonesia, we do not see such an engagement of the government of such scale. However, Indonesia has many domestic and international NGOs, which take over the government's role because it is not active. Sometimes the NGOs even work against the government and sue it. Other countries, such as Australia or the U.S are engaged in Indonesia's social-cultural sector. In Singapore all NGOs are domestic and are only a few. These NGOs support the government in its work, through further education, clean ups and advisory. Both, NGOs and the Singaporean government are very active in the social-cultural sphere. Furthermore, both use social media extensively – a modern tool to reach great mass of a population.

But the Indonesian government is not active on social media. Concretely, either it does not have a channel on a social media plat form or it registered an account but does not use it. The NGOs in Indonesia, on the other hand, communicate actively through social media in order to reach the people.

The questions which arise are whether these entrepreneurship are future oriented, whether they include economy, society and environment, and whether they are innovative. In Singapore, we can observe longterm planning by the government, considering 25 year long contracts with private companies, setting up a strategies to make Singapore a *Hydro Hub*, and the construction of a deep drainage system. Singapore attempts to conserve the environment, to keep its waterways clean and to engage the society through activities, education and promotion of healthy water usage. At the same time it supplies water to everybody and provides the financial means if low income households cannot afford water. And with the costs covering tariffs the water market continues to flower; also because of extensive investments. In Indonesia, however, the pattern of competition and non-collaboration pervade every other sphere of the societal construct. The economic entrepreneurship is short-term focused by aiming higher profits rather than high quality service. Due to such behavior on the corporate side, social needs (access to clean water for everyone) are not met. The society is simply not the focus of Indonesia's water management. Even though the 25 year old contract in Jakarta was aimed for a longterm supply and expansion of water networks, it turned out to be an adhesion contract. Indonesia is nowhere near of innovative technology, but it is rather at the state of fixing pipes to avoid leakages and keeping water running. Overall, we can say that Singapore shows a sustainable character of its three types entrepreneurship, while Indonesia can be regarded as not sustainable.

Limitations

This analysis had serval limitations. The used theory is can be regarded a new theory and is thus not well established in the academia as classical or neoclassical theory of economics. Further, one might question if co-evolutionary theory is actually an new type of approach rather than a theory. The theory itself is quite broad and expands the scoop of this research. Therefore, it was not possible to analysis the macro level. The analysis of the micro level, as it is originally suggested, is mathematical and does not identify clear opinions from individuals. Semi-structured interviews pose an effective solution. Nevertheless, as we saw in this thesis, the conducted interviews are not enough to have a proper base for an analysis. Those interviews function as support of the findings on the meso level, underlining and setting accents to the content. Particularly, it was difficult to

receive answers from Indonesia. Consequently, more quantitative interviews would be needed to conduct an in depth analysis of the micro level. Other things like velocity and different types of rules are described in the co-evolutionary theory. Yet again, an analysis of types of rules and velocity would go beyond the scope of this thesis. For the same reason, the focus of tacit norms and conventions was on the use of tools such as social media, online magazines and major campaign. Additional indicators to observe could be TV commercials, local newspapers, and local radio programs.

Implications

Further interesting research would be an investigation of individual behavior. Either through qualitative interviews or field research it might be possible to examine indicators for change of individual behavior and then deduct to possible change of population behavior. An additional analysis of the macro level would contribute to this work. Through this thesis we see the difference between Singapore, representing a developed county or a city, and Indonesia, representing a developing country. The comparison of those two country contributed to the academic research. The next step could be to examine how these two different countries can learn from each other. So, how can advanced countries like Singapore teach others to manage water or share their knowledge? And how can countries like Indonesia implement learnings of developed countries? Maybe in the future we can foster those learnings, by identifying macro, micro and meso level units and their traits in order to be able to adjust policies, educational tools or economic methods to a country's need – in such a way as to enable economic, political and social-cultural entrepreneurs to keep the water clean and make this the way of life.

7. Abbreviations

ABC Waters – Active, Beautiful, Clean Waters

ADB – Asian Development Bank

APWF – Asian Pacific Water Forum

AWDO – Asian Water Development Outlook

BAPEDAL – Badan Pengendalian Dampak Lingkungan (Engl.: Agency of Environmental Impact Management)

BCA – Building & Construction Authority

BPK – Badan Pemeriksa Keuangan (Engl.: Supreme Audit Agency)

BPKP – Badan Pengawasan Keuangan dan Pembangunan (Engl.: Financial and Development Supervisor Agency)

BPPSPAM = Badan Pendukung Pengembangan Sistem Penyediaan Air Minum (Engl.: National Development Planning Board and Development Support Agency for Water Supply System)

CA – Cooperation Agreements

CASP – Corporate and School Partnership

CGS – Clean and Green Singapore

CGW – Clean and Green Week

CSR – Corporate Social Responsibility

CPI – Consumer Price Index

DB – Design-Build contract

DBB – Design-Bid-Build contract

DBOO – Design-Build-Own-Operate contract

DPRD – Dewan Perwakilan Rakyat Daerah (Engl.: Regional Representatives Council)

EEA – Environmental Educational Advisor

EPC – Engineer-Procurement-Construction contract

EPCA – Environment Pollution Control Act

EWI – Environment and Water Development Council

FSB – Fire Safety Bureau

GDP – Gross Domestic Product

GDS – PT Garuda Dipta Semesta

GPOBA – Global Partnership on Output Based Aid

HIPPAM – Himpunan Penduduk Pemakai Air Minum (Engl. Association of Drinking Water Users)

IndII – Indonesian Infrastructure Initiative

IndoWater CoP – Indonesia Water Community of Practice

IWP – Institute of Water Policy

IWRM – Integrated Water Resource Management
 KATI – PT Kekarpola Thames Airindo
 LTA – Land Transport Authority
 MDG – Millennium Development Goals
 MEWR – Ministry of Environment and Water Resources
 MF – Micro-filtration
 MOE – Ministry of Education
 MOF – Ministry of Finance
 NEA – National Environment Agency
 NParks – National Parks Board
 NRW – Non Revenue Water
 OECD – Organization for Economic Co-operation and Development
 Palyja – PT PAM Lyonnaise Jaya
 PAM – Perusahaan Air Minum (Engl.: water company)
 PDAM – Perusahaan Daerah Air Minum (Engl.: local water company)
 PM – Prime Minister
 PP – Private Partner
 POV – Point of View
 PT PAM – Perseroan Terbatas Perusahaan Air Minum (Engl.: limited liability water company)
 PPP – Public-Private Partnership
 PUB – Public Utility Board
 RAS – Restroom Association Singapore
 RO – Reverse Osmosis
 R&D – Research and Development
 SC – Subscription Connection
 SDA – Sewerage and Drainage Act
 SDE – Sustainability Driven Entrepreneurship
 SINGwater – Singapore INnovation Gateway for Water
 SIWI – Stockholm International Water Institute
 SIKLUS – Siaran Khusus Lingkungan Sekitar (Eng.: Special Program on Our Surrounding Environment)
 TPJ – PT Thames PAM Jaya
 U-Save – Utility Save
 URA – Urban Redevelopment Authority
 UV – Ultra-Violet

WATSAL – Water Resources Sector Adjustment Loan

WB – World Bank

WCED – World Commission on Environment and Development

WCT – Water Conservation Tax

WEB – Water Efficient Building

WHO – World Health Organization

WPCDA – Water Pollution Control and Drainage Act

WWS – Waterways Watch Society

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9. Appendix

9.1. Water Coverage in Indonesia

Water Coverage in Indonesia 1980-2013 (sorted by year)

1987			
Typ	Urban in %	Rural in %	Total in %
Tap Water	33,5	2,6	11,8
Ground Water	64,4	87,5	80,6
Rain Water	0,8	2,1	1,7
Bottled Water	-	-	-
Surface Water	1,2	7,5	5,6
Other non-improved	0,0	0,4	0,3
Total	99,9	100,1	100

1991			
Typ	Urban in %	Rural in %	Total in %
Tap Water	38,9	4,5	14,6
Ground Water	58,2	83,1	75,8
Rain Water	1,2	2,6	2,2
Bottled Water	-	-	-
Surface Water	1,1	8,3	6,2
Other non-improved	0,5	1,4	1,1
Total	99,9	99,9	99,9

1997			
Typ	Urban in %	Rural in %	Total in %
Tap Water	39,9	7,0	19,2
Ground Water	57,9	83,1	73,9
Rain Water	1,3	3,7	2,8
Bottled Water	-	-	-
Surface Water	0,7	5,5	3,7
Other non-improved	0,4	0,7	0,6
Total	100,2	100	100,2

1980			
Typ	Urban in %	Rural in %	Total in %
Tap Water	26,4	2,1	7,0
Ground Water	66,6	81,7	78,7
Rain Water	1,4	1,5	1,5
Bottled Water	-	-	-
Surface Water	2,1	12,7	10,5
Other non-improved	3,1	1,9	2,1
Total	99,6	99,9	99,8

1990			
Typ	Urban in %	Rural in %	Total in %
Tap Water	33,4	4,4	12,9
Ground Water	63,4	82,9	77,3
Rain Water	1,4	2,5	2,2
Bottled Water	-	-	-
Surface Water	1,0	9,2	6,8
Other non-improved	0,8	1,0	1,0
Total	100	100	100,2

1994			
Typ	Urban in %	Rural in %	Total in %
Tap Water	37,1	5,9	15,2
Ground Water	60,9	84,3	77,4
Rain Water	1,1	2,5	2,1
Bottled Water	-	-	-
Surface Water	0,4	6,7	4,8
Other non-improved	0,6	0,5	0,5
Total	100,1	99,9	100

1998			
Typ	Urban in %	Rural in %	Total in %
Tap Water	37,9	8,0	19,1
Ground Water	58,3	82,1	73,3
Rain Water	1,3	3,3	2,6
Bottled Water	1,6	0,3	0,8
Surface Water	0,5	5,7	3,8
Other non-improved	0,5	0,6	0,5
Total	100,1	100	100,1

1999			
Typ	Urban in %	Rural in %	Total in %
Tap Water	36,4	7,0	18,6
Ground Water	59,3	83,2	73,8
Rain Water	1,4	3,7	2,8
Bottled Water	1,8	0,3	0,9
Surface Water	0,6	5,4	3,5
Other non-improved	0,4	0,5	0,5
Total	99,9	100,1	100,1

2001			
Typ	Urban in %	Rural in %	Total in %
Tap Water	33,6	6,5	18,3
Ground Water	60,7	83,0	73,4
Rain Water	1,5	4,2	3,1
Bottled Water	2,9	0,3	1,4
Surface Water	0,7	5,7	3,5
Other non-improved	0,5	0,3	0,4
Total	99,9	100	100,1

2002			
Typ	Urban in %	Rural in %	Total in %
Tap Water	33,3	6,2	-
Ground Water	61,3	83,8	-
Rain Water	1,4	4,0	-
Bottled Water	2,9	0,3	-
Surface Water	0,7	5,5	-
Other non-improved	0,4	0,4	-
Total	100	100,2	0

2003			
Typ	Urban in %	Rural in %	Total in %
Tap Water	28,9	7,1	-
Ground Water	59,3	80,7	-
Rain Water	1,2	3,2	-
Bottled Water	6,2	0,8	-
Surface Water	0,3	6,0	-
Other non-improved	4,0	2,0	-
Total	99,9	99,8	0

2004			
Typ	Urban in %	Rural in %	Total in %
Tap Water	32,8	7,0	-
Ground Water	59,8	84,0	-
Rain Water	1,4	3,4	-
Bottled Water	4,9	0,6	-
Surface Water	0,6	4,6	-
Other non-improved	0,5	0,4	-
Total	100	100	0

2006				
Typ	Urban in %	Rural in %	Total in %	
Tap Water	48,7	45,8	-	-
Ground Water	10,9	44,3	-	-
Rain Water	-	-	-	-
Bottled Water	13,0	1,7	-	-
Surface Water	27,0	7,8	-	-
Other non-improved	0,4	0,4	-	-
Total	100	100	0	0

2007				
Typ	Urban in %	Rural in %	Total in %	
Tap Water	28,4	9,0	17,3	
Ground Water	49,6	79,4	66,6	
Rain Water	1,9	2,5	2,2	
Bottled Water	14,9	2,3	7,7	
Surface Water	1,0	5,5	3,6	
Other non-improved	4,2	1,2	2,5	
Total	100	99,9	99,9	

2008				
Typ	Urban in %	Rural in %	Total in %	
Tap Water	25,8	6,8	-	-
Ground Water	52,1	80,9	-	-
Rain Water	1,4	4,7	-	-
Bottled Water	7,9	0,7	-	-
Surface Water	0,4	4,6	-	-
Other non-improved	0,2	0,3	-	-
Total	87,8	98	0	0

2009				
Typ	Urban in %	Rural in %	Total in %	
Tap Water	24,8	7,1	-	-
Ground Water	49,1	80,5	-	-
Rain Water	1,5	4,3	-	-
Bottled Water	9,0	0,7	-	-
Surface Water	0,4	4,3	-	-
Other non-improved	0,2	0,3	-	-
Total	85	97,2	0	0

2010				
Typ	Urban in %	Rural in %	Total in %	
Tap Water	23,0	8,6	15,7	
Ground Water	49,6	77,5	63,6	
Rain Water	1,2	4,3	2,8	
Bottled Water	25,5	4,1	14,7	
Surface Water	0,4	4,9	2,7	
Other non-improved	0,3	0,5	0,4	
Total	100	99,9	99,9	

2011				
Typ	Urban in %	Rural in %	Total in %	
Tap Water	16,9	6,1	2,1	
Ground Water	47,1	77,3	-	-
Rain Water	1,0	3,8	3,0	
Bottled Water	34,4	8,0	-	-
Surface Water	0,4	4,6	-	-
Other non-improved	0,1	0,3	-	-
Total	99,9	100,1	5,1	

2012				
Typ	Urban in %	Rural in %	Total in %	
Tap Water	18,7	6,3	12,5	
Ground Water	41,1	77,5	59,3	
Rain Water	1,0	3,1	2,0	
Bottled Water	38,4	8,8	23,6	
Surface Water	0,5	4,1	2,3	
Other non-improved	0,4	0,2	0,3	
Total	100,1	100	100	

2013				
Typ	Urban in %	Rural in %	Total in %	
Tap Water	15,9	6,2	11,0	
Ground Water	40,2	73,6	57,0	
Rain Water	1,0	4,1	2,5	
Bottled Water	15,0	1,8	8,3	
Surface Water	0,3	3,6	2,0	
Other non-improved	0,1	0,2	0,1	
Total	72,5	89,5	80,9	

Water Coverage in Indonesia 1980-2013 (sorted by source)

Rain Water				Bottled Water			
Year	Urban in %	Rural in %	Total in %	Urban in %	Rural in %	Total in %	
1980	1,4	1,5	1,5	-	-	-	-
1987	0,8	2,1	1,7	-	-	-	-
1990	1,4	2,5	2,2	-	-	-	-
1991	1,2	2,6	2,2	-	-	-	-
1994	1,1	2,5	2,1	-	-	-	-
1997	1,3	3,7	2,8	-	-	-	-
1998	1,3	3,3	2,6	1,6	0,3	0,8	0,8
1999	1,4	3,7	2,8	1,8	0,3	0,9	0,9
2001	1,5	4,2	3,1	2,9	0,3	1,4	1,4
2002	1,4	4,0	2,7	2,9	0,3	1,6	1,6
2003	1,2	3,2	2,2	6,2	0,8	3,5	3,5
2004	1,4	3,4	2,4	4,9	0,6	2,75	2,75
2006	-	-	-	13,0	1,7	7,35	7,35
2007	1,9	2,5	2,2	14,9	2,3	7,7	7,7
2008	1,4	4,7	3,05	7,9	0,7	4,3	4,3
2009	1,5	4,3	2,9	9,0	0,7	4,85	4,85
2010	1,2	4,3	2,8	25,5	4,1	14,7	14,7
2011	1,0	3,8	3,0	34,4	8,0	21,2	21,2
2012	1,0	3,1	2,0	38,4	8,8	23,6	23,6
2013	1,0	4,1	2,5	15,0	1,8	8,3	8,3

Year	Surface Water		
	Urban in %	Rural in %	Total in %
1980	2.1	12.7	10.5
1987	1.2	7.5	5.6
1990	1.0	9.2	6.8
1991	1.1	8.3	6.2
1994	0.4	6.7	4.8
1997	0.7	5.5	3.7
1998	0.5	5.7	3.8
1999	0.6	5.4	3.5
2001	0.7	5.7	3.5
2002	0.7	5.5	3.1
2003	0.3	6.0	3.15
2004	0.6	4.6	2.6
2006	27.0	7.8	17.4
2007	1.0	5.5	3.6
2008	0.4	4.6	2.5
2009	0.4	4.3	2.35
2010	0.4	4.9	2.7
2011	0.4	4.6	2.5
2012	0.5	4.1	2.3
2013	0.3	3.6	2.0

Year	Non-improved Water		
	Urban in %	Rural in %	Total in %
1980	3.1	1.9	2.1
1987	0.0	0.4	0.3
1990	0.8	1.0	1.0
1991	0.5	1.4	1.1
1994	0.6	0.5	0.5
1997	0.4	0.7	0.6
1998	0.5	0.6	0.5
1999	0.4	0.5	0.5
2001	0.5	0.3	0.4
2002	0.4	0.4	0.4
2003	4.0	2.0	3
2004	0.5	0.4	0.45
2006	0.4	0.4	0.4
2007	4.2	1.2	2.5
2008	0.2	0.3	2.25
2009	0.2	0.3	2.25
2010	0.3	0.5	0.4
2011	0.1	0.3	0.2
2012	0.4	0.2	0.3
2013	0.1	0.2	0.1

9.2. Interviews

I. Interview Guidelines for Singapore

Singapore					
	Personal	Political	Economic	Social-Cultural	Last Question
NGO - Eugene Heng	A) Can you briefly introduce yourself? Say in what field you are working and what are your main duties are?	2: Singapore's government is very strong . How do you evaluate their performance? (Reliability, interagency collaboration)	3: In Singapore government creates an artificial market for companies for water supply in form of 20-25 year contracts. What is your position upon this issue? (Is it right that private companies become responsible for water treatment? Tendency towards privatisation)	1. What are your main goal with this NGO/ activity?	4: Can you describe the water supply situation in Singapore in one sentence?
	B) What was your motivation in this field		Are the private sector's activity sustainable?	How do you reach the people?	
				How is your activity different from the government?	
Pol. - George Madahan	A) Can you briefly introduce yourself? Say in what field you are working and what are your main duties are?	1: Why do you think it 3PN important for Singapore?	2: In Singapore government creates an artificial market for companies for water supply in form of 20-25 year contracts. What is your position upon this issue? (Is right that private companies become responsible for water treatment? Does the government still keep overview to a certain degree)	3: There are different NGOs in regard to Water conservation in Singapore. How do you think they are different from the government activity?	4: Can you describe the water supply situation in Singapore in one sentence?
	B) What was your motivation to work in this field?	2: How does 3 PN work influence the political decisions/legislature? (Does it influence the collaboration of governmental agencies?)	Are the private sector's activity sustainable?	Do you think Singapore need the activity of NGOs? (Isn't the government enough? If they comply with goals?	

II. Interview with Waterways Watch Society – 15.06.2016 (via zoom with video)

Interviewer: Elena Popov (author) – Q

Interviewees: 1. Eugen Heng – A1 and 2. Muhammad Fariz bin Abdul Kader

Q: First question. Can you briefly introduce yourself and say what field you are working in and what your main duties are?

A1: Okay. I start myself and if I will give/ handover to Fariz. I am Eugene.

Q: Mhhmhh.

I am the chairman and founder of the organization Waterways Watch.

Q: Mhhmhh.

A1: We are 19 years old. Ah, and we do environmental education and awareness programs for schools, and corporates, and basically for anybody who wants to know more about sustainable environment – in the specific area *water*. That is what we started of basically. But now launch of into other areas. I let Fariz explain that in little more detail later. Ahh, and basically I have a banking history career.

Q: Mhhmhh.

A1: I am not an environmentalist. (Q chuckles) Worked in a bank, but just love the environment. That's why I started [inaudible] while I was working. Fariz.

A2: Okay. I am Fariz. I joined as a member in 2006. In 2006 I was voluteer.

Q: Mhhmhh.

A2: So in 2000 – I think end of 2011 – ahhh, I joined as a full-time staff.

Q: Mhhmhh.

A2: Alright. At that time I was a – but then, but then then I became a full-time. So I've stopped becoming a volunteer in a sense. 'cause I was already working full -time here. That's why there are other full-timers, besides me. So in terms of duties, that makes me the administrator.

Q: Mhhmhh.

A2: Ahhmm, and I also conduct programs. In a nutshell.

Q: Mhhmhh.

A1: But he actually volunteers on weekends also. (jokes with a wink & smiles)

(Q laughs)

A1: But it's an agreement without [inaudible]. Full-timer are on on weekdays, but weekend activities, that's when most of my full-time volunteers get back in to service.

Q: Mhhmhh.

A1: And to clarify also, in essence: Although they are full-time, they are also partially volunteers, because most of my full-time staff are paid below market rate.

Q: Mhhmhh.

A1: They are all graduates of poli – graduates of diplomat or this. They are all paid below commercial rates. So that in an essence – to put the record straight – is a really voluntarily term.

Q: Okay. Awmh. What is then the motivation of you two to work in this field?

A1: For me, I guess, I saw the need. Because there was a strong lacking in the people in Singapore of appreciating our water. So to care about water. How water is life. People don't understand when it is so easily available. And commercially, it is not a commercial product. It is not so expansive. It cannot be so expansive. No? Ah, people take things for granted. And I a need that we should bring back the reality to the people of Singapore: that we should respect and appreciate this. Ah, because you cannot create water. You can buy water, if somebody wants to sell. And other than that, it is the gift of god. No? (Cell phone rings.) And if you don't have it, then you don't have it. So no matter how rich you are, if you don't have water, you don't have water. So that was my motivation. I wanted to show people to ensure a sustainable future and environment for Singaporean people. For Fariz...

A2: So for me, I was actually looking for a place to volunteer. Ahh, I kind of – I guess I was questioning in environmental sense from ever since I was schooling.

Q: Mhhmhh.

A2: Ahhmm. But I didn't have the opportunity of (thinks) – I guess I was in for finding a place to volunteer. And the chance came when I was in university as an undergrad. Ahh, and in part of time we get to do some hours of community service. This was mandatory. Without this, 80 hours of community service, we couldn't graduate.

Q: Mhhmhh.

A2: So they kind of forced us to contribute to society. And ahmm. So it was quite opportune that, ahmm, I joined the Waterways Watch Society as a volunteer facilitator for academia. And then from there ever since I – after those three days and two nights working with them I decided to continue on my, on my journey as a waterway watch volunteer.

A1: He was more touched once he got to know the work. (Laughs)

Q: (laughs)

A2: Yeah. (smiles).

A1: Well, I guess the motivation between the two of us that keeps us going, that the people that we meeting keeps on motivating us.

A2: Uhm (affirmative).

Q: Mhhmhh.

A1: You meet people who are disinterested or you don't meet people, because nobody is interested. You sort of loose interest and passion. But, you know, we've continued without realizing it. It is already so many years. It's because there has been a demand for it.

Q: Mhhmhh.

A1: You see: I assume, that there is a need of our services and appreciation. And so we continue.

Q: Now, you've mentioned that, ehm, you started with the education and that there was a lack of it there. Ehm. Do you so that over the past years or since you have started, did it change in Singapore? Did the perception of the people towards water changed?

A1: Ehm, from my perspective I see a change. But the change is very slight and very slow. Ehm, it has been little more encouraging this year from the government's side. And from the inquiries that we get from schools and cooperates, we find that there is hope. That there is people – they are beginning to take an interest to say: What is the environment? Why do we need to sustain it? What is water? Why is water so important? So we are beginning to see the change. But personally – maybe I am quite impatient – 19 years are a little bit too slow. (Smiles)

A2: Mhhhmhh. (Nods and chuckles)

Q: (Chuckles)

A1: But this year is quite encouraging. Although, still, in my opinion, we should be much faster in changing that all.

A2: So a few things, eh, actually, ehm from my opinion of/about Singapore and about the water, eh, and environmental kind of things here – is that, ehm, we at waterways watch society – and the main factor is that we, eh, do not have the capacity. And we also prefer not to handle large groups of people at one time. So we are trying that the groups are small, that the students that we talk to, the companies, that we talk to when we invite them to do the programs with us – environmental awareness programs. Ehm, due to logistical consensus sort of, ehm, we have to keep the number small. But also we prefer that. Because, I find that small is more effective in, eh, leaving an impact. Ehm. And in engaging someone, it is better to have small groups. So this is one factor. I wouldn't say it is the only factor, but, ahm. One thing is, that is slowing this phase, because there are only so many people that we can here.

A1: Yeah. We, we, we quickly found out that mentoring is more or less is close to engagement and holding your hands and bringing you –

A2: (Nods) Mhhmm.

A1: Ehh – gives better results, than going and doing a lecture or a talk to thousands of people in a school.

Q: Mhhmhh.

A1: – or in a seminar or a forum. Because human beings, I think, take life a lot for granted and listening to lectures or seeing a movie can be helpful to some extant. But once you leave the movie/ the theater or you leave the lecture hall –

Q: Mhhmhh.

A1: – you begin to forget. But when you personally come and I showed you. And you and me actually saw the litter, smelled the litter, picked up the litter – able to reflect back that it comes from us, our human behavior. I think it is a better chance that you go and leave my place with more – what do you call – a better believe.

Q: Mhhmhh.

A1: And, eh, more meaningful impression that you will not forget.

Q: Mhhmhh.

A1: So unfortunately, as Fariz says, this boat of sharing and educating and bringing awareness is a slow process. I cannot do 1000. We can only do in small numbers.

Q: Mhhmhh.

A1: But, that's the way it is, I think. It has to be. There is no other way. Unless, you pass a law. And when you pass a law you need to enforce.

Q: Mhhmhh.

A1: Without enforcement there is no point. The law is just on paper.

Q: Mhhhhh.

A1: This is the problem.

A2: Yes. And as you foresaw (directed to A1) – actually no.

A1: – in your youth?! (laughs)

A2: (laughs). No, actually.

A1: (laughs) Now talk. (laughs).

A2: Almost. Almost. (laughs). Ahhm, well, I think the main problem here in our society is also that – Ahh, like. Well, you didn't say that there is a lack of awareness. (Directed towards A1) Ehm, I think further than that. Even though there is awareness, ahhh, it takes some time for real to converted into –

A1: – action

A2: – into action and habits. And we have very very big opposing force to that to that matter or that effort so far. And it is called apathy in my opinion. Yeah, people are – many people do not simply, simply just don't care about this issues. Ahhh, it's not, eh, the main but it is our daily concern.

A1: Yet.

A2: Yeah, yet. Whether we have enough water. Or whether the water is clean. Because when our water is delivered to us in terms of drinking water, we can actually drink it from the tap, which not many countries in our region enjoy.

Q: Mhhhhh.

A2: So in my honest opinion we've become very complacent. Ahm, mainly because we always have clean drinking water out of the tap. There never – at least, eh, you know, ever since, ah, at least my 32 years in Singapore being alive. Ahhh, there is – there was never a time when we had serious water shortages.

Q: Mhhhhh.

A2: But when I ask my parents and grandparents, those were the realities they had to face. If not every day, every week – you know. Ahm, but for us youth, I would say that we are very blessed, we

are very blessed to be living in a what we consider a first world country and all the necessities are there. So we don't value water as we should. I think that's another problem as well. Yeah. So many of us don't see the need waste/ to save water, ahh, you know. Ehh, we have other people cleaning our rivers for us as well as our reservoirs. So, ahm. We – when we don't take personal ownership, I think this is one of the big problems.

Q: Mhhhhh.

A1: Yeah.

Q: Ehm, okay. So, the next question would be: What the main goals – you kind of already answered it. So the main – can you put it more in a nutshell what you main goals of your NGO activities are?

A1: Well, I think our main goal is to trying to convince and influence the minority group to become a majority. Where as we become.

A2: Mhhh.

Q: Ahmhm.

A1: Because everyday a cultural thing what everybody automatically does. And I am sure – I have never been to Zurich – but I am sure the people there know how to behave, know how to recycle, know how to not litter. Ahh, and eh, it is in the action that you see.

A2:Uhm.

A1: In Singapore we still lack that. Ahh, our goal is actually to push and eh, show to the majority of our people that we must take ownership. We want to be proud of this country. And every individual must give everything to stand up for their rights and to correct people, who are doing it wrongly.

Q: Mhhmhh.

A1: That is the thing that is different.

A2:Yeah.

A1: Many of us know that it's wrong. But we don't have the internal automatic, ehh – what do you call – corrector or social believe to go out and say: “Don't do this. You are not supposed to do it. Please clean it up.” When in many of the other developed countries we see it. They do it. When you have this kind of peer pressure existing, I think it also helps. The environment naturally becomes cleaner. People go and constantly behave themselves and do the right thing. We are lacking it.

A2: Mhhhm.

A1: We know it's wrong. But to translate it into action. That is my goal. You know, that is our goal. Finding and getting many more people who do that.

A2: Mhhhm.

A1: When we have this majority vs. minority concept changed.

A2: Mhhhm.

Q: Mhhmhh.

A1: Then, then you can see the a change in behavior on the outside. Singapore, if we take an exam, everybody would score a 100 max and would give you the right answers: that this is wrong and you should not do this. You must do that. But when you go out and face the real world, action is a different reality.

Q: Mhhmhh

A1: You kind of make it inconsistent. You say don't, you do it actually when you go. You don't just

score it in a exam paper or press the person into it. You actually believe and you actually do it. That is what is missing, I think.

A2: I think so, yes. Yeah.

Q: Okay. Ehm, is your – how is your activity different from what the government's? So the government has also a lot of campaigns. How does that, your work, differ from the governments work?

A1 & A2: (laugh).

A1: Do you want to answer it (directed towards A2).

A2: (laughs). Obviously, the government cannot paint a–

A1: – negative.

A2: – negative picture. So, in that way, you know, just about our mission, right. You don't have a full view. Or you don't have the full grasp of every citizen. When, you know, you read the news or when you watch the news, you – ehh – the government campaigns, yes, they do tell you that you must take care of the environment. But, I don't say the lack of – or rather the the sense of urgency is not there.

A1: You. (towards A2). Ehm.

A1 & A2 (thinking pause).

A1: Yeah.

A2: (laughs) Okay. Okay. (Chuckles).

A1: I think, what he is trying to say: there is a lack. And –

A2: Uhm uhm.

A1: You know we run a lot of campaigns and you (towards Q), you hit the nail on the hat. And these campaigns, actually, aren't campaigns. It is like a public relation thing.

A2: Yeah.

A1: But the campaigns don't evolve into action, encouraging and changing a person's social behavior. And that is where we differ. That's why you – you know, if you check our website we have a website that we call 364 movement – three six four. On an average a year is 365 days. And we are encouraging people to do good 364 days a year. It is besides the day they come and see us.

Q: Mhhmhh.

A1: Because that day that you come, it's like a campaign day.

Q: Mhhmhh.

A1: That does not count, actually. That is just a day for you to say: Yes, I know it is bad. Let's go and pick up litter. And then when I leave the remaining 364 days I commit exactly the opposite. So to us, campaigns are good; but more for political agenda and PR. What is more important is a sustainable action plan. That will enable you to actually encourage people to do things every day the same and not just only one day. The campaign should be the day when you think or record, like a report card to say: Of the last year, this is what we have done. And we should be proud of ourselves or we shouldn't be proud of ourselves or we should be improving in certain areas. The campaign should be a reflection of your past year.

Q: Mhhmhh.

A1: No?! It should not be something that just reminds us to go plant a tree today and then tomorrow

you forget it and you destroy all the trees. Alright?! Eh, how to know and how to be kind today? So the rest of the year you don't be kind? (laughs) You know. That's not what we want. But unfortunately, ahhh, that's what most of the campaigns are. And that to us is the difference between our programs and their programs.

Q: Mhhmhh.

A1: We do not really believe in this.

Q: Mhhmhh.

A1: Yes.

Q: And ehm, so would you say that your focus is then rather to change peoples attitude or is it also to kind of influence the government in its policies and its decision making in regard to water?

A1: Both. I think it is both, because Singapore is a small nation. Our environmental groups are not as strong and radical as some others in the world. And we cannot afford to have radical opinions in a small nation like ours. So the only way that we can progress and hope to develop and improve ourselves is to work together. Now we can work together in many ways. We can work together to subtly show and tell things that are negative, that people don't like to hear but need to hear and need to know.

Q: Mhhmhh.

A1: Eh, We can work together in partnerships to explain to them that if you don't, this is what the price we pay. And show them why we are concerned. Right? Give them the feedback, give them the photos. You know, the picture tells a thousand words. No? And then hopefully, they will change their mindset and their action plan. And maybe even resign, changing some of the laws. Which I think is necessary for this to work. But we definitely cannot do it on our own. And we don't do it on the business of just less criticized the people in charge. That's the easy way to do. We always like to offer solution. But solution, that is logical, meaningful, and substantiated with facts – not perception.

Q: Mhhmhh. Okay. So, the next question is in regard to the government. How do you perceive the government's role in Singapore's water management?

A1: (thinking pause). Government's role is to provide the people at any costs.

Q: Mhhmhh.

A1: Alright, because they wanna make sure that everyone is happy. But that is their first priority. And tend to concentrate too much on that. Our role: more to educate and ensure that the people who are receiving it value it and understand it.

A2: Uhhhm.

Q: Mhhmhh.

A1: Unfortunately, ours is an intangible role. For us it is. The government is more very tangible: I bring you the water. I bring more pipes. I get more reservoirs. You know. And nobody can deny that I am doing a good job.

A2: That is right.

A1: But it has to be balanced with – you know – the EQ side. You know. The part where the people begin to understand that why I am getting this so easily? What it is like if I don't get it?

A2: Yeah.

A1: How miserable can I be if I don't have it? And what is the price I pay if I use it?

A2: Yeah.

A1: That is the part most government parties do not want to emphasize on. Because they are too prioritizing giving the hard way and the main thing. That is how I see the difference.

A2: Yes.

Q: Mhhmhh. Now. If you look back, how would you describe the policies and decisions in regard to water management in terms of its consistency?

A1 & A2: (thinking pause)

Q: So, is the question clear?

A1: Do you want to? (Directed towards A2).

A2: Mhhh. Okay. (laughs). Can you just repeat the question?

Q: So, if you look back for the last couple of years or as far as you remember.

A2: Okay.

Q: How would you describe the policies or the decisions that the government made in regard to water, of course, in terms of its consistency?

A2: (thinking pause) Okay. From our opinion: It has been very consistent. The fact that, what Eugen says, eh, there is always the need to bring pure water of very clean, of very high standard water to the people. So we, the government need to price something like that. Ahh, having enough water for everyone. That's why, eh like, I have never had a day where I don't have enough water. And you know, it is always clean. Of course there have been really minor incidents where we have all spheres of water pollution going in tap waters. But it's not an everyday – it's rather – you know – it is not normal. Yeah.

A1: I think the – to emphasize on the consistency on the government's actions from the day of our great founder, Lee Kuan Yew – and you can look in his memoirs and he has mentioned the value and importance of water.

Q: Mhhmhh.

A1: The that that they are consistent and we started with one reservoir and now we have 17 reservoirs. We are trying that – you know, we've done the introduction of desalination.

Q: Mhhmhh.

A1: The fact that now we even got this technology of converting waste water into *New Water*. I think these are all the physical plans that the government has been consisted. Because they've gone out of their way to make sure no matter how, we must have more water, more water, more water, because population is going up and up, the industrial is growing more and more. And lately, the weather is unpredictable.

Q: Mhhmhh.

A1: So that move has been very consistent from day one.

A2: Yeah.

A1: And because they value water so much – you know in Singapore we as a citizen cannot keep water. Rainwater actually belongs to the government. You know, because the value of water for the general people is equal.

A2: Uhhhm.

A1: So there must not be an imbalance or favorite treatment of the – everybody shares the water.

Q: Mhhmhh.

A1: Yeah, it's always have been consistent.

A2: Eh, water is here actually really heavily subsidized.

A1: Yeah.

A2: People don't –

A1: – they don't understand that.

A2: They don't understand. And they don't even pay the full/the real costs of what water is valued.

A1: And that is one of the reasons why people take it for granted. When you see that, you definitely don't think twice risking it.

Q: Mhhmhh.

A1: So that is the problem.

A2: Yeah.

A1: We can too –

A2: Mhhmhh. Sorry. But recently also – and I, I, I hope to believe that waterways watch society has been the main driving force behind this. They the government agency behind this PUB, the agency for water. They finally have understood that the message to the people, to the whole nation must be clear about saving water, about, eh, not polluting it. So, eh, I have a feeling that already my opinion was that in the past the engineers the team of PUB would say, you know: Look, no matter how dirty the water is, we will clean it. We will make it from sewage water, really dirty water, into pure water that is of such a high grade that it can be used for way of manufacturing. So they had this thing going on that, you know I have to call it a challenge. And it was a positive challenge. But I think that they were missing the point. The point was not about, we know that you are good. We know that you clean it very well and we know that have worked very hard, eh, to increase our, eh, capacity of water by manyfold. Ahhh, but now the clearing problem is that, ehhh, the people who have had all this gifts that stood upon them, they don't understand that. And they don't value that gift, that this prevision they have made for them. And it was a very daring problem, which. It was not so easy to tackle, because it required you to actually start changing habits. So that is where we step in. That's our role I would say. Mhhmhh. So in terms of the hard way, if we want to simplify it. The hard way, the government has been very consistent and very very good. But in terms of the soft way, and what I mean by the soft way is – you know by engaging people, ehh, changing believes, improving attitudes, ehh. So far we still have a long way to go.

Q: Mhhmhh

A2: Yeah.

Q: Great. Ehm. So the next question is in regard to the economic sphere. You have already mentioned it the *New Water* and desalination. How do you think or how do you perceive the impact of such projects as *New Water* and desalination in terms of sustainability of water management?

A1: Well, I think the government have come out a very clearly to say, that desalination is the most expensive.

A2: Yeah. (laughs). Right.

Q: Mhhmhh.

A1: So we have, we call them the four national taps. What we have is desolation as one of our national taps. It is the most expensive. And like in anything in business, you always try not to use

the most expensive. But then you can survive on it.

A2: Ummm.

A1: And indirect, what you are saying: you wanna do mo a little bit. It is gonna to cost you people more.

A2: Ummm.

Q: Mhhmhh.

A1: I can just tell you the facts. You know. Then of course waste water, we can convert it, but I mean as a human being, how much waste can you create? I can convert how much you can – no?! And eh, back in the mind of our people, I think, waste water at the moment because it is so pure, as already mentioned, it goes to change the wasteful fact. But really from a human perspective, I really don't wanna be drinking waste water converted to New Water. Alright? And I will still like to drink natural water. So at the end of the day, it's the explanation of ways to the people. And hopefully tthe people will then to begin to understand and then hopefully the translate then into a more responsible behavior, that will then enable all of us to have our fresh and at least sustainable water. I think that's the only way we can only appreciate that.

A2: Uhhhm.

A1: Now what we do is to our education: we highlight all this and hope people go back and do the mathematics. (cell phone rings). And people can go back and say: I really need to be a little bit more responsible. Because we do have a really high usage of water compared to european standards. On average every Singaporean today consumes over 150 liters a day – 150! Well we are on the equator and need to bath more often, eh, 150 is still to high. 'cause you use a lot of water everyday. You know?! So our target is to reduce it to 140. So our eduction hopefully helps the government to help the people to begin to understand. And all begin to use water more really assent, when you need it and not just waste it.

Q: Mhmhh. Do you think that in those projects the aspects of social needs met and also aspects of environmental needs are met in those projects?

A1: Eh, so far. When you say environment – so far it is not create any major environmental disagreement.

A2: Yeah.

A1: Ehh, but I think, because we are a small country a lot of us actually are not very strong in our green mission. You obviously are less resistance.

Q: Mhhmhh.

A1: We don't do technical studies on the sea water and all that, you know. Eh, so it's easier for the government at this stage to introduce all this with less objection or less negative feeling from the people But they probably also say obviously we all need water. So because everybody knows you need water most water projects are really seen as a must-have.

Q: Mhhhmhh.

A1: What ever you wanna do as a government, just give me this must-have to survive. Most likely, all that's it. Different from, like I am building a MRT line and I am going to the jungle. I am creating, collecting more water for you so you can survive and have a better live. Nobody objects. (laughs).

Q: Mhhhmhh. Mhhmhh.

A2: But in a – if you just roll back to your previous question about the sustainability of the projects

right?

Q: Mhhmhh.

A2: I would say that it is rather in a way of a short term, middle term. It is not really long term in a sense, because it doesn't change – it does not focus on changing realities of improving usage of water. It – I mean the essence is the, uhm, we don't have enough water. Okay, the first reaction would be: okay, let's find a another source of water. So our government is good at that. (laughs)

Q: Mhhmhh.

A2: You know there is a lot of intelligent people, who can give more sources, who can increase the size of our pool of water. But, ehm, also it must be couple in effect, that just because you have a bigger pool it doesn't mean that you can drink more. You know what I mean?

Q: Mhhmhh.

A2: You still need to have that attitude in check line that will fit couple of generations. It is not something that happens really fast. But that is for me really important. In fact I would say that is even more important than finding more sources of water, because we as a nation, we can adapt and we can control our usage. Then I personally think –

A1: The question of finding new water source is lesser.

A2: – is lesser. In terms of when it is crisis, when the people automatically know how to share and how to – you know –

A1: – how to adjust their lifestyle.

A2: Yeah. How to adjust. Yeah yeah yeah. Correct. Correct.

Q: Mhhmhh.

A2: Yeah. Yes. So that's a fear.

Q: Okay.

A1: It is not a fear when you know how to adjust. And this is what we actually are working towards to.

A2: Yeah.

Q: Mhhmhh. Okay. Interesting. So it is already the last question. So you gave me a lot of answers here. Ahm, each of you describe Singapore's water situation in one sentence.

A2: (laughs)

A1: (laughs) Can we describe it? Lot's of water, but don't take it for granted. (laughs).

A2: (thinking pause). Ahhh, may I? (Directed towards A2). I just wanna rephrase that statement a little bit. Seemingly lots of water –

A1: (laughs)

A2: – and we are taking it for grated. (laughs).

Q: (laughs). Interesting. Yeah, thank you a lot for your time.

A1 & A2: You're welcome.

Q: – and your willingness to participate.

III. Interview with 3PN director, PUB – 20.06.2016 (via telephone call)

Interviewer: Elena Popov (author) – Q

Interviewee: George Madhavan – A

Q: So, can you first introduce yourself and state what your position is, what your name is?

A: Okay, so I am George Madhavan. I am the current director of the department that's called 3P Network.

Q: Mhmmhh.

A: 3P stands for: people, public and private.

Q: Mhmmhh.

A: So basically I take care of public communication as well as community relations.

Q: Mhmmhh.

A: Alright. I am a civil engineer by training. Right. So I have been doing the professional water issues for about 15 or so years. Before I've moved to do corporate work.

Q: Mhmmhh.

A: And for the last four years I am heading this department called the 3P Network department. Going back 50 or so years ago, when Singapore became independent in 1965. Right?

Q: Mhmmhh.

A: At that time water was really a major strategic issue. Right?

Q: Mhmmhh.

A: You know, today we are the densest country in the world. Country and not city. So can compare us with other cities like Tokyo, Bangkok, Kuala Lumpur, New York. Because all those cities have got a huge hinterland to support the city in terms of water supply, energy, food and so on. But Singapore is a country as well as a city. Right?

Q: Yeah.

A: Right? So that makes the water challenges even more serious and more dire. Because we are so small, we don't have enough land to collect and store sufficient water for the population. Just imagine we are only 710 km². Right? In area. So very very small. Currently we are more than 5.5 million people living on this little piece of island. Can you just imagine how difficult that is for us to overcome our water challenges?

Q: Mhmmhh.

A: Right. So when we separated from Malaysia in 1965, as part of this separation agreement was two water agreements with our neighboring country Malaysia. 'cause without the two water agreements Singapore would not have enough water to go and develop.

Q: Right.

A: Right? In 1965, so we had three reservoirs in Singapore and we had these agreements to import water from Malaysia. Right? So we had two agreements. Ahh, one of the agreements expired in 2011. So we now are left with one more agreement. Alright, which will close in 2061.

Q: Mhmmhh.

A: So what we have done for all those years is really to use innovation, technology to develop, ahh, various sources of water supply. So much so that today we have what we call the four national tabs. Right? We have four nationals, four sources of supply. One is rainwater, that we collect ourselves that is for Singapore. And for that we have turned 2/3 of the island into what we call a water catchment.

Q: Mhhmhh.

A: That means that 2/3 of the rain that falls onto Singapore gets collected in one of our 17 reservoirs now. Because it's 2/3 of the island, which nowhere else in the world has done this large scale rain water harvesting.

Q: Mhhmhh.

A: Right. So that is the first source: rainwater that falls onto Singapore. Second source our contract in Malaysia that goes on until 2061. Third source of supply is something we call New Water, which is high grade recycled water. If you check our website you will get it.

Q: Yeah, I did the research.

A: You know, alright?!

Q: Yeah.

A: And of course, desalination.

Q: Yeah.

A: So we now have four tabs. Right, which we already have mentioned. Interestingly, two of the tabs are dependent on the weather. That means water that we collect from rain as well as the water from Malaysia are dependent on the weather.

Q: Mhhmhh.

A: When you have drought, and climate change kicking in, these two sources will be affected. But the other two sources, which is, eh, desalination and New Water are not dependent on the weather.

Q: Right.

A: So you have two depending on the weather – heavily – and two not dependent on the weather. The downside is that the desalination and New Water uses more energy.

Q: Yeah.

A: Right? So while you bring yourself on not being dependent on weather you become more reliable on energy, which we also don't have any also. (laughs) So, what we do is mix and match. When you have a lot of rain, most of our water will come from our natural sources and during droughts or dry weather when there is less rain, then we use more of the nonconventional sources: desalination and New Water.

Q: Mhhmhh.

A: So that's how we go about ensuring water sustainability.

Q: Right.

A: Okay? So that's the supply side. We also need to manage the demand. Because the demand keeps on increasing then you find yourself to keep on looking for more and more supply. So we have various programs to make sure that water is used judiciously, carefully and wisely in Singapore. So water conservation is another area that we focus on. Right? So while the supply side depends mainly on PUB, 'cause we are the water producers, the demand side depends a lot on the citizens. Right?

Q: Mhhmhh.

A: Their, behavior, how they use water, how they value water and so on.

Q: Exactly, yeah.

A: Right, yeah. So that's where the social part comes in: how we get the citizen 1) value water. We do this by three ways. One is by education. Right. From schools, graduates, you know. So that education on how you can go about saving water. Two, is also have what we call mandatory measures. Eh. So rules against water wastage. We also ensure that only water efficient things are sold. So like for example washing machines. If you buy a washing machine in Singapore, you can only buy water efficient ones. Because we fade out those inefficient washing machines.

Q: Mhhmhh. Yeah.

A: Same with tap and washing systems and so on. Right?

Q: Mhhmhh.

A: And the third is pricing. We price water to reflect its, eh, true costs. So there is no subsidy for water. And of course the lower income – there are sort of water vouchers and there is help. So nobody goes without water. But the price of water is the same for everyone. So we don't subsidize the price directly.

Q: Right.

A: Right. So through these measures, eh, we try to aim for longterm water sustainability.

Q: So this water pricing is also happening from the PUB side, right So the P U B. And you created this market and it is not a subsidized market.

A: Yeah, it is not a subsidized market.

Q: Exactly. What do you think are the advantages of that?

A: Oh. The advantages of not subsidizing water is so that people will appreciate that there is a value to water.

Q: Mhhmhh.

A: One. And two it also makes us sustainable, financially sustainable. 'cause we've seen many countries where they subsidize water. Who suffers in the end is actually the customers. Because water is so cheap, eh, the companies that produce water cannot do it properly. The quality suffers. The liability suffers. At the end everybody suffers. So giving out water, in our mind, it is not a good solution at all. But water is not so expensive that you cannot afford it. Right.

Q: Mhhmhh.

A: Most people can afford it. Like the cell phone bill costs probably more than the water bill. But we make sure that we don't subsidize at all. In fact, in Singapore there is a thing that we call Water Conservation Tax of the industry. That goes to the government. Because we want to signal to the population that water is scarce resource, you must use it wisely and not waste it.

Q: Mhhmhh.

A: So, we try to balance this all this different imperatives. Right. So we focus on looking for new sources of supply, focus on managing demand. We manage the demand, to pricing some mandatory, eh, measures and through education.

Q: Mhhmhh.

A: Okay. Now, what we also have done – I have already earlier that we founded reservoirs and we

have 18.000 km of canals and drains and all that. So we have a program to turn this infrastructure into usable community space. So we have a program that we call Active Beautiful and Clean Waters Program. Again you can find it on the website.

Q: Yeah. Yeah.

A: We try to turn our canals or drains, reservoirs into space that the public can come and use. And we believe that it's they come and enjoy water, the people will then value water and then take care of this precious resource.

Q: Mhmmhh.

A: Right. Next thing, that we are doing quite a lot is also Research and Development. Right? Eh, we are always finding more efficient ways of doing desalination as well as New Water. So from the old method of flash system installation used we a lot of energy. Currently, what we are doing is revers osmosis.

Q: Mhmmhh.

A: It uses a lot of water and less energy. And we do R&D with quite successful in the lab. We try to build a demonstration plant to use a new method call Electrochemical Desalting, which uses about half the energy of the current revers osmosis membrane plants.

Q: Right.

A: So we are always trying to look at more efficient ways of creating, turning dirty water into fresh water.

Q: Right.

A: On your question on NGOs, ehh.

Q: So let me interrupt you here. Ehm, the 3PN thing is quite a broad thing to handle. Because you, from the government are in touch with the private sector and private people. Why is it important for Singapore? Why is it important to create such a network? Especially if you think that other countries don't have that.

A: Yeah, because we want our population to appreciate water, to value water. You know? So that they will cherish this resource. Let me elaborate a little bit. Two-third of Singapore is water catchment, right. That means that a large part of where we live is water catchment. It means that if the rain falls, outside my house for example, the rain that falls on the road will into the drain and then in one of our reservoirs. So if I don't take care of the catchment, if I litter, if I throw rubbish, if I throw soapy water onto the road or into the drain, it will end up in our resource.

Q: Mhmmhh.

A: So it is important for the public to be/ to join us and be part of the solution to ensure water sustainability. One, by using water carefully – not wasting it. Two, by taking care of the environment, so that you don't pollute the land because it is connected to the drain. It's connected to the reservoirs, our drinking water. So it's important for everyone to be part of – be involved in – taking care of our water. Okay. Is that clear?

Q: Mhmmhh. Yeah yeah.

A: (laughs)

Q: And in regard to New Water and desalination. For the long term usage you already mentioned new technology. Now that the government has already started in 1965 to think about water, how do you think those technologies influence the sustainability of Singapore's water management?

A: We believe that New Water and desalinated water is really the way to go. Ehm. Currently, New Water and desalinated water can meet 55% of our water needs. Okay? By 2060 our water demand is expected to double.

Q: Mhhmhh.

A: Alright. And by water 2060 we expect more than 80% of the supply to be from New Water and desalinated water. Alright, so these two are very important for our supply. Because we are already collecting 2/3 of the rain that falls into Singapore. It is not much left to collect.

Q: Mhhmhh.

A: Right. And the agreement with Johor is a fixed amount. We cannot increase the amount.

Q: Mhhmhh. Right.

A: So new demand. You know, the population grows and industries are developed. New demand needs to be met by desalinated water or New Water. So that's how important that is.

Q: Alright. Okay. And in regard to NGOs, what do you think are the main differences between our agency's goals and the NGO's.

A: We have a few water centric NGOs. They are helpful. But in Singapore context the NGOs are not very, ehh, large. They are not very well resourced. They get involved by giving us feedback and we work quite closely with them to promote, ehm, keeping the water always clean. Eh, to promote water conservation. Yeah.

Q: Mhhmhh.

A: So many of these NGOs are more environmental NGOs. So they not only promote water. The y also promote other environmental issues.

Q: Right.

A: Yeah. But, eh, yeah. So we work closely with them as much as we can. So one example. What we have for PUB a group called the water network. Right. This group are comprised from different representatives from different stakeholders. So we have NGOs, we have industries, we have companies, we have newspapers, editors and so on. We are 36 members or so with in this network. And we meet them about 3 or 4 times a year, where we get feedback from them.

Q: Right.

A: Ah, ehm. So we can feed our policies. So for example, when we opened our reservoirs for water activities, we got feedback that some of the more natural reservoirs we shouldn't allow sort of a lot of allowed kind of activities like kind of dragon boating or power boat skiing and all that. Or how do you call that power boat skiing? So we we allow dragon boating and sort of skiing on some of the reservoirs, which are more open. But not more pristine and natural ones. You know. Because then you don't disturb the habitat. That.

Q: Mhhmhh.

A: So we do that, we we do meet NGOs. I mean the water network representatives regularly to get feedback.

Q: Mhhmhh. Right. So how do you use this feedback? Do you use this feedback in order to make also further improvement in policy making and implantation processes?

A: Yeah. Yes, the feedback is useful, eh, then we use it to treat our policies accordingly.

Q: Mhhmhh.

A: Alright. For example even opening up more areas for fishing and so on. Because we have 17

reservoirs and there are a lot of fishes. So we get feedback from the water network on how to do this. You know, in a way that is sustainable. Ehm. So they are a useful group for us to bounce ideas off.

Q: Mhhmhh. So would you say that they are critical or important also for the government to work with.

A: Ehm, I wouldn't say critical. But I would say that they are useful. Yeah they are useful. The NGO situation, well probably it is not as – how do you say – active or as Probably in the european countries. Like I said our NGOs tend to be quite small. They are not so well resourced.

Q: Mhhmhh.

A: So their contribution in some sense, is very limited, I would say.

Q: Alright. Okay.

A: But they are useful for us to get inputs on any policy that's going to effect a bit.

Q: Mhhmhh.

A: Yeah, so we work closely with them.

Q: Alright. Okay. Ehm. Can you describe Singapore's water situation in one sentence?

A: Ahh, okay. I would say that we are confident of our water sustainability but we cannot be complacent about it.

Q: Mhhmhh.

A: So on the one hand, yeah, we are confident and we will have enough water for the future. But we must never be complacent and make sure that we manage the demand complete, make sure we manage our reservoirs. You know.

Q: Mhhmhh.

A: So, yeah. I would say we are confident about water sustainability but we cannot be complacent about it.

Q: Yeah.

A: That's the sentence. (laughs).

Q: Right. Right. Great. Also tried to reach somebody from New Water. Unfortunately, I was not so lucky. I would like to ask –

A: – You can ask me about New Water.

Q: Exactly. It would be one more question.

A: Mhhmhh. Sure.

Q: So it is a little bit different. So the PUB selects – I've noticed that you guys call it the P U B.

A: P U B.

Q: Yes. So the PUB selects companies through open tender offers for operations like New Water and desalination plants. And you also set the pricing of the new water resources. Right? Generally –

A: We don't.

Q: What Excu-

A: We don't set the price. What we do is for example if we want to build a new plant, some time we going to design a public call. So we put a public tender. The companies will bit on the pricing. So

we give it to the lowest price set comprised with our specifications.

Q: Right.

A: So we don't set the price. The market sets the price.

Q: Right. But the water tariffs. Right?

A: Oh tariffs. Yeas, tariffs we set.

Q: That's what I meant. Sorry. That is the wording. Uhm. So generally the PUB is quite active in this sphere and is operating these plants. But could you describe in your words how the PUB coordinates and controls those water treatment plants?

A: Ah okay. So for water treatment plants we, we operate – we build and operate them.

Q: Mhhmhh.

A: Right. The new water factory, some of them are operated by the private sector.

Q: Mhhmhh. Right.

A: A couple of them we run ourselves. Right. And we try to put in, you know, the most modern equipment to run it. We are particularly careful about water quality. So we monitor the water quality throughout the entire process. And the quality that we produce, is also with in the WHO guidelines. So we have very high quality water that's produced. And in Singapore we assure you that you can drink your water directly from the tap.

Q: Mhhmhh.

A: Anywhere in Singapore. Right? So.

Q: Right.

A: So we've set a pretty high standard for ourselves in terms of water quality, in terms of reliability and so on.

Q: Mhhmhh. Uhm. Why do you think it is important that the PUB engages to that degree that it currently does? I mean, for example, could the private sector completely take it over or is it like a completely out sphere imagination?

A: Yeah. Yeah. For water it is difficult, because of our agreement also with Malaysia. So and, and and. You know. So we have a government to government agreement with Malaysia. It is not possible for a private company to take over. So what we do is that some plants we allow the private sector to run and operate. But as the whole system we believe it is a lot more efficient for one agency to do it. In fact, we are one of the few countries in the world where we manage not only drinking water. We also manage the rain water with the drainage. We also manage, eh, what do you call it, sewage or we call it used water.

Q: Mhhmhh.

A: So the entire water loop is managed by one agency. And we believe that a lot of synergy are in different parts of the water cycle. For example. Let me just give you a quick example. In many countries the drainage is managed by one agency – right – drinking water by another agency. So if you are in charge of drainage your mission in life is to drain the rain water as quickly as possible.

Q: Mhhmhh.

A: Because you don't want flooding. Right. So when the rain hits the ground you want to get rid of the water really quickly. But in our context water is such a valuable resource. So instead of getting rid of it quickly, we (thinking pause) want to hold and manage as much of this rainfall that falls onto Singapore as we can.

Q: Mhhmhh.

A: So harvest the rain water. So the mindset becomes very different. You know. We believe that there is a lot of efficiency and synergy for one organization to manage the entire water loop.

Q: Mhhmhh.

A: So, like for example for recycled water, right. The input to recycle water is actually a treated used water. Water that you have used will be collected back in a part we use the treated to affluent and going see. But now because of technology it's an opportunity – instead of this treated used water back the see, we put it to our membrane process and then we get New Water.

Q: Right.

A: So the whole loop is managed by one agency. I don't think that the private sector can do it, eh, any better. (laughs)

Q: (laughs). Do you regard it as a sustainable approach for the future if only one agency controls it?

A: Yes, yes. I think that is the best way, eh, for the future.

Q: Alright.

A: Because the thing about the infrastructure is, you have to think long term. Right. You can't think, well, next quarter whether you gonna make a profit or not.

Q: Right.

A: You have to think of many many years. We plan up to 2060. We plan 15-100 years ahead. So only the government, eh, will have such long term planing.

Q: Mhhmhh.

A: If you let the private sector, it's going to be very short term.

Q: Right.

A: That's one of the reasons why we wont let the private sector run the whole. Although what we do is that we allow the private sector to participate in different parts. Like for example, even parts of lakes are contracted out to private contractors and so on. So in terms of the private sector, it is heavily involved in our system, although they don't own the entire system.

Q: Mhhmhh. Right. Well, thank you for your participation and your willingness.

IV. Interview Guideline for Indonesia

Indonesia					
	Personal	Political	Economic	Social-Cultural	Last Question
NGO -IndoWater	A) Can you briefly introduce yourself? Say in what field you are working and what your main duties are?	2: A) Can you do you evaluate their performance? (Reliability, interagency collaboration)	3: What is your opinion on the role of private companies and PDAMs in regard to Indonesia's water supply? (Tendency towards privatisation)	1. What are your main goals with this NGO?	4: Can you describe the water supply situation in Indonesia in one sentence?
	B) What was your motivation in this field	B) Can you name some activities or campaigns how the government tries to change individual opinion/ behavior in regard to water?	B) Are the private sector's/ PDAMs activities sustainable?	How do you reach the people? What have you achieved so far?	
		C) If you look back... Consistency?			
			C) Role of Bottle Water Companies?	How is your approach different from the governments?	

V. Interview with IndoWater Cop. – 29.-31.08.2016 (via mixed media: e-mail, zoom, voice messages)

Interviewer: Elena Popov (author) – Q

Interviewee: Riska Darmawanti – A

Q: Can you briefly introduce yourself? Say in what field you are working. What is your position and what are your main duties?

A: My name is Riska Darmawanti and working in a NGO called Indonesia water community of practice (IndoWater). IndoWater is a consortium of 3 NGO which working in river conservation in Indonesia. Three members consist of: ECOTON which is working on Brantas River basin, Komunitas Peduli Ciliwung on Ciliwung River, and Yayasan Mitra Insani on Kampar River. Our focus in IndoWater is water pollution, particularly endocrine disrupting chemicals. As national coordinator, my responsibility are: coordinating among members, lobby and advocacy at national levels, developing network.

Q: You say that there are three NGOs or three members. So ECOTON, the KPC in Ciliwung River and the Mintra Insani. And what I have found that there are this Netherlands NGO or the NGO from Netherlands called BothENDS. And they seemed quite engaged in it. An they also mentioned that there are four NGOs participating in it. And actually on the website of IndoWater, it says that there five. So also the NGO from Bengkulu River Basin, the Ulayat. Ehm. So there are five. So that is a little bit confusing for me. Why do you say that there are three, BothENDS says that there are four and IndoWater says its five? Did some change happened there? Or what happened that there are different information regarding how many members exist in IndoWater?

A: Yes, we have partnership with BothENDS. At first, it was initiated by 5 NGOs: ECOTON, Ulayat, Mintra Insani, KPC and BothENDS. After the changing of Ulayat chairman, they've decided to step down from the membership for they feel won't be able to give their 100% commitment to the IWC due to the lack of members to work on water pollution issues. Their mainly working on mining issues.

Q: What is your motivation to work in this field?

A: Talk about motivation, our water resources is polluted with different kind activities and it's

quality deteriorating every year. But sadly government do not take this matter seriously. This things upsetting us, how government becomes unreliable ones to solve the problems. So we took initiatives to build IndoWater.

Q: What is your personal motivation? Is it the same or are there different aspects there, because you are more engaged in, ehh, into the environment? Or is there a story behind that you are particularly engaged in this NGO field?

A: I'm a fisheries diploma with main subject with water resources management. During my study, I saw that many of our research went to campus bookshelf and it didn't make any social or political change. Many of our research do not bring solution to social and environmental problem and most of university professor stands on industrial sides not on community and environment. I want my skill and knowledge meaningful and could drive a social change especially in environmental sectors. After I graduated, I work as intern in ECOTON as water researcher and involve with different kind of community development programs, meet people. From experience on facing water pollution case, I know that if you have data you have power and if you educate community to increase their skill and knowledge through participatory research, you make a environmental and social change. So, that's the reason why I involves in IWRM, particularly in water pollution, and working in NGO.

Q: What are your main goals with this NGO?

A: Our goal is supporting government agencies at different levels to improve performance in river basin management through practicing community participation in all stages of integrated water resources management at river basin level.

Q: How do you reach the people?

A: Basically, we have 2 actions: litigation and non litigation. Non litigation action is consist of: education, participatory research, campaign, and other community programs. We use litigation if they (often government) do not want to open discussion, it is our entry point to make that.

Q: What do you mean by "opening discussions"? Discussions about environment? Or environment about particularly water? And with whom are those discussions? With the citizens or the shareholders, which of course also include citizens? Or also with the NGOs?

A: Mostly government and industries who pollute the water resources. We build the case through in-depth research and investigation. After we got strong case, we would send them letters of concerns (a lot of) and if they're not respond to it, we play the activist role - demonstration and gathering mass media. If it's not working we take litigation/ sue them. That's what I call open discussion

Q: What have you achieved so far?

A: What IndoWater achieved so far is that we build negotiated platform with multi-stakeholders participation. Mentioning coordination platform in IWRM, Indonesia have formal coordination platform build by government institution responsible for managing water resources management such as Ministry of Public Work and Ministry of Environment and Forestry. Different ministry have different coordination platforms, Ministry of Public Works - with their water council (national and regional level) and Ministry of Environment and Forestry with their own watershed forum. Different coordination platforms but same institution and or members. These coordination platform do not work properly. For each ministry/agency have their own big ego and concept to visualize IWRM. The coordination platforms is not working as coordination but as information platform. Each of institution have their own program and have no intention to coordinate, working by themselves. Many times, people who comes to these coordination platform are staffs that do not have authority and even though they're making action plan, well you know, its just formality.

Q: In regard to making policies, each agency has their own working group. Are these the coordination platforms or is it something distinct? So are the coordination platform different from those working groups that are working on decisions, which each, eh, agency should make?

A: Coordination platform is refer to coordination team that build by the government – they are top-down platform – such as water council (Dewan SDA), watershed forum (Forum DAS, and TKPSDA (Water Resources Management Coordination) build from regency, provincial, and national level. These top-down coordination platforms have responsibility in: a) coordination, consultation, and integration to achieve policy coherence and common understanding among stakeholder; b) monitoring and evaluation of the implementation of IWRM; c) provide advice/ input to governor/regent/minister on potential issues that arise do to IWRM and river basin policy. These coordination platforms consisting of multi-stakeholder members: private sector, government, communities, NGOs. NGO and communities was being involved/ invited as member is the one who close to government institution and have tendency to not 'rebel' their policy. As I had mentioned before these coordination platforms wasn't working as it should be. Our negotiant-approach coordination platform characteristic is bottom-up approach, where communities participate in every step of decision making process. For example, Mintra Insani is dealing with clean water supply, and sanitation. Mintra Insani initiated Kampar River Basin Initiative which involves indigenous group, government institution, PDAM, regent and provincial government institution. At first, it was difficult for government institution to sit together and open up about their data and program. After sometime they start to open up and share their data and programs. They decide to have joint sanitation and clean water supply program in one of village in Kampar river basin.

Q: How is your approach different?

A: Our negotiated platform or negotiation approach platform was initiated by the community/NGO then involving multi-stakeholders such as private company, government institution, NGOs, communities. Negotiation approach platform gives voices to the community and becomes platform for community to participate and develop their own conservation program and was being supported by the government institution and/ private company. Each members have their own negotiation platform.

Q: When you look back, how did NGOs or activists influence policy making and implementation processes in regard to water management in Indonesia?

A: NGO or Civil Society Organizations (CSO) definitely play important roles in influencing policy making process, in a hard or softer way/methods, but often hard way through litigation process and campaign through mass media. In pollution case, ECOTON sued east java governor (in 2000s) for ignoring the water pollution in Surabaya rivers. The lawsuit resulted in a better management and they counted river carrying capacity (which never been counted. Less than 30% of Indonesian river have been counted for its carrying capacity). The biggest hit happened in 2014, when religious CSO, PP Muhammadiyah succeed in revoking water law No. 7/2004.

Q: In your words, how would you describe the governments role in Indonesian water management? Can you evaluate its performance?

A: It's frustrating seeing what they do to manage water resources and how environmental is not important for them. The environmental/ water resources problems catch their attention after there are big disaster (landslide which kills hundreds of people, a villages that experiences lead poisoning cause by industrial pollution) and NGOs which suing them. Here are some examples to show you how they work/ manage with water resources:

Two years after the water law was revoked, they're still in the process of drafting. For a draft/ bill to become priority, they need to get into PROLEGNAS (National Legislation Program) and it doesn't. The impact of the revoked was massive. For eg. the water council were being halted, no reservoir

maintenance cost. Although after it was revoked, they issued more than 20 delegated regulations, it doesn't solve the problems. Water resources is not their main priority.

Economy driven not sustainable development as what they've said. In Indonesia, you could start building and producing goods/ services before you obtain the environmental permit. So when you're polluting water resources during your production/building process, you can use the polluted condition as your initial data when you're applying for environmental permit. Follow by lack of monitoring and control, the pollution is continuing and the water quality were deteriorating.

They don't think holistically or integrated and long term, only project by project. Example for the case is about building reservoir. They plan to build it without rehabilitating the upstream/ catchment areas which then increase sedimentation. There are many journals which discussed about massive sedimentation in Indonesia reservoir and how the dredging cost is exceeding the building cost. And yes, they're keep doing the same mistakes again and again, never learn.

Overlapping regulations, unclear responsibility, and lack of coordination. This lead into big problems, such as National Capital Integrated Coastal Development (NCICD). As you may heard about NCICD, these problems has led to wrong decision: Jakarta governor issued reclamation permit for reclamation when it is on the hand (authority) of national government (Fisheries ministries). They stated that they need to stop the sinking due to massive groundwater extraction, so they plan to build massive reservoir collected water from 13 high polluted river to produce clean water – with high treatment cost – and built reclamation islands first before improving sanitation and control on water pollution. Because Jakarta is downstream area, they need to coordinate and collaborate with West Java province to manage water pollution, but they think it takes a long time and could be done later after the giant sea wall finished.

Difficulties to gain reliable, readily, and accessible data on water resources. We often face difficulties to gain data, for eg. a month ago we ask for an industry sentence for water pollution case, which should be public information. We already had good cooperation with provincial environmental protection agency – or in Indonesian Badan Lingkungan Hidup – yet we still facing this difficulties. You can imagine what kind of difficulties common people who have no relation with government institution had to face to get data. The other case: there are three institution that have responsibility to measure water quality in Brantas river basin, but their data is different – a big gap from one to another. This also a problems.

Q: Can you name some activities or campaigns of how the government tries to change individual behavior/opinion in regard to water?

A: Government do have programs to increase community awareness on water issues: green school competition, spring conservation schools, spring rehabilitation activities

Q: What is your opinion on the role of private companies and PDAMs in regard to Indonesia's water supply?

A: You know, that over 70% of our PDAMs (government drinking water company) rely heavily on the river for their raw materials. Which means that the quality would influence their production and ability to produce clean water (not drinking water). As an example, PDAM Surabaya is one of the best PDAM in Indonesia. Their coverage area are 90% and they make quite a big profit, with cheaper water tariff. Often in the dry season, the consumer had to please with brownish to yellowish water for PDAMs have to deal with high pollution (detergent and industrial waste).

Q: Are the environmental needs integrated in middle or long term perspective? Are social needs integrated? Is it economically sustainable?

A: Talking about private companies which is industries, they takes a lot of water from the river or other water resources. And often they have the privilege to have more waters (in water distribution

scheme). Some farmers have told us that they do not accept enough water to irrigate their rice field and make them only able to have 1-2 production cycles and it is a industrial polluted water.

But if you talk about private company who play the same role as PDAM, they pursues for profit. As you can see in the case of PALYJA, private drinking water company in Jakarta. Their tariff is quite expensive and their target is middle to high economic class. Low economy class and marginalized one have hard time to get clean water from PALYJA for they need to pay more than 6 million rupiah for a household connection. I don't remember the exact case, but they're sued (probably class action lawsuit/CLS) by community for water privatization.

Q: Can you describe Indonesia's water situation in one sentence?

A: Indonesia Water Resources Situation is a big mess and NGOs had to play the roles which should be government responsibility in managing water resources.

9.3. Abstract/ Kurzfassung

Abstract

Within the last 50 year Singapore managed to change its water situation from dirty waterways, water shortages, and no water storage to a world known blue and green city, with innovative approaches to clean water, and full coverage of water needs. Now Singapore is known for being a *Hydro Hub*. Its neighboring country Indonesia, which faces the same geographical climate issues, is currently in a similar situation Singapore was 50 years ago. It struggles with polluted water and has difficulties to provide access to water with clean drinking water to its citizens. How can these two neighboring country be different in their approach to water management? This thesis aims to examine the dynamics of each countries' water management. Through the lens of co-evolutionary theory of economics three types of sustainability driven entrepreneurship (economic, political, and social-cultural) are examined. The main focus of the analysis is the meso level. On this level all three types of entrepreneurship are analyzed in order to extract the main rules to which each entrepreneurship of each country complies. On the micro level interviews with experts from each country are underlining the previous findings on the meso level. All identified rules indicate the dynamics of each countries' water management. The result of this thesis is that Singapore's water management follows sustainable path of collaboration, innovation and development. Indonesia's water management is characterized by chaotic legislature in the political sphere, mismanagement in the economic sphere and opposing forces between government and NGOs in the social-cultural sphere.

Kurzfassung

Innerhalb der letzten 50 Jahren hat es Singapur geschafft seine Wasser-Situation von verschmutzten Wasserwegen, Wasserknappheit und kaum Möglichkeiten Wasser aufzubewahren hinzu einer weltweit bekannten grünen Stadt mit innovativen Ansätzen zur Wasseraufbereitung und einer umfangreichen Wasserversorgung zu machen. Nun ist Singapur renommiert für ein *Hydro Hub* zu sein. Das benachbarte Indonesien, welches dieselben geographisch bedingten Klimaproblem erfährt, befindet sich an dem gleichen Punkt, wo Singapore vor 50 Jahren bereits war. Es hat mit verschmutzten Gewässern zu kämpfen und hat Schwierigkeiten Wasserzugang mit sauberem Wasser für die Bürger herzustellen. Wie können diese beiden Länder sich in ihrem Vorgehen im Bereich des Wassermanagements so unterscheiden? Diese Masterarbeit beabsichtigt die Dynamiken des Wassermanagements der beiden Länder zu untersuchen. Aus der Sicht der co-evolutionären Theorie der Ökonomie werden drei Arten von Nachhaltigkeit-getriebenen Unternehmertum (ökonomisch, politisch, und sozial-kulturell) untersucht. Der Hauptfokus der Analyse liegt auf der Meso Ebene. Auf dieser Ebene werden drei Typen vom Unternehmertum analysiert, um die Hauptregeln, welche die Unternehmer jedes Landes befolgen, zu extrahieren. Auf der Mirco Ebene unterstreichen Interviews mit den Experten der Länder die Ergebnisse aus der Meso Ebene. Alle ermittelten Regeln kennzeichnen die Dynamiken des Wassermanagements eines jeden Landes. Das Ergebnis dieser Arbeit ist, dass Singapurs Wassermanagement einen Weg der Kollaboration, Innovation und Nachhaltigkeit folgt. Indonesiens Wassermanagement wird dagegen von einer chaotischen Legislatur in der politischen Sphäre, Misswirtschaft in der ökonomischen Sphäre, und entgegengewirkende Kräfte von Regierung und NPOs in der sozial-kulturellen Sphäre charakterisiert.