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Variation in Access to Safe Drinking Water across Different Countries: An Explanatory Framework

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Abstract: Building upon extensive field interviews with past and current public officials from domestic agencies and international organizations who are involved in safe drinking water policy in Indonesia, Vietnam, Malaysia, Singapore, and South Korea, the research identifies and clarifies the causal mechanisms behind the different rates of expansion in access to safe drinking water among these five countries. It then examines how well theories in public administration, particularly with emphasis on theoretical frameworks in implementation scholarship, help capture and explain these mechanisms. Both strengths and weaknesses of public administration theory are examined where efforts to improve existing frameworks are suggested with their merger with theories from comparative politics. This opens the discussion on how public administration scholars should be involved in addressing and offering insights and advice to tackle the outstanding global challenge of 663 million people still living without access to safe drinking water.

Keywords: safe drinking water; sustainable development goals; infrastructure

1. Introduction

According to United Nations International Children's Emergency Fund's (UNICEF's) and World Health Organization's (WHO's) Joint Monitoring Report, 663 million people still lack access to improved drinking water sources, where the "improved water sources" are defined as water with physical barriers erected to prevent fecal contamination (UNICEF and WHO 2015, p. 4). Given 663 million is more than twice the size of the entire US population that was calculated to be 324 million in January 2017, it is a global challenge that cannot be ignored (United States Census Bureau 2017). Especially since it is estimated that 88% of diarrheal diseases are attributable to unsafe water, sanitation and hygiene (Selendy 2011). Infectious diarrhea is fatal as it is directly responsible for an annual 2.2 million deaths, which ranks it as the 5th leading cause of death and the 2nd most common cause of childhood mortality (Selendy 2011). The reason why diarrhea from water contamination is of pressing concern is because it is preventable. Research demonstrates that outbreak of diarrheal illnesses was reduced by 11% when the water source was treated and by 39% when treated at the household level (Selendy 2011). Thus, the question, "why do a large number of the world's population still lack access to safe drinking water?" This question can also be reframed as a question of how can we deliver water services that took much of Europe 150 years to achieve. Hence, whilst acknowledging that different countries and regions start from different positions including the availability of raw water, income and monetary resources, administrative arrangements and governance more generally can be expected to play a central role in delivery.

The relevance of the question is pronounced because the science of safe drinking water treatment and delivery is well established for both urban and rural areas (American Water Works Association and American Society of Civil Engineers 2005; American Water Works Association 2000, 2004; Water Partnership Program 2012a, 2012b, 2012c). Recognizing the relevant knowledge for water supply system design, construction, operation, and maintenance is available and accessible, the lack of

applicable solutions are insufficient as an explanation to the variation in access across different countries. With advancements in information technology exerting a continued downward push to cost in information transmission, the persistence of variation in access across countries is befuddling. Hence, the lack of engineering solutions alone is inadequate to capture the wide variation in the outcome variable. This signals the need to search for other relevant explanatory variables.

Recognizing the field of public administration was founded on with the purpose of improving the detailed and systematic execution of the public law, its literature was reviewed and examined in order to identify other critical explanations behind why wide variation persists in access to such a critical public service (Wilson 1887; Frederickson et al. 2016). The reason behind why execution became the focus is because public laws regarding access to safe drinking water exists. At an international level, access to improved water services falls under Article 25 of the Universal Declaration of Human Rights. Article 25 states, "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services (United Nations 1948)." Lamenting the slow progress on access to safe drinking water, the international community declared the 1990s as the decade for water to galvanize dedicated efforts to catalyzing access that further built on the Universal Declaration (United Nations 2004). Even with members of the United Nations having agreed to improve access to safe drinking water, the variation in access to safe drinking water persists. Why? This lead us to investigate whether the varieties of implementation is responsible for the variation. Thus, it forces us to look into the public administration literature on implementation as inputs to policy for technical solutions exist and are available.

Public Administration literature informs us that policies fail to fulfill their policy objectives for various factors along their implementation (Pressman and Wildavsky 1973; Mazmanian and Sabatier 1981, 1983; Lipsky 1980; Palumbo and Calista 1990; Winter 2012). The factors that could exert influence on fulfilling policy objects range from ambiguous policy design, street-level bureaucrats operating in resource constrained environments, failures in public communications producing uninformed beneficiaries failing to exploit entitlements, and poor monitoring and evaluation feedback loops undermining efforts to generate any baselines for future improvements. The question is then to what extent do these identified bottlenecks advanced in public administration scholarship offer analytical lens to the understanding the wide variation witnessed in access to safe drinking water across these countries.

With aims to evaluate the validity of the evolving synthesized implementation framework, five inter-country comparative case studies were conducted. These five countries were Indonesia, Vietnam, Malaysia, Singapore, and South Korea. Based on existing World Bank data, Indonesia is some of slowest improving countries in terms of expanding access to safe drinking water for its citizens. Vietnam's coverage is also relatively low on par with Indonesia in the 1990s. However, the country has demonstrated accelerated growth over the same span of 20 years vis-à-vis to Indonesia. Thus, it raised the question why and helps us starts identifying some of the critical factors that enabled the country to do so. Malaysia and Singapore's case studies are relevant, as they are adjacent countries to Indonesia. Malaysia shares a border with Indonesia. Thus, the question emerges why adjacent countries exhibit different pathways in expanding access to safe drinking water, as Malaysia has complete access to safe drinking water for its citizens. With Malaysia some suggestive factors are controlled vis-à-vis Indonesia, such as religion since both countries are Muslim majority countries. The selection of South Korea also lens an analytical lens since the country was at one time economically more deprived than the other countries, yet it attained universal access to safe drinking water. Thus, it serves to tease out what happened in that country which enabled it to do so. The countries are restricted to Pacific Asian countries. This was deliberate, as restricting selection of countries to a single continent allows better control of country impacting continent-wide events that may vary across continents. To illustrate, all the case study countries experienced colonization with independence achieved after the end of World War II. The country case studies were compiled with visits to field sites and multiple interviews with policy designers and policy implementation unit managers.

The cases are used to refine the implementation framework to the peculiarities of the safe drinking water sector elements. By doing so it propels the constructive dialogue and discussion on how implementation scholarship can enhance design, management, and performance of the safe drinking water sector. Despite the rich case studies being built with field work and interviews, there are still limitations to the study. This discussion on limitations at the end of this article opens up new discussions on future directions of subsequent research that will further build on to this study.

2. Literature Review

Implementation frameworks and studies are examined because the research question asks, "why do we still see wide disparity in expansion in access to safe drinking across countries despite the international consensus on the importance of providing access to safe drinking water and countries' pledges to act upon it?" When the International Drinking Water Supply and Sanitation Decade was declared on 10 November 1990 with UN General Assembly Resolution 35/18, 157 members were present (UN. General Assembly 1980). Since UN member countries endorsed the Resolution, leaders are not oblivious to the challenges in their society on safe drinking water. Nor is it a question on causal theory, as advancements in science and engineering research resulted in the production and publication of standard manuals. Thus, it raises the question on whether there is a disparity between planned and actual interventions. That is, it is a problem of how and why similar social policies manifest differently in response to local settings, which is a question of implementation.

In search of a framework to collect observations to compare implementation processes, implementation scholarship dating back to Pressman and Wildavsky were examined (1973). Their trailblazing study on the federally funded Economic Development Agency projects in Oakland, California demonstrated how policies that are oblivious to the bottlenecks and delays during implementation can expend resources without fulfilling original policy objectives. In similar fashion, we can transpose this to access to safe drinking water. Efforts were expended following the international consensus on the importance of safe drinking water in 1990. Yet, the world today is still left with 663 million people without safe drinking water.

Pressmen and Wildavsky's classical study generated normative conclusions for policy-designers. Their suggestions for up-stream preventative policy design on implementation stirred subsequent scholarship on this approach (Mazmanian and Sabatier 1983; Hogwood and Gunn 1984). These groups of scholars focused on the "top-down" approach, where downstream implementation bottlenecks should be anticipated and resolved through preemptive policy design. It placed great emphasis on the ability of senior policy-makers in a hierarchical Weberian bureaucracy to foresee and prevent delays and obstructions in implementation. Mazmanian and Sabatier produced an 18-point checklist with questions broken down between statutory design and critical conditions to help policy-makers to identify obstacles and formulate solutions to minimize delays during implementation (Mazmanian and Sabatier 1981, pp. 25–26). Hogwood and Gun reaches similar conclusions in a similar approach where the job of minimizing delay during implementation still predominantly falls upon the policy formulators. Hence, it is up to the policy designers to get it right at the beginning prior to implementation. They also produced a list of preventive measures that policy designers should be aware of and ensure its effectiveness in order to prevent delay during implementation (Hogwood and Gunn 1984). Bardarch epitomizes this top-down approach, as his study emphasizes the importance of scenario writing abilities and fixing the game of policy formulators (Bardach 1977). As consequence, successful implementation of policy is overwhelmingly burdened on the foresight capabilities of the policy designers; a responsibility that is not unreasonable given the policy designers are deemed capable as they are a select corps of civil servants who have assumed seniority by moving up hierarchical ladder in the meritocratic Weberian bureaucracy. Experience and insight from having worked at the different tiers of the bureaucracy should have equipped them with the foresight on how changes in law translates into policy which then manifests into intra-ministerial decrees or circulars to be executed by those within the lower-rungs of a hierarchical bureaucracy.

This approach, although informative in extending the foresight for policy designers, was not a panacea. This is because it failed to take into account the conditions of those responsible for interacting and processing citizen requests on a day-to-day basis. Lipsky's groundbreaking study illustrated how those operating at the agency-citizen front lines developed coping mechanisms to deal with the large number of top-down requests within their day-to-day environment of limited resources (Lipsky 1980). These coping mechanisms arising out of necessity were often inadvertent yet inimical to the fulfillment of policy objectives. Thus, clarifying through detailing the downstream implementation responsibilities by the policy formulators does not necessary produces better results. Rather a "bottom-up" understanding of the conditions facing the "street-level" bureaucrats is more conducive to achieving policy objectives as it leads to the identification and resolution of contextual constraints fettering those public servants. Elmore develops this further by advocating the importance of "backward mapping" where designs on policy implementation can be improved more effectively when the design discussions start from the vantage point of the private choice-administration action nexus. Backward mapping reverse engineers the policy process whereby the desired output at this nexus are first narrowed and specified. It then analyzes what needs to occur at the implementation organization to ensure resources are devoted to generate this preset output at the private-public boundary. Thus, implementation should not be approached with the mindset of being wary on what might derail during the execution of a well-design policy but rather should be approached from the perspective that implementation failure occurs when those at the frontlines of policy delivery are setup to fail. Thus, setting them up for success is much more important than a dogmatic policy with clear instructions for all scenarios.

Both top-down and bottom-up approaches are not mutually exclusive and this is reflected in the modern implementation scholarship where both orientations are merged into a synthesis implementation framework (Winter 2012). Winter's *Integrated Implementation Model*, depicted in Figure 1, draws from both top-down and bottom-up approach groups of scholars, as both are indispensable in deciphering implementation behaviors and outcomes. As a result, Winter's model is comprised of four key components: (1) policy formulation, (2) policy design, (3) implementation process, and (4) implementation results. Policy formulation is important because the political process in which policy is produced may result in policies with ambiguous goals and unclear linkages in the policy components with those goals. Policy design is a separate component because how goals, instruments, and executing units are compiled matters. In practically, this component manifests diversely due on-going developments on implemental tool choices (Hood 1986; Salamon 2002; Howlett 2011). Implementation process is pulled out as a separate component to highlight relevant variables that emerges during implementation. That is, these variables do not emerge prior to policy implementation yet are present and influential during implementation. These emerging variables are grouped into four subcategories: (1) organizational and interorganizational implementation behavior, (2) management, (3) street-level bureaucrats' skills and will/interests, and (4) target group behavior. Organization and interorganizational implementation behavior captures the commitment and coordination of the involved organizations. Management includes practices such as clear signaling, recruiting right fit workers, and visibly managing street-level bureaucrats' practices. Street-level bureaucrats' skills and will/interest refers to the behaviors of those interacting with citizens. They occupy a crucial role in public policy delivery, as they represent the point of interaction when the rubber hits the road. They are relevant as their coping behavior influences merges with their delivery behavior. Target groups are categorized as a separate subgroup, as their behaviors and responses to street-levels bureaucrats also shape the effectiveness of the policy delivery. The three components in total affect implementation results. A feedback loop of the entire process is also modeled in to inform the policy formulators for further refinement of policy in the long run.

In retrospect of the developments in implementation approaches and frameworks, the question then is, how well does it inform us of the variation in access to safe drinking water across different countries? This question can be further split into, (1) how does the synthesis implementation

framework help identify and explain reasons behind the variation in access to safe drinking water across different countries, and (2) could detailed case studies further inform and refine the existing implementation framework to better emphasize the catalytic factors behind why certain countries were so successful in expanding access to safe drinking water while other were not?

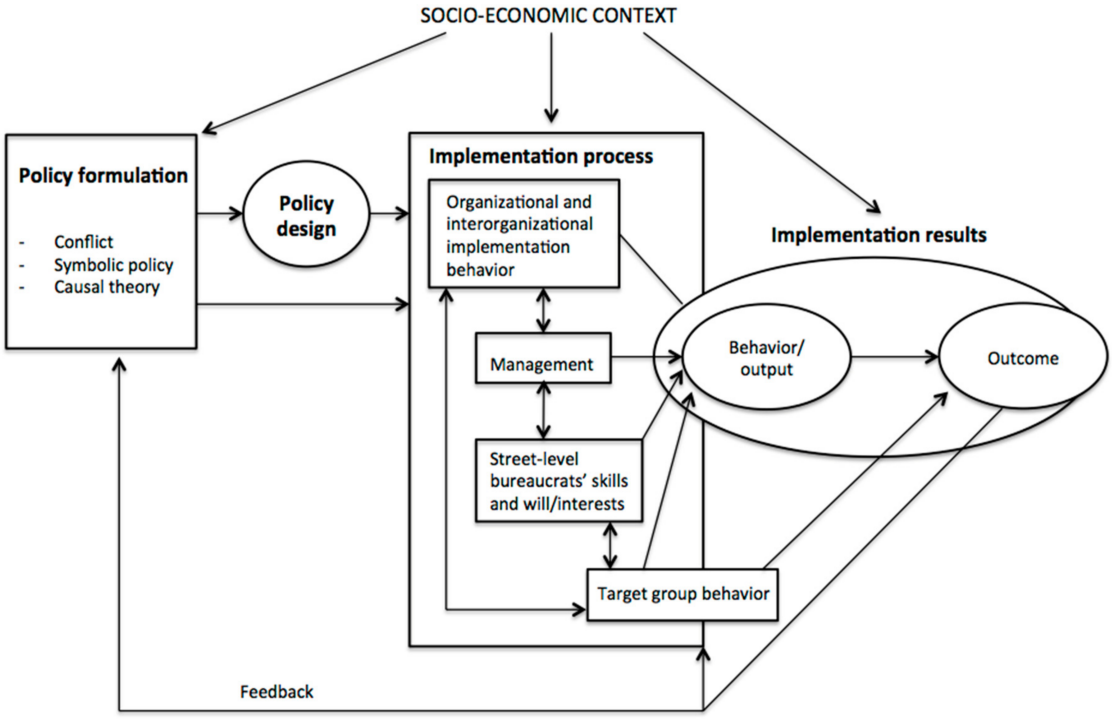

Figure 1. Integrated Implementation Model. *Source:* Winter, Søren. 1990. "Integrating Implementation Research." In (Palumbo and Calista 1990; Winter 2012).

3. Research Methods

Five countries were selected to collect data on safe drinking water policies. They are Indonesia, Vietnam, Malaysia, Singapore, and South Korea. Indonesia and Vietnam were selected because they were at opposite ends of the spectrum in terms of safe drinking water coverage performance (UNICEF and WHO 2015). Over a 20-year period between 1990 and 2010, Indonesia's safe drinking water coverage rate increased only by 15%. In the same period, Vietnam's safe drinking water coverage expanded by 28%, which is almost twice the percentage increase than that of Indonesia's. Malaysia was selected because despite it being Indonesia's neighbor, it achieved universal access to improved water sources. Singapore, which, is also situated between Indonesia and Malaysia exhibits universal access to improved water sources as well. South Korea was included as well since it represents a country that achieved universal coverage of safe drinking water within a single generation.

A good implementation framework should encapsulate all crucial factors that enabled South Korea, Singapore, and Malaysia to rapidly achieve universal access to safe drinking water. The absence of these factors should also explain why Indonesia and Vietnam still do not have universal access to safe drinking water, where the absence in the set of necessary factors would be more pronounced in Indonesia versus Vietnam.

Primary data was collected through in-country interviews with recognized water specialists working in the public sector of these countries. Given that not all civil servants in these countries are and were involved in safe drinking policy formulation and implementation, random sampling is not employed. This is because random sampling does not lend any insight to the decision process within the narrow pool of decision-makers involved in safe drinking water policy. Rather snowball sampling was used, as it builds on the realistic assumption that decision-making on national policy is confined

to the few. Snowball sampling through referrals is also necessary for this type of research, since those involved in policy formulation, design, and implementation would not agree to interviews without a recognizable level of trust that is forged through official and personal introductions. The trust to engage and share their professional experience was established in the form of prior working relationship with the referees when the researcher previously worked at an international development organization. Potential biases that may arise from the interviews were actively removed through internal and external validation exercises using probing and triangulation. Given that the saturation of explanations was used as a guide in narrowing the pool of subsequent interviewees, theoretical sampling was juxtaposed with snowball sampling (Glaser and Strauss 1967; Rubin and Rubin 2005; Charmez 2006). That is, the goal was to both confirm presented explanations while also eliminating all other competing explanations. Thus, in order to do so, if given a choice, the latter interviewees were selected on the basis of their potential role in providing additional primary data in the theory-building exercise.

Prior to meeting the interviewees, formal introductions were paired with a succinct explanation of the research. Anonymity over interview content was ensured in print prior to the start of the interviews. A total of 83 in-country interviews were conducted. In-country travel was necessary as the identified people were either still working within the public sector of their respective country or they were retired with residence in the country. In-country interviews were preferred, as the identified professionals were not comfortable speaking freely over the phone to someone that they have not yet met face-to-face. Translators accompanied interviews where the interviewee was known to not be fluent in English.

Interviews were conducted in an open-ended question format. The only common procedure shared across all the interviews was the brief introduction of the study at the onset of the interview that included recent water coverage figures and its change over time. The interviewees were asked of their engagement and their explanation behind the longitudinal change witness in their country. Probing, an interview skill to elicit further clarification, were actively used in a non-intrusive manner (Rubin and Rubin 2005). That is, used only at the end of the explanation where a brief pause was taken by the interviewee. All interviews were conducted for at least an hour.

The in-country visits served another purpose in this research. It allowed access to archival documentation that were only physically accessible onsite. Access to archival documentation was necessary to verify interview content and do a deeper dive into the important events that was raised during the interviews. Recognizing the interviewing professionals possess greater knowledge on the policy formulation and implementation process of their countries, a steep learning process through retrieval and review of secondary data sources were necessary. This parallel process served two purposes: (1) it allowed a deeper investigation on key events and developments mentioned emphasized by the interviewees, and (2) additional research in the archives enabled both the verification of interview content and helped eliminate hypothetical alternative explanations. Archival data were photocopied when permitted and where services were available. In South Korea, Malaysia, and Indonesia certain key documents were translated through a hired translator. In South Korea, this was necessary, as archival documents prior to 1990s included many Chinese characters, as it was the norm of the times. In Malaysia and Indonesia, translations were commissioned to further refine accuracy of the key native language documents.

Data collected from interviews and archival research were compiled into case studies. Each chronological case study was developed based on the totality of collected evidence. The causal mechanism was constructed by weaving together a series of identified important developments identified by the interviewees and verified by archival research. Proving association, temporal order, and elimination of alternative explanations were the adhered standard in this exercise. Existing implementation frameworks were juxtaposed on the narrative case studies to see how well they capture the crucial mechanism identified by the practicing professionals in the safe drinking water policy arena. Multiple findings were generated through this approach. Below, I present the in-depth case studies unearthed from my fieldwork. This is then followed by analytical findings on how well

theory and practice overlap. It is followed with the development of a new framework that better consolidates the key findings from the case studies.

3.1. Case Study 1: Indonesia

In the 20 years spanning from 1990 to 2010, the proportion of Indonesian citizens gaining access to improved water sources increased 15%. This improvement in coverage occurred in the absence of a clear target in coverage.[1] This should not be translated a lack of discussion on the role of the public sector in the management of water resources, as it is clearly expressed in Article 33 of the 1945 Constitution that waters are subjugated to the powers of the states to be exploited for the greatest benefit of the people. The theme being more explicit in Article 5 of the Water Resources Law (Law 7/2004) whereby it states:

> *The State guarantees the right for every person in obtaining water for minimum rudimentary daily use to fulfill a healthy, clean and productive life.*

Accordingly, Ministry of Public Works oversees water resource development in the country. Within this ministry, the Division of Human Settlement within the Ministry is responsible for water supply system development. However, this Division is only responsible for design and construction whereas the operation and maintenance of the facility is delegated to the local water enterprises more commonly known as Perusahaan Daerah Air Minum or PDAMs through Government Regulation 14/1987. Local Governments owns the PDAMs. Hence, water supply systems in Indonesia involve collaboration between the federal and local governments. As of 2015, there are 386 PDAMs in the country (BPPSPAM 2015).

The Ministry of Public Works' role is confined to the bulk water supply production, i.e., constructing the more technically sophisticated initial part of the water supply system where water is drawn from a water resource and is then treated. These facilities require a lot more initial capital, as this facility produces all the water that will be pumped out to the distribution pipe network. Thus, the federal government is more suited to assume this role with its deeper pockets and access to international finance. PDAMs are responsible for the subsequent steps within the water supply system, which is storage and distribution. Required investment in expanding distribution networks are less lump sum in nature and are more incremental. Hence, expanding distribution and connecting more customers falls under the duties of the PDAMs.

Given the linearity of design, construction, operation, and maintenance, a similar pattern is expected to emerge. That is, growth in coverage should be linear and incremental as more and more water supply systems are being built and the PDAMs expand coverage by connecting more customers to the network. However, we do not see this pattern emerging in Indonesia.

Interviews revealed various reasons behind the discrepancy between expectations and reality. First, it was mentioned that water supply design and construction were not properly built to intended specifications. This was possible because the mayors and governors of local government overlooked the poor construction in the sake of not ruffling any feathers of the central government political leadership. This was because prior to Suharto's fall, the Golkar party led by Suharto was also responsible for selecting and anointing the Mayoral and Gubernatorial candidates. The hierarchical political relationship between the federal and local government placed the local government leadership in a subservient position preventing them from voicing discontent. This was also due to the fact that infrastructure investment funds were held by the central government and subject to their discretion. Hence, dissonance faced the potential threat of change of leadership along with the prejudice in allocation of inter-government transfers.

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[1] This is no longer true in 2017 with the launch of the 100-0-100 program (100% access to drinking water, 0 slums, and 100% access to sanitation) by the Ministry of Public Works to be achieved during the 2015–2019 period.

There were natural consequences of poorly constructed systems. These included poor financial viability and subsequently undermined the ability of the local water utility to pay back the low-cost infrastructure investment loans offered by the federal government to the local utilities. Deferred payments and the stacking up of arrears were overlooked and unenforced by the federal government since it further supported the political alignment between the federal government and the local government.

Heads of local governments were aware of this situation, as local government investment in the water utilities were dire. It made no sense to invest in a system where on average non-revenue water was at 33%, meaning that 33% of all the water being produced was either leaking or unaccountable (Frauendorfer and Liemberger 2010). Furthermore, local legislative bodies are responsible for setting the water tariffs, which were suppressed below commercially sustainable levels. That is, the tariffs did not reflect the cost of production and operation. Hence, maintenance and expansionary activities were also reeled back.

These poor financial conditions of the PDAMs did come to the fore in the mid-1990s, as Indonesia was seeking additional financing from the Asian Development Bank. In the process of acquiring a loan, ADB performed a sector survey and highlighted these problems and forced the Indonesian government to address these deficiencies undermining the efficient operation of the PDAMs. In effect, it forced the PDAMs to prepare and implement local institutional development action plans, local revenue improvement action plans, and PDAM corporate plans. These sent out an inadvertent signal to the wider lending institutions on the riskiness of investing in Indonesia's water sector. This, however, had limited immediate effect on the PDAMs, as these activities were geared toward acquiring investment capital from the federal government and not from the commercial lending institutions. That is, as long as they engage and follow through the recommendations, they expect to receive additional capital financing from the federal government as a reward. Yet, these reforms were not taken up at an accelerated pace. This was due to the lack in any expedient pressures being exerted on the PDAMs and the Local Government leadership.

The push for improvements was further compromised by the tectonic shift in Indonesia's political landscape with the 1997 Asian Financial Crisis and subsequent downfall of Suharto's authoritarian regime in 1998. Suharto's departure after 32 years of rule was quickly followed devolution of greater authorities and resources to the local governments in an appeasement tactic to continue to attract loyalty and political solidarity with the federal government. However, political fragmentation was irreversible where devolution sowed the foundations for local government independence. The tipping point was the passing of the administrative and fiscal decentralization laws, Law 22 and Law 25, in 1999. The administrative decentralization law placed the regencies and municipalities in the driver seats of public works planning. Through the fiscal decentralization law, local governments retained a greater share of locally generally public revenues than before. The greater flexibility in deliberation over spatial planning and the increased financial capacity weakened the federal government's influence over local government matters (Nababan et al. 2014). This in consequence for water supply system reform ebbed the incentive to follow through with the federally directed reforms.

The transition from Suharto to post-Suharto period was also plagued by the lingering effects onset by the Asian Financial Crisis. The 2348 Rupiah to the Dollar in January 1997 was devalued to 14,850 Rupiah to a Dollar by June 1998. The lingering economic turbulence from the financial crisis coupled with rapid decentralization resulted in a time of uncertainty. The decentralization was unsettling as coordination across different tiers of government was unclear (Turner et al. 2003). This meant that public service delivery were fraught with delay in face of this newly emerged uncertainty.

Uncertainty over the operating status of the utilities loomed in the new post-Suharto era. USAID was then asked to be involved to provide technical assistance and assess the conditions of the utilities (USAID 2005). The report help draw the sobering picture of the water utilities in Indonesia. These include: PDAMs having difficulty completing questionnaire forms on performance data due to lack of technical capability; separate working units within the same PDAM reporting different

figures; and high bureaucracy where assessments were prevented from proceeding without meeting with the PDAM director. In sum, the PDAMs were being run under the helm of a strong stewardship of the director. However, this also meant that the director could push back on externally imposed technical capacity improvement programs and routine recording keeping. A possible scenario when the director only needs to report to the head of the local government, where the latter can draw and use revenues generated from the PDAM, as it was not unheard of since some pre-colonial PDAMs' mandates were modified in the post-colonial era to include the additional clause of contributing to the Regional Income (Nababan et al. 2014).

The USAID PDAM performance assessment was scaled up and integrated into Indonesia's national program on water utilities, as the Water Supply System Development Support Agency (BPPSPAM) was setup through Minister of Public Works' Ministerial Decree No. 294/PRT/M/2005 to collect, report, and assess the performance status of the PDAMs. Performance assessment of all PDAMs by BPPSPAM portrayed many of the PDAMs to be plagued with performance concerns. In their 2010 performance evaluations, 142 out of 341 PDAMs or 41.6% of all PDAMS were reported to be "healthy". 128 PDAMs or 37.5% of all PDAMs were reported to be "unwell". 71 PDAMs or 20.8% of all PDAMs were reported to be "sick" (BPPSPAM 2011). These were reflected in coverage.

3.2. Case Study 2: Vietnam

Vietnam's water access levels improved dramatically from between 1990 and 2010. It increased by 28% to provide 95% coverage to its citizens. In Vietnam, the role of the state in ensuring health of its citizens is pronounced in its constitution. Although the constitution has been modified multiple times since its inception in 1946, the role of the state in ensuring citizen health continued to be incorporated. Prior to 1990, Vietnam's constitution was modified in 1959 and 1980 prior to 1990. After 1990, it was modified in 1992 and 2013. All constitutions emphasized the role of the state in developing and ensuring its citizen's health.

Vietnam's water coverage expansion is best understood by separating out the developments in the urban sector versus the rural sector. For the urban areas, Ministry of Planning and Investment and the Ministry of Construction were responsible for developing urban water supply systems. Following its construction, State Owned Enterprises (SOEs) took over the operation and maintenance along with addition investments. The SOEs were ring-fenced from the local governments and were able to directly submit requests for additional finance to the Ministry of Finance and Investment. The SOEs were under the stewardship of the provincial governments upon decentralization subsequent to the 1986 Economic Reform of Vietnam that is more commonly known as *Doi Moi*.

The rapid expansion in urban water coverage is attributed to the incentives facing the provinces. Following *Doi Moi*, Vietnam was more lenient to Foreign Direct Investments (FDI). FDI net inflows gradually grew and the provinces that were able to attract large FDIs were granted greater autonomy in their local government decision-making, particularly in infrastructure development. The autonomy is derivative of these provinces being net contributors to the national budget (Jandl 2014). The greater autonomy was buttressed by the changing tides in the political leadership whereby Nguyen Van Linh, the General Secretary of the Communist Party between 1986 and 1991, appealed to the provincial leadership to execute reforms on recalcitrant central bureaucracy. As a result, more and more provincial officials were gradually included in the Central Committees. In 1982, only 15.6% of the 154 members in the Central Committee were from the provinces. This figure changed to 41% in 2001, whereby 56 officials within the 150-member Central Committee were from the provinces (Abuza 2002). Given economic success were both vital to maintaining the political gains by the provincial leaders and given economic success were underpinned by FDI, the provincial leaders actively invested in infrastructure development.

The expansion in access to safe drinking water in the rural areas is attributed to the National Target Program (NTP) that specifically laid out coverage goals. NTP's blueprint came from the 20-year rural water strategy drafted from support from Danish International Development Agency (DANIDA)

in 1997. Prior to this period, rural water supply coverage expansion was mainly in the form of water pumps funded by UNICEF. With NTP, implementation bodies were designated along with dedicated public funding. The NTP was issued through a Prime Minister's decree where it was specified that 80% of the rural population should have access to clean water by 2005. Ministry of Agriculture and Development would spearhead the efforts. The program was allocated a capital budget of USD $271 million. The first phase of NTP was executed between 2000 and 2005. Through NTP I, 23 million rural people gained access to clean drinking water.

The second phase of NTP (NTP II) lasted another 5 years and spanned from 2006 to 2010. Reforms were coupled during NTP II based on the Joint Annual Reviews conducted by international donors providing financial support to the program. As a result, the National Center for Rural Water Supply and Sanitation (NCERWASS) was created to provide technical assistance to the projects. Rural Water Supply and Sanitation Partnership (RWSSP) was also created to inform and match foreign donors with domestic projects seeking funding. Both entities provided support to the NTP Standing Office responsible for program oversight. Implementation of NTP II was further improved with the passing of series of circulars on coordination, monitoring and evaluation, construction procurement, instruction on master plan for awareness promotion, investment and management of rural water supply facilities, water quality management, financial management, and establishing of engineering and technical standards (Vietnam Government 2012). These series of reforms were de facto coerced, as the international donors were not going to fund the NTP II without the adoption of these reforms. This was a credible threat, as the international donors were on the same page regarding the implementation obstacles as they participated in the Joint Annual Reviews that monitored progress. That is, they were able to act in union and hold each other accountable because the list of implementation barriers was jointly identified.

The success in the implementation of the NTP was responsible for the large increase in coverage in the rural areas. Given the predominant rural population, this also was responsible for pushing up the national coverage figures. Therefore, the strong urban utility performance driven both by political and economic incentives combined with a concerted effort in the rural areas under the auspices of senior political leadership and unified donor voice explain the success of the Vietnam water coverage expansion.

3.3. Case Study 3: Malaysia

Malaysia is the first of the three countries where the entire process towards universal access to improved drinking water sources was traced and its causes examined. Given the high provision rates of safe drinking water already by 1990, pre-1990 data was collected. The evidence examined colonial data and post-independence data. From what was collected, the following explanations emerged.

Water supply development meeting a certain quality standards was well-recognized early on as archival records dating back to the 1950s show Town Boards assuming the responsibility of enforcing these standards. The draft 5-Year Development Plan covering 1950 to 1955 included construction of 60 water schemes. Public sector involvement in water provision continued as the idea of State Water Boards being independent and financially self-supporting is floated in 1955. At the same time, water supply development was the second highest priority in national development within the 1st Malaysia Development Plan covering the period 1955 to 1960. Plans for 111 rural water supply schemes were included in the 1960 Plan. The 2nd Malaya Development Plan dedicated $174.9 million for the Malay Peninsula. This figure is 2 times larger than the allocation to water supply systems under the 1st Malaya Development Plan. The 2nd Malaya Development Plan included 159 additional rural water supply schemes to be built during this period with $49 million allocation. It was to increase the piped water coverage beyond 40%, which was the coverage in 1960. Production capacity at the time was at 100 million gallons per day of treated water.

During the 2nd Malaya Development Plan period, the National Development Planning Committee (NDPC) and its secretariat the Economic Planning Unit (EPU) was setup to identify cause of delay and difficulties in implementation and to propose solutions. The staffs of these entities lacked technical

capacity and thus, their technical capacity was strengthened through overseas post-graduate studies, mentoring by advisors from the UN, the Columbo Plan, Ford Foundation, and the World Bank. The two were pivotal institutions in executing policy and respectively so setup in the Prime Minister's Office. The Chairman of NDPC served as the head of the Civil Service.

NDPC works closely with the Treasury Economic Division, Department of Statistics, Economic Research Department in Malaysia's Central Bank, Planning & Research Division in the Ministry of Agriculture and Cooperatives, and Planning & Research Division in the Ministry of Education. The Planning & Research Division of the Ministry of Health and Ministry of Transportation are included in this committee from 1970.

NDPC is particularly important to the explanation, as detailed considerations of many policy problems are NDPC's special responsibility. NDPC and EPU help state government and local authorities to improve planning and implementation procedures through short-term assignments of federal officers to the states. NDPC also conducts field tours to visit projects and resolve development problems.

Within NDPC, there is the Development Estimate Sub-committee and the Standards & Costs Sub-committee. The former is responsible screening estimates and the later is responsible for developing standard plans and utilizing locally sourced materials. These two sub-committees' function was integrated to the general objective of developing sufficient portfolio of projects that is properly studied to facilitate securing of foreign assistance.

In addition to the NDPC and EPU, a National Operations Room was established by 1965. It was organizationally located within the Deputy Prime Minister's Office and displayed progress on public development program arranged by state and district. This arrangement was mimicked at both the provincial and district level with Rural Development Committees and State Operating Rooms along with District Rural Development Committees and District Operating Rooms. The Deputy Prime Minister who oversaw the National Operations Room would visit the provincial and district offices to check progress. The arrangement was intended to expand information control and facilitate decision-making for development.

1965 was a time of change for Malaysia as a whole because the eastern provinces of Sarawak and Sabah decided to join the Peninsula Malaya provinces to form the Federation of Malaysia. $202.0 million was budgeted for water supply systems in the 1st Malaysia Development Plan. It included the completion of 40 new treatment plants that increased production capacity by 48 million gallons per day and to service an additional 1.15 million people. Also, all small schemes in the rural areas were entirely financed by domestic funds. This was to prevent any delay from expanding coverage in the rural area. In 1996, a pilot project to provide safe piped water in sufficient quantity at a low cost was developed by the Medical and Public Health Department with the assistance of WHO&UNICEF.

During the 2nd Malaysia Development Plan covering 1970 to 1975, spending on water increased 21.5% from the previous plan. External finance from ADB and IBRD were tapped. The Durian Tunggal scheme for Malacca received a $15 million from ADB whereby British Special Aid covered the cost of design and supervision. $21.6 million for the Sungel Muda project to supply provinces Wellesley and Penang was financed by ADB. $10.8 million from IBRD was loaned to the Sungei Langat scheme to supply water to Kuala Lumpur. A total of 204 water supply systems were in West Malaysia and 4.5 million people were using piped water.

In the rural areas, a systematic investigation into possibilities of using groundwater sources was explored. This was to see whether these source developments would be more economic for small rural communities. Small schemes were being continuously provided in the rural areas. The rural expansion covered isolated communities and new land development schemes.

The 2nd Malaysia Development Plan period was a time of public administrative reforms. This was because capacity was being attenuated over time with expansion of government projects. It was identified that there was a problem of acute shortage of senior and experienced staff required for implementing the project and for the operation and maintenance of treatment plants. Therefore, on the administration side, public service recruitment procedures were streamlined along with engaging in

early recruitment and placement of local personnel. The private sector capacity was utilized for design and supervision of reoccurring projects. Overseas personnel were recruited when necessary.

National Committee for Development Administration was setup during the 2nd Malaysia Development Plan. It worked the Development Administration Unit (DAU), which serviced as the Division to provide advice and guidance for administrative improvements in the major sectors of the economy. Furthermore, Training and Career Development Division was established within the Public Services Department (PSD). External help was sought as well on capacity. The UNDP/SF project took place during this time to train and enhance data processing capacity for the Department of Statistics. The latter would be responsible for analyzing the National Manpower Survey conducted in 1973.

At the most senior level, monthly briefings were reactivated with the Prime Minister, Ministers, NDPC, Secretary-General of Ministries, and Heads of Department at the National Operations Room. Treasury, EPU, DAU, PSD, and Department of National Unity (DAU) conducted the budget reviews.[2] Programming and performance budgeting was adopted. However, it was also recognized that a large corps of accounting officers needed to be recruited. The Government Staff Training Center expands to the National Institute for Development Administration. The Institute is responsible for professional training and research into administrative problems.

The National Institute of Public Administration (INTAN) was strengthened during the 2nd Malaysia Development Plan. INTAN provided management consultancy services and management audits were applied to Government operations. It also was responsible for developing courses focused on implementation and coordination. The Institute was responsible for carrying out education programs to better align the civil service with central government objectives.

This was a time of active integration of knowledge centers. University cooperation was promoted. EPU gets a new Implementation Division dedicated to monitoring. General Planning Unit (GPU) is setup and develops the National Integrated Data System. The GPU and DAU jointly were dedicated to problem-solving and removing bottlenecks. The DAU is later absorbed into the Implementation Coordination and Development Administration Unit in 1971. These developments are significant, as the research conducted by these entities are graphed into the 3rd Malaysia Development Plan.

Financial management of water supply systems evolved as well. The State of Selangor setup the Water Supply Division within the Public Works Department (PWD) to install and oversee separate financial and accounting system. State Government contributes in financing the expansion of water network to adjoining rural areas. Other provinces follow this model. In necessary circumstances the private sector was utilized to prepare financial reports and assess operating efficiency.

During the mid-term review of the 2nd Malaysia Development Plan, the budget is revised. The budget allocation for water projects in Sarawak is increased by 2.5 times and 2 times in Sabah for the remaining 1973 to 1975 period. By 1973 6 million people in West Malaysia had access to piped water.

The 3rd Malaysia Development Plan continued its investment in water. Expansion of water supplies to poverty and new regional development areas were assigned high priority in order to provide social amenities and to prove the health and quality of life for the rural poor. Also, the expansion of water supplies will provide the necessary infrastructure for further development of towns and their surrounding areas. Johor Muar Phase I, Penang Sungai Muda Phase II, Kuala Lumpur Phase III, and Johor Segamat, Johor Labis urban water supply project were implemented during this period. $70.4 million was dedicated to the Federal Land Development Authority Program during this period.[3] $100 million was dedicated for rural water supplies during this period. In 1988, the

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[2] DAU was responsible for reviewing expenditures in considerations of the social objectives of the country.

[3] The Federal Land Development Authority program refers to the plantation estates developed from clearing of jungle land. The estates are part of a poverty alleviation program where the poor will be allotted a land to work and eventually purchase the land. It was a federal program whereby the federal government purchased and cleared land for crops. Houses equipped with water and sanitation was built to increase desirability of voluntary migration to these estates. At the end of 1980, 97% households in rubber estates and 99% households in oil palm estates had access to free piped water.

financing policy of rural water supply projects was modified in order to accelerate progress. The federal government bears the total capital costs of the project in deficit States of Kedah, Kelantan, Melaka, Perlis, and Trengganu and 2/3 of the costs in other States including Sabah and Sarawak.

Administratively, federal EPU offices were setup in the provinces to help State Planning Units (SPUs) in identification and preparation of projects for external financing. Regional authorities continued to expand. South Kelatan Development Authority and Bintulu Development Authority in Sarawak were created in 1978. They added to the existing Jengka Authority, Pahang Tenggara Authority, Johore Tenggara Authority, and Trengganu Tengah Authority. All authorities were staffed by both Federal and State Government representatives. However, capacity at the provincial level was weak. In 1978, UNDP and the World Bank executed the State and Rural Development Project due to weak capacity in the State Economic Planning Unit. Australia and New Zealand helped Melaka Trengganu in identification, preparation, and implementation. In light of these circumstances, Federal Revenue Grant for project development was increased. Standardization of project identification and submission format was developed. In the process, it was made sure the review included operating expenses and manpower resources.

In 1977, Malaysian Administrative Modernization and Manpower Planning Unit (MAMPU) was setup the Prime Minister's Department. It was responsible for management auditing to assess operating efficiency. In absence of capacity, foreign consultants were still be relied on. However, when foreign consultants were employed, they were urged to be partner and hire local firms.

In 1976, the Local Government Act was passed. It emphasized that the local authorities are responsible for preserving and protecting public health in their areas. Following, in 1978, new PWD was setup in Ministry of Health and Ministry of Home Affairs for preparation of plans and engineering designs. The Government was also then encouraged to purchase land in advance. At the end of 1980, Population and Housing Census was carried out. The census is relevant as its data is utilized to design housing policies during the 4th Malaysia Development Plan.

The 4th Malaysia Development Plan is marked by rapid increase in both urban and rural water supply coverage. In the urban areas, along with on-going developments on water supply systems, the housing sector received help from the federal government. The federal government provided a 4% loan to the States for low-income housing development. Commercial banks and finance companies were directed to allocate a minimum 10% to housing in 1981 and 20% in 1982. Homeownership was being promoted through the Special Housing Loan Scheme.

In the rural areas, the Village Rehabilitation Program was launched. It supplied material assistance in value of up to $1000 per household. The materials were to be used in conjunction with collective self-help. It was devised to promoted integration of Organ Asli by upgrading basic facilities such as water. Through the program, the metric of poverty was better defined. In Malaysia, poverty is not narrowed defined as household income because it does not take into account public serviced by the Government, such as clinics, water, and subsidies. Rather poverty alleviation strategy rests on the provision of basic services.

In terms of implementation, the 4th Malaysia Development Plan was a time of consolidation and integration. Water Supply Departments were established in each State. Previously, water supply system development and management was delegated to a mosaic of entities such as the Water Board, Water Department, and Public Works Department. Furthermore, a push for adopting commercial accounting systems was in place. To assist in project development, the Integrated Project Monitoring System was launched to share and integrate all requirements to project development. Data was gathered and shared on 19,000 public projects. Other information systems were adopted at this time, such as the Management Information System for chief executives and Public Enterprises Management and Evaluation System. On the legal front, amendments to the National Land Code and the Land Acquisition Act took place to the expedite land acquisition for project implementation.

A framework for efficient and productive public sector was promoted in the Government. It was applied to all facets of Government. The combined result of these factors resulted in 70.9% of the

total population gaining access to piped water through 4162 million gallons per day water treatment production capacity. Coverage among the urban population was higher with 93.1% having access to piped water services by the end of 1985. In the rural areas, 57.6% of the population had access to piped water services. This is a figure that is still significantly higher than the 1990 figures in Indonesia and Vietnam.

At the end of 1985, the growth of the public service was curbed. Public Private Partnerships of Build-Operate-Transfer was being tested in the water sector. For large utilities, unaccounted for water (UAW) studies were conducted. It was shown that UAW was 43% on average. Meter under registration and systemic losses was identified causes. It also pushed to upgrade and rehabilitate old structure rather than building new. Work on reducing UAW was launched during the 5th Malaysia Development Plan.

In the rural areas, alternative sources were explored. A complementary Special Rural Water Supply Program was carried out alongside the normal rural water supply scheme developments. The latter involved installation of reticulation systems to distribute water from newly completed source works. Other sources such as groundwater and rainwater sources were exploited.

The 6th Malaysia Development Plan starting in 1990 was a time of increasing efficiency. UAW was reduced to 38%. Evolved computerized systems were adopted. A computerized scheduling system that monitors physical progress in addition to financial monitoring was adopted. Affordability and willingness to pay is more carefully examined as cost recovery and tariff structure are considered. Implementation of commercial accounting systems was reviewed with emphasis on increasing efficiency in revenue collection for long-term financial viability. In 1994, Johor State Water Department became the first state water authority to be corporatized in the country; a demonstration of the privatization movement.

Post-1995 are times where water scarcity is an issue. National Water Council created in 1995 to resolve legal, institutional, and financial issues in order to improve and coordinate river basin development management on a national basis. To further address, the water scarcity issue, UAW is further reduced to 28% by the end of 2000. Although figures are available after 2000, the analysis stops at 2000, as the steep slope to expanding access is more relevant to our research inquiry.

In summary, multiple crucial factors emerge as drivers in Malaysia's continuous expansion in piped water services. Foremost and most conspicuous is the clear commitment to develop water supply systems as demonstrated in the Development Plans. Budgets were allocated and process closely monitored. However, for large projects, project preparation was done with attracting foreign capital, particularly of the development banks. On top of the transparency in commitment, active public administration reform in improving implementation took place. These manifested differently over time but they focused on identifying the problem and coordinating among relevant actors to resolve the problem. Coordination was centralized and responsive to the most senior level civil servant. Institutions were setup to build capacity with a long-term vision.

As for continuous growth in the rural piped water coverage, it is attributed to the dedicated commitment to extending central government services to the remote areas. This is driven by framing poverty alleviation to not only focus on improving incomes but also in improving coverage of public services. The commitment to expanding rural coverage is further demonstrated by funding rural water supply system entirely with domestic funds. And later by providing material in the form of grant in unreached areas. Federal Land Development Authority projects immediately helped move the rural poor to estates with water. Hence, these federal projects further expanded safe drinking coverage in the rural areas.

3.4. Case Study 4: Singapore

Singapore reached universal access to improved water sources by 1990. Hence, pre-1990 events that were responsible for expansion in coverage were asked during interviews and archival documents. Upon examining the various sources, certain critical drivers behind the expansion in coverage were

identified. Multiple enabling factors were at play in Singapore. Most important circumstantial factor is Singapore precarious situation on water resources. That is, at the time of separation from Malaysia, Singapore did not have the water resource infrastructure to supply enough water to its citizens. Water had to be transported from Johor of Malaysia.

Singapore's precarious situation with water resources was well recognized by Prime Minister Lee Kwan Yew. More so since the British in Singapore surrendered to the Japanese as direct result of the Japanese cutting off the water supply to the island. Prime Minister Lee Kwan Yew prioritized water resource development throughout his career as Singapore continued to rely on Malaysia for its water supply and also the water supply agreement between Malaysia and Singapore had an expiration date. Furthermore, Singapore's dependency on Malaysia for its water supply was frequently reminded by the leadership in Malaysia with its threats to cut it off in times of discord between the two countries.

Building reservoirs increased water resources in the country. Reservoirs were seen as a solution since Singapore received ample rainfall. At the time of independence, Singapore did not have the infrastructure to retain all the rain. Although water resource development is a crucial part of the explanation in expanded coverage of safe drinking water, it is not a sufficient explanation. This is because increase in water resources does not directly translate to safe drinking water provision.

Singapore's expansion in safe drinking water coverage is better attributed to expansion in public housing. The percentage of people living in public housing in Singapore is particularly high. This did not come by chance but was result of deliberate policy. Although independent safe drinking water access is not available prior to 1990, it is safe to assume the public housing residence figures mirror the accelerated path in which Singaporean citizens acquired safe drinking water. This is because all public housing was equipped with piped water.

The question then becomes reframed to how Singapore was able to rapidly increase public housing provision. Singapore did this first disbanding the previous housing agency, the Singapore Improvement Trust, and replacing it with the Housing Development Board (HDB) in 1960. Lim Kim San was appointed the first Chairman and started his work firing everyone that was not competent. HDB then developed their own building course to rapidly fill the human resource shortage. HDB was able to operate with a bit of leeway and was not confined to strictly adhering to Building Ordinance procedures that would cause delay in construction. This was as long as it did not compromise structural integrity. This was permitted because constructing low-income housing was the upmost priority at the time. More so, since the Bukit Ho Swee Fire in 1961 left close to 16,000 on the streets overnight. HDB received the full backing of the People's Action Party (PAP) and its leader, Prime Minister Lee Kwan Yew. The Prime Minister actually ran campaigns promising the rapid construction of affordable public housing.

Rapid construction of public housing biggest threat was rise in material costs. Suppliers could easily hike up the price during a time of scarcity. Lim Kim San threatened the suppliers that if the prices go up, HDB will directly intervene and produce the materials. This threat was put in play as HDB opened up granite quarries and sand quarries to stabilize price. Upon verification that HDB will carry out its threat, the private sector suppliers stabilized their price. In return, HDB expedited payments to contractors to make sure HDB was not a source of delay in construction. Lim Kim San would personally tour the construct cites and point out irregularities to be addressed. All housing at the time was built with water, electricity, and modern sanitation.

Constructing public housing is ineffective in moving people to better environment health if people choose not to move to public housing. This was tackled by lowering the cost of home ownership. Homeownership financing programs were put in place where people would pay less than 20% of their income to purchase a house and within 5 miles of their work area. This became a reality in 1964 with the "Home ownership for the People" scheme and as a result people chose to move to the public houses. The estates were maintained by staffing Housing and Maintenance Inspectors and Estate Officers. These would public servant who would inform the new residents on inculcating amiable community living behaviors. This sustained demand for HDB units.

In 1963, the Public Utilities Board was established under the Prime Minister's Office. It was responsible for servicing electricity and water. In the same year, Lim Kim San, the previous Chairman of HDB, became the National Development Minister. He calls the Public Works Department under the Ministry of National Development once a week to follow-up on progress. During his tenure, a coordinating body is setup to bring together various statutory boards so that roads would not be dug up and close repeatedly. It was to make sure water pipes and drainage pipes are installed all at once.

The role of the Government in expanding access to safe drinking water was further strengthened with the Land Acquisition Act in 1966. It enabled the government to acquire compulsorily land of private and commercial use in the case of public interest. The state would determine payment of compensation. In the case of acquiring squatter land, the squatters were given HDB allocation. This Act permitted the state to increase its ownership from 44% to 85% in the future.

Singapore continued adhering to the formula of moving people into improved housing to expand coverage of safe drinking water. There are more technical developments in Singapore's water sector that followed later. However, it is less related to expansion in coverage but more related to reducing dependency on Malaysia for its water. That is, the process in which water is supplied evolves over time but for the end-user it does not alter their status of having access to safe drinking water.

In summary, Singapore's path to universal access to safe drinking water is best explained by following the developments associated with expanded housing coverage in the city-state. Singapore's case study is relatively simpler because it does not have a rural population and a much smaller geographical boundary relative to the other case study countries. However, the usefulness in Singapore's case study is in its clarity on how access to safe drinking water was expanded rapidly in an urban area.

3.5. Case Study 5: South Korea

South Korea registered 97.7% coverage of piped water services in the country in 2010. This is a combined figure including both the urban and rural populations. Thus, the question once again is how South Korea was able to achieve this feat within half a century. In the case of South Korea, the country invested early in developing and expanding water treatment facilities in the urban areas. Seoul's 1st Facility Modification and Expansion Plan was executed between 1961 and 1963. Pusan launched its 1st Water Supply Expansion Project in 1960. Daegu engaged in its 1st Water Source Expansion Project in 1959. Investments in water supply facilities were executed early with external aid. United States aid was a key resource along with the Japanese War Reparations Fund.

Due to external source engagements, project preparations were led by the central government. The central government was actively engaged in establishing the legal foundations in the early 1960s. Water supply ordinance regulations were engaged in 1962. With this legislation, the Minister of Interior approved cities' and provinces' water ordinances instead of respective Mayors and Governors. Central government role at the helm of infrastructure development in the country was further solidified with the National Land Plan Basic Design. It was a 20-year long-term plan on land development and utilization in Korea for years 1966 to 1986.

To execute the 20-year land development plan, various laws were passed. These included the Land Accommodation Law, City Planning Law, Architecture Law, National Land Construction Overall Plan Law, Special Multipurpose Dam Law, Regional Industry Development Law, etc. Legal foundations were established to grant central government authority to execute the long-term visions of the country. For the purpose of our inquiry, another key factor was drafting of the 10-Year Water Resource Overall Development Plan covering the years 1966 to 1976. The 10-Year Plan changed the treatment of water from a free resource to an economic resource. A water budget of established as a result. The state-owned enterprise of Korea Water Corporation was inaugurated in 1967. These early policy and legal foundations help establish direction and sequence in water infrastructure development.

Water supply systems in urban areas were built with a combination of external and domestic funds. This approach was adopted because domestic funds alone were not sufficient in meeting all the

infrastructure development demands. Also, projects utilizing external funds were preferred as those projects involved utilizing foreign technical knowledge. They were opportunities for both Korean Government and domestic companies to acquire knowledge and experience on how infrastructure projects should be executed. The technical knowledge partnerships were not only forged on project management but also in material production. US Steel and Kubota of Japan engaged in technical partnerships with Korea's domestic companies for domestic production. The domestic production of water infrastructure materials helped keep the material costs down in the long-run.

The continued expansion of the safe drinking water coverage in the urban areas is attributed to Korean Government's involvement in public housing. The state-owned enterprise Korea Housing Corporation was established in 1962 to cater to the neglected low income housing market. Private sector housing companies were only engaged in meeting the larger profit generating high-income population's housing needs. This was persistently the case due to the housing shortage. Hence, the Korean Government created the state-owned enterprise and established also the Korea Housing Fund in 1967 to facilitate homeownership. The aim was to rapidly increase the number of available housing in Korea. Water supply systems are integrated with housing as the Water Supply and Sewerage Division is placed within the Urban Housing Bureau within the Ministry of Construction in 1968.

A 10-year Housing Construction Plan is drafted to map out housing projects between 1972 and 1982. The goal was to satisfy 82.8% of urban housing demand and 88.4% of national housing demand by 1982. Subsequently, in 1986, the 6th 5-Year Economic Plan is dedicated to the construction of 2 million houses. The growth in housing supply maintained the momentum in piped water coverage in the urban areas.

In the rural areas, short-term water supply systems were developed with community labor during the New Village Movement and overseen by the Ministry of Health and Social Affairs. These systems are short-term as they are minimal filtration system, often only have a sand-filtration system. They were not meant to be permanent, as these systems are later replaced by water transported from urban treatment plants with production capacity growth. In 10 years of the New Village Movement, potable water supply facilities were constructed in 21,205 villages (Ministry of Interior 1981). By 1980, 7.8 million people out of a total rural population of 9.5 million people had access to potable water supplies. Thus, 82% coverage was achieved in the rural areas by 1980. The rural village beautification movement sustained growth in coverage in the rural areas.

In summary, South Korea's growth in safe drinking water coverage started sequentially with early establishment of legal foundations. The central government spearheaded the effort in infrastructure development, as external resources were sought out. External resources both in finances and technical transfer were sought. Continued investments in production capacity by focusing on reservoir development and treatment plants allowed uninterrupted expansion in coverage. Domestic production of pipes kept the costs down. Government engagement in high density housing helped maintain coverage expansion in the urban areas while preventing the growth of slums due to increased population migration into urban areas.

In the rural areas, a village beautification effort titled the "New Village Movement" served as a catalyst in involving community labor in constructing potable water supply systems. The government was actively involved in promoting the movement, as it was the primary objective of the 3rd 5-Year Economic Development Plan. Water supply coverage was not the primary goal but rather a by-product of rural productivity improvement and improvement of environmental health efforts. However, its success in the expanding coverage of access in improved water sources is self-evident with the number of villages owning potable water supply facilities after 10 years of the movement.

4. Explaining the Patterns

From the five case studies, it is clear that Government had a pivotal intervening role in the longitudinal trajectories in access to safe drinking water. The question then is how well we can encapsulate these critical factors with public administration theory. Figure 2 illustrates the longitudinal

patterns in piped water coverage in the five countries. From the variation in the dependent variable, we want to extract why there is variation between Indonesia and Vietnam over the same period. We also want to extract why the three other countries were able to reach universal access to piped water while the other two countries have yet to meet that goal. Given implementation lies at the core of public service delivery, the implementation framework is applied in separating out and compartmentalizing the observations. Søren Winter's *Integrated Implementation Model* reflects the latest developments in the implementation field. Hence, his framework is applied. The contours of his model are presented in Figure 2 and the how observations fit within his framework is listed in Table 2. Figure 3 further expands the longitudinal variation for Indonesia. Figure 4 does the same for Vietnam.

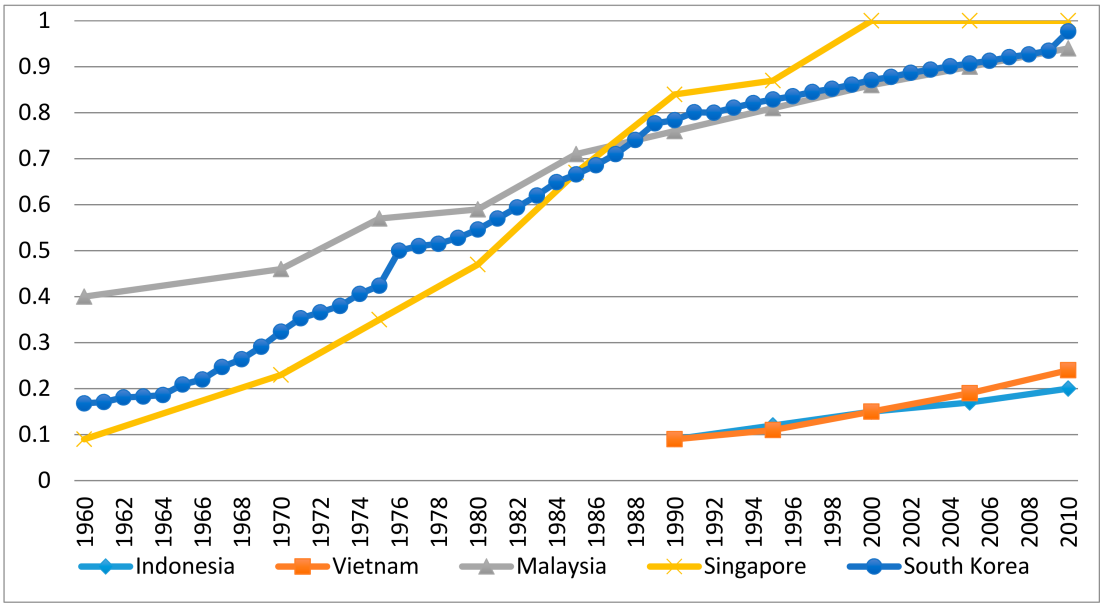

Figure 2. Percentage of National Population with Access to Piped Water onto Premises. Sources: (UNICEF and WHO 2013a, 2013b); 5-Year Development Plans of Malaysia dating back to 1955 and up to 2010. This includes the 1st and 2nd Malaya Development Plan and 1st to 7th Malaysia Development Plans. All published by the Malaysia Government. The figure after 1990 come from (UNICEF and WHO 2013c). They were adopted, as they were more conservative figures; Housing and Development Board (2014). HDB Annual Report 2013/2014. Singapore: Housing & Development Board; Ministry of Environment (2008). 생활에서 생명까지 맑은 물로 지켜온 100년: 한국상수도 백년사 지방 광역상수도 편. Seoul, South Korea: Ministry of Environment.

Upon examining the variation on the explanatory side, the compartmentalization helps separate out the various factors at play in the longitudinal patterns, particularly regarding the organizations involved during the implementation phase. We see that in Indonesia, inter-organizational coordination was made difficult due to fiscal, administrative, and electoral decentralization following 1999. This was a different issue altogether in the case of Vietnam, as they demonstrate a more efficient balance in decentralization on access to improved water. For urban utilities, Vietnam was decentralized like Indonesia with the establishment of SOEs. However, they received priority support from both the local government and the Ministry of Investment and Planning under the overarching goal of export-oriented economic growth. Furthermore, this prioritization was maintained politically, as the more economically successful provincial officers made headway in occupying more seats in the Central Committee. As for the rural sector, it was less decentralized. Rural water supply development was tied under the National Target Program funded by international donors. The cohesive push for removal of implementation barriers combined with domestic institutions to act as dedicated liaisons to the program implementation helped trigger reforms necessary to success of the program. This also was enabled with the Prime Minister setting a specific figure and a date on goals to achieve access to safe

drinking water. Given the Prime Minister Decree is translated later to Ministerial Decrees, there was little basis for localities to push back on participation. Rather it was the opposite where the localities vied for compliance since the program was run with funds from the central government that in turn was assisted by the international donors.

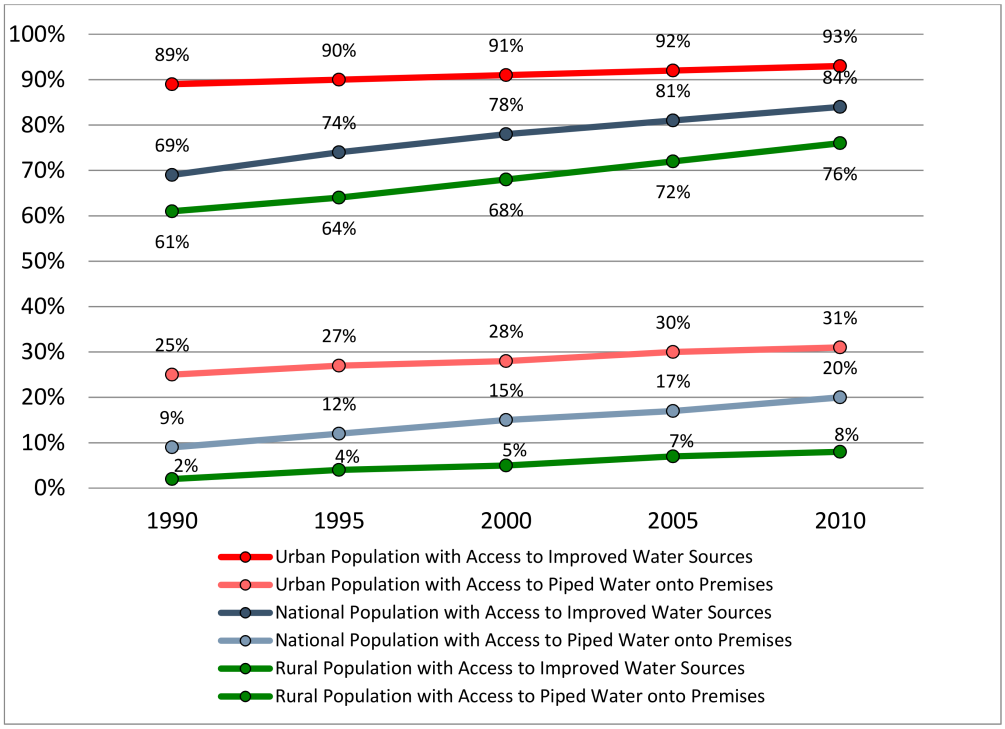

Figure 3. Detailed Indonesia's Longitudinal Changes in Access to Improved Water Sources. Source: (UNICEF and WHO 2013a).

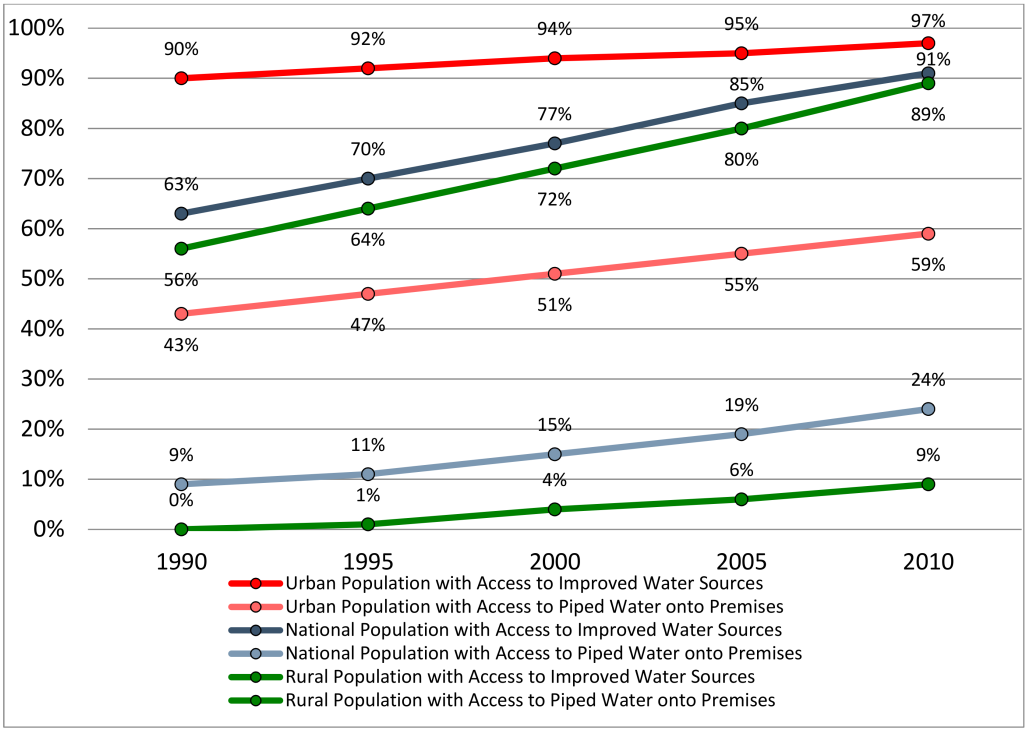

Figure 4. Detailed Vietnam's Longitudinal Changes in Access to Improved Water Sources. Source: (UNICEF and WHO 2013b).

Table 1. Fitting the Case Studies in the Integrated Implementation Model.

	Indonesia	Vietnam	Malaysia	Singapore	South Korea
Policy Formulation	Sector policies are developed in response to assessment reports by international organizations. This is the due to the low prioritization of water supply infrastructure. The priority of water sector policy is historically on irrigation systems (Law 5/1960 and Law 11/1974)	Communist Party of Vietnam explicitly states protection of health is the responsibility of the state. Bilateral funds are used to formulate long-term policy.	Policy formulation is anchored on the Development Plans where investment in water supply system development is explicit.	Policy arises from Prime Minister Lee Kwan Yew of People's Action Party promising to move people to improved housing units.	Policies are formulated in conjunction with the economic development plans where water resources and water supply are assigned high priorities.
Policy Design	MoPW involved in water supply system development. However, project funding is no longer centrally governed as result of administrative and fiscal decentralization. (Law 22/1999 and Law 25/1999). PDAMs are responsible for O&M. BPPSPAM was later setup to monitor PDAM performance. CBO involvement is encouraged and supported.	State-owned utilities are responsible for urban water supply. Local government directly requests financial assistant to the Ministry of Planning and Investment. Rural water supply is developed via NTP initiatives with MARD taking lead role but working in partnership with MoH and MoE.	Ministry of Public Works is responsible for urban sector. Water supply investment projects leveraging foreign sources of finance were prioritized. Rural water supply development is assigned to the Environmental Health and Engineering Unit within the Ministry of Health under the Environmental Sanitation Program.	Public Utilities Board is responsible for water service. Service coverage and network expansion is tied together with land development and urban planning. Housing is undeniably a complementing development, as the Government becomes actively involved in its construction.	Water resource development is delegated to Korea Water Corporation. Urban water supply system development is catalyzed with the use of foreign finance, particularly from ADB, IBRD, OECF, and USAID. Rural water supply systems were built during the New Village Movement.
Organization and Inter-organizational implementation behavior	MoPW is the main technical agency. However, it loses leverage vis-à-vis local government as the latter hold discretion and deliberation in project funding.	SOEs act independently working directly with MPI. MARD is the main vehicle for rural water supply development.	MoPW works with FELDA to supply water for rural land development projects in addition to developing urban water supply systems. MoH integrated rural water supply system development within their rural healthcare center programs.	PUB works in close coordination with Housing and Development Board. They are both under the Ministry of National Development. Lim Kim San having served both HDB and Minister of National Development and improved coordination and cooperation.	Cooperation among organizations is explicitly outlined in the Law-Presidential Decree-Ministerial Decree arrangement. Furthermore, they are anchored on long-term development plans. Central government plays a crucial role in coordination with their leverage in intergovernmental transfers.
Management	PDAM benchmarking exercise starts in 2005 with the creation of BPPSPAM. Data on performance are reported starting 2007.	A joint donor group conducts management review at the end of each NTP phase. It reviews and suggests managerial reform to the program.	Developments on federal programs are updated and monitored in the Operation Rooms setup at the central and local government levels and they are reflected in annual reports that percolate to the subsequent national development plans.	Reports on progress are regular. Results are reflected in annual reports. Also, direct leadership involvement in monitoring and oversight is pervasive during project implementation.	Detailed reports are produced of progress, although a lot of them have been deliberately lost to shield against retaliatory politics. Among surviving documentation, management was keen on developing detailed indicators of progress.

Table 2. Fitting the Case Studies in the Integrated Implementation Model.

	Indonesia	Vietnam	Malaysia	Singapore	South Korea
Street-level bureaucrats' skills and will/interest	Street-level bureaucrat's skills have been noted as much to be desired. However, they are shielded from removal due to pervasive legacies of the electoral spoils system. That is, utility managers are of political appointees often without technical training.	Street-level bureaucrat's skills have been noted as much to be desired. However, skills are being transferred and quality been overseen with continued involvement in developmental project by the engineers in the government.	Street-level bureaucrat's skills were improved through central government-led training programs. As for encouraging willingness, the Prime Minister frequently address the civil service and visited provincial offices to monitor progress.	Street-level bureaucrat's skills were improved via training. Instilling pride and raising the salaries of the public servants promoted willingness.	Multiple training programs were developed to improve the skillset of bureaucrats. Involvement in externally funded projects with foreign technicians aided the skillset development of local bureaucrats.
Target group behavior	Although piped water supply coverage is still much to be desired, there is little demonstration. People became accustomed to alternative means, which they do not need to pay for.	Urban piped water supply coverage is high. However, production capacity is still a challenge with most houses not receiving 24/7 water supply. Demand exists but no demonstrations.	As people acquired convenient access to piped water services, water usage increased.	As people acquired convenient access to piped water services, water usage increased.	As people acquired convenient access to piped water services, water usage increased.
Behavior/Output	Outputs are access to improved water sources with piped water supply as the most desired means.	Outputs are access to improved water sources with piped water supply as the most desired means.	Outputs are access to improved water sources with piped water supply as the most desired means.	Outputs are access to improved water sources with piped water supply as the most desired means.	Outputs are access to improved water sources with piped water supply as the most desired means.
Outcome	Prevention from waterborne diseases.	Prevention from waterborne diseases.	Prevention from waterborne diseases.	Prevention from waterborne diseases.	Prevention from waterborne diseases.
Feedback	Weak feedback due to the previously identified issues still having to be addressed later in the future.	Feedback is externally enforced.	Feedback is systematic with mid-term reviews serving to adjust projections.	Feedback is systematic with progress made transparent with annual reviews along with future actions.	Feedback is systematic. The time gap between amendments to decrees becomes shorter and shorter with time.

Malaysia also split their implementing entities. Ministry of Public Works was responsible for the urban water supply whereas the rural water supply was expanded through a combination of Ministry of Health and the Federal Land Development Authority programs. Coordination was enabled between the different organizations by the "Operations Rooms" run by the Prime Minister. Progress was regularly reported and obstacles were expediently removed under the centralized implementation authority held by the Prime Minister.

Singapore's implementation agency was the Public Utility Board. It received priority attention by the Prime Minister because Singapore was reliant on its political hostile neighbor for its water supply. Thus, water security was integrated into the Master Plan development of the city-state. This meant water use was closely monitored and reported.

The Korea Water Corporation operated within an arms-length under the auspice of Ministry of Construction was responsible for water resource development in South Korea. Under their responsibility falls the development of bulk water supply that is delivered into the metropolitan water supply networks. Water supply development was coordinated through a 10-Year Water Resource Development Plan that was drafted and integrated into the National Development Plan of Korea. In terms of rural water supply, construction was done through rural community initiatives overseen by the Ministry of Health. These systems became obsolete, as the main pipes were extended from the urban water networks. Water quality monitoring later is taken away from the Ministry of Construction to the Ministry of Environment following the water pollution crisis in 1990s.

From the longitudinal variations of the case studies, we are able to extract that the division of responsibilities between the urban and rural areas were effective in expanding access relative to not making that division. We are able to extract that a division also occurs between construction and operation and maintenance whereby the construction is better left to the centralized ministries with more experience laden technical expertise. However, operation and maintenance is a localized activity and often the shortcoming to continue expansion in access happens here due to the dearth of capable technical expertise that is further mired in localized political incentives of political hires and utility revenue usurpation.

The aforementioned aspects are specific to the water sector. Hence, they are characteristics that are not properly captured in the existing implementation model. That is, the generalist implementation model is informative but incomplete in providing the more sector-specific insights where strategies to achieve the SDG goal of universal access can be developed. This brings us to the next exercise of water sector specific implementation framework.

5. Developing a Sector-Specific Implementation Framework

By reconstructing the detailed longitudinal case studies and deconstructing it according to the existing framework as shown in Figure 5, there is discrepancy between the descriptive causal mechanism and the model of implementation causality. Thus, based on evidence, there is room for improvement and advancement to reduce the theory-practice gap.

The evidence provides guidance on where the improvements need to occur. As mentioned in the prior section, certain sector specifications need to be built into the new sector-specific implementation framework. Thus, the urban-rural divide and the construction/operation and maintenance divide need to be highlighted.

Also, based on the causal mechanism identified by the case studies, complementary sector developments need to be highlighted as well. This means home ownership programs and rural health extension programs need to be built in as well. The formulation produces the implementation model illustrated in Figure 6.

The new sector specific framework is titled, "State-Implementation Synthesis Framework". The reason behind the "State" adjective is because the historical context in which the political influences operating within existing institutional structures to translate into laws, policies, programs, and projects cannot be overlooked in explaining access to safe drinking water. This is because the "state" in

operation in the case studies are legacy modern states following the end of colonialism. Thus, there is a great deal of isomorphism in play where countries depict similar organograms with ministries established by sector. Historical context matters, as seen in South Korea. The country received low-interest bearing water infrastructure loans from the United States over a very short period of the time immediately after the Korean War. The loan was coupled with technical assistance with legacy state institutions to resolve technical deficiencies undermining the successful utilization of resource aid. Those institutions resembled the Japanese state institutions during the colonial times.

Historically, the expedited lending occurred because South Korea was a country of vital U.S. security interest as it bordered a communist country. Thus, historical context informs us the political expediency and the institutional settings within the country that allowed specific policy formulation arrangements to be established and certain policy designs to emerge. This is captured in the first large box in the left side of Figure 6. The Enabling Conditions and Circumstantial Triggers are vital confounding variables to take into account. This is because it sets the parameters to which key political leadership will prioritize water infrastructure development and the state resources they are willing to encumber to that end. Case study countries that were able to accelerate their coverage all had this in common.

For Singapore, water was placed as a high priority by Prime Minister Lee Kwan Yew due to the country's heavily reliance on Johor, Malaysia for their bulk water supply. Recognizing that the British surrendered Singapore during WWII when the Japanese blew up the water supply line from Malaysia, the newly independent Singapore was constantly exposed to a similar fate without a self-sufficient water supply. As consequence, the Prime Minister prioritized the formulation and execution of an integrated water resource management in Singapore's development to work toward establishing self-sufficiency in water supply. The political prioritization in water supply system development also occurred in Malaysia. The circumstantial triggers of the communist insurgency targeting poverty ridden rural populations for support against the government and the racial riots that erupted due to the pronounced economic disparity between the different ethnic group legitimized the pro-Malay and pro-indigenous ethnic group policies by the leadership. This manifested in the form of continuous large investment transfers from the central government to the rural areas. The large investments focused on improving public health facilities in the rural areas where the majority of the Malays and indigenous ethnic groups resided. In Vietnam, the political leadership warmed up to foreign engagement as it experienced failure of self-determined domestic economic policies in a closed economy. Although Indonesia suffered from an economic crisis in the 1990s, it was viewed differently. This is because the political leadership blamed its economic woes not on domestic mismanagement but on international forces. Circumstantially, this was a palatable explanation and blame because unlike Vietnam, Indonesia operated in an open trade economy with their sale of natural resources in the international market. For Indonesia, the economic crisis exacerbated with the rapid depreciation of the Indonesia Rupiah in the international market making their dollar denominated loans costly to service. Thus, these circumstantial aspects are indispensable to understanding the variation exhibited across the countries. In the case of Indonesia, the circumstantial environment severed the interlinkages that were in play in countries with rapid increase in safe drinking water coverage. The existing implementation model fails to highlight this aspect. Thus, a modified framework was developed to better represent this aspect.

The safe drinking water sector specific implementation model includes essential features that are better identified in the state development literature. This is because although the case country's bureaucratic entities are isomorphic to modern state structures in advanced industrialize nations, their interconnectedness, functionality, and effectiveness are not necessary on par with the latter set of countries. Thus, the countries that were successful made specific efforts to improve their colonial legacy institutional bodies. This is what is represented in the boxes of policy formulation and policy design. For policy formulation, there was a clear separation of jurisdictional responsibilities. The urban areas were separately out from the rural areas. In the urban areas, the technical ministry in the central government was responsible for policy formulation, as it was a highly technical challenge since large

quantities of surface water extraction need to be designed to supply the growing urban centers. Due to the technical complexity required for the job, the technical ministries were responsible for providing the primary technical input in policy formulation dialogues. However, in the successful countries, the technical ministries did not operate in isolation. They absorbed policy and technical advice from multilateral financial institutions and bilateral aid institutions. There were clear incentives to do so, as they offered capacity improvement opportunities with their engagements and they offered financial resources that would enable the formulate policies to be realizable. The technical ministries also would engage the private sector. This is because they were interested in growing domestic water industry actors. Given that water infrastructure policies will need to be supplied with materials and labor, the technical ministries would work with potential private sector actors to see if they can produce the materials domestically and supply trained domestic high skilled labor for the proposed jobs. The private sector would work with the universities for innovations that took into account the unique local environment. The universities would be in partnership with the technical ministries to research more locally tailored technologies and materials.

As for policy formulation in the rural areas, successful countries tackled the safe drinking water challenges differently. The policy formulation was approached with a rural livelihood improvement orientation. Thus, policy formulation was done with the local government or village leadership in mind. Central government's health and education ministries offered support. However, they tend to play an auxiliary and supporting role rather than a leading role. This goes the same for bilateral, multilateral, and NGOs. The local government or village leadership were the catalysts. This is because rural areas required relatively simple water supply systems. Thus, it was more about mobilizing voluntary labor and promoting ownership that ensures the water supply systems and drainages be built. Hence, the formulation process centers around the local government and village leadership inputs, as they are in the best position to provide the vital localized information necessary in formulating a tailored policy.

The policy design mirrors and complements the policy formulation separations. For the urban areas, the emphasis is on refining river basin urban spatial planning. Concrete key infrastructure components are determined. This include clarifying the treatment facility location and developing specified plans on distribution networks and expansions. To enable those plans, proper budget allocations need to be in place. Given that all the case studies were developing countries immediately after their independence, they did not have the fiscal capacity to rapidly investment in large scale water infrastructure. Hence, they required loans from development banks and bilateral aid organizations. The loans would be made on sound financial projections including proper tariff structuring for cost recovery and profits that can be converted into network expansion investments.

As for the rural areas, policy design involved specific plans for localized labor participation that will be encouraged and spurred on by local government and village leadership. The latter will receive technical support from the relevant central government units in terms of engineering design along with material subsidy. The government may serve as a conduct of grant based assistance from other countries or foreign entities. The notable aspect of policy design in the rural areas is the explicit effort to improve rural residential settings on water access and sanitation. Furthermore, either the point of contract for the extension units for central government ministries are made explicitly clear to the local government and village leadership to be easily contacted for assistance, or the local government and village leadership are aggregated on a regular basis for training and knowledge sharing. In both cases, the emphasis is absolving communication barrier between the local government and village leadership with the necessary technical ministries required for village improvements.

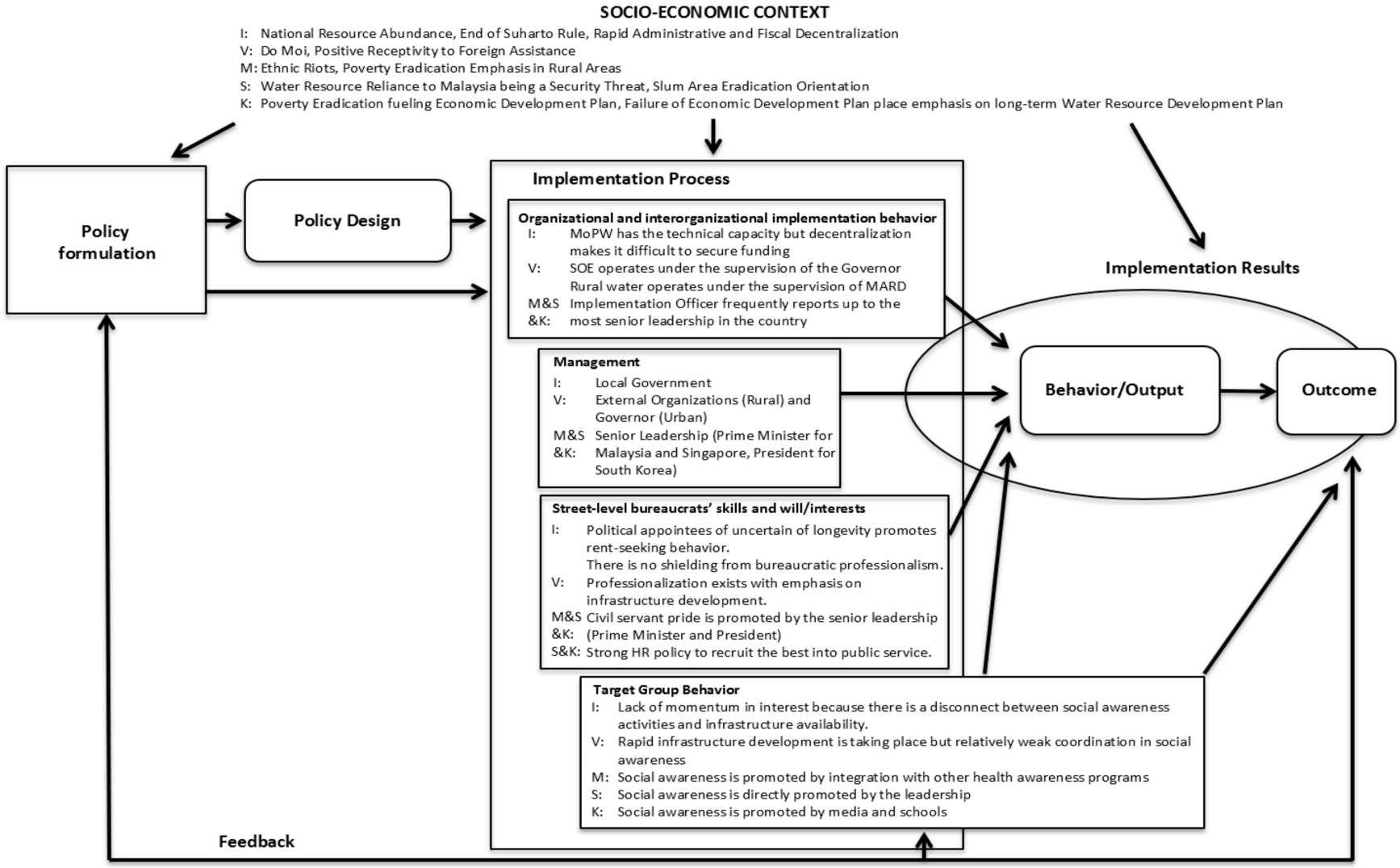

Figure 5. Case Studies and the Integrated Implementation Model.

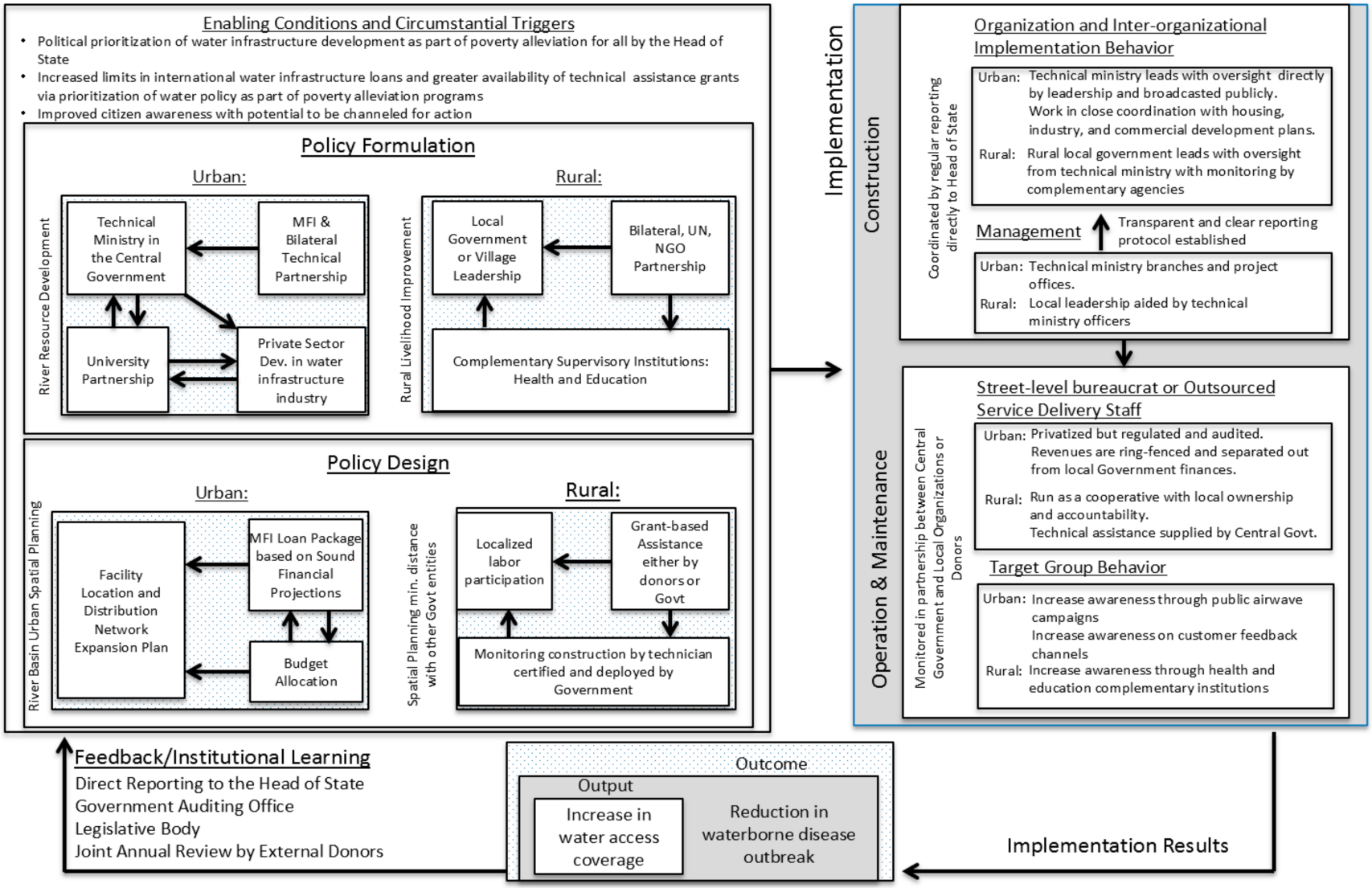

Figure 6. State-Implementation Synthesis Framework for Catalyzing Access to Water.

Once policy formulation and policy design are complete then implementation follows. For water infrastructure, the implementation separates out construction from operation and maintenance. Construction refers to the development of capital assets. Operation and maintenance makes sure that the capital assets are continuing to deliver the service for which it was built for over the expected life-time of the asset. In successful countries, the construction of water infrastructure is regularly and consistently reported to the head of government. Close monitoring reports are produced and delivered up. Also, the head of governments would regularly visit the construction sites to personally verify the veracity of the reports. These are often televised or covered by print media. By doing so, it also sends both deliberate and inadvertent message to the cabinet on the priorities of the head of government. Deliberate in the sense that it reinforces the message to cabinet on the head of government's current priorities. Inadvertent in the sense that those who may not be in direct contact with the head of government is made aware the priorities of the head of government and aligns their priorities accordingly as well since they know the head of government is acutely monitoring developments in the water sector.

Once nested in the priority of the head of state, organization and inter-organizational implementation behavior is easily modified and improved. This is because when the head of government makes it his/her priority, coordination across complementary governmental units are facilitated. This is evident in both the urban and rural areas. In the urban areas, urban planning is greatly enabled, especially when one of the most difficult challenges which is affordable housing for the urban poor is directly tackled by the government's direct intervention by setting up a state-owned enterprise to directly serve the underserved housing market segment. The coordination across the ministries are further incentivized as the head of government requires joint progress reporting of complementary governmental units. As for rural organization and inter-governmental implementation behavior, it is incentivized as the head of government directly participates in the local government and village leadership gatherings to hear and respond to their concerns. This then translates to reporting meetings with relevant technical ministries. As for construction management, urban areas have technical ministry regional branches and project offices. For rural areas, the management responsibilities rests on the local leadership. The technical ministries support training and auxiliary supporting roles. Although the responsible units for management may differ between the urban and rural areas, a transparent and clear reporting protocol is established for all units involved in construction.

For proper operation and maintenance to be institutionally established, active monitoring needs to happen by all involved entities. In this regard, the street-level bureaucrat or outsource service delivery staff can be separated out from the target group behavior. The former refers to the public sector or quasi-public sector that is operating at the intersection of citizen engagement in terms of public service delivery. In the water infrastructure sector, it is often the quasi-public sector since utilities are often state-owned enterprises. That is, they are entities expected to operate with commercial principles. However, they are heavily regulated with majority stake of ownership held by the government. Thus, for the urban sector, successful countries privatized the public service delivery entities. However, they are closely regulated and audited. Furthermore, even if they are placed under the close supervision of a central government ministry, their revenues are clearly ring-fenced so that their revenues are not lumped back into general government funds. The generated revenues are retained and only used for the state-owned enterprise operations. In the rural areas, water supply systems are owned and operated as a cooperative, where all village residents have ownership over it. If operation and maintenance problems occur, the village leadership reaches out to the relevant technical ministries.

Target group behavior is also vital for successful operation and maintenance. This is because additional sets of eyes on the water infrastructure ensures that problems are immediately made aware when they occur. Vigilant watchful eyes do not come naturally. Thus, public awareness campaigns are vital to elevating awareness levels. In the urban areas, public airwave campaigns are effective ways to promote awareness. Since the urban areas are serviced by fee-based utilities, awareness can be promoted through flyers included in their bills. Also, customer service hotlines are established so

that people can directly report on observed problems. In the rural areas, awareness can be promoted through community healthcare center interactions and education facilities. These institutions become effective means of promoting awareness as more community healthcare centers get built in the rural areas and as education become mandatory.

Although the crucial components are presented, it takes time for these institutional arrangements to settle and to improve their effectiveness. Thus, the feedback loop is important. As shown in the case studies, the output of increasing water access coverage and the outcome of reduction in waterborne disease outbreaks improves as the institutional arrangements get settled. The important aspect is making sure there are mechanisms in place for institutional learning. This may involve making sure the head of state/government is continuously engaged through direct reporting, strengthening the authorities and functions of the government auditing office, increasing oversight authority of the legislative body, and/or encouraging external donors to produce joint annual reviews to improve leverage and audience vis-à-vis local institutions.

The important aspect is making sure institutions are strengthened over time. This is because there is a lag between what is formulated and designed and what is actually achieved. Korea's case is quite telling of this, as the Water Supply and Waterworks Installation Laws were first passed in 1961. It was modified after 3 years in 1964. It then took another 2 years before its next revision in 1966. Then it took another 25 years before it was entirely revised in 1991. It then took another 2 years before it was revised with subsequent revision taking less and less time to revise and amend. What this indicates that implementation cannot be disjoined from the institutional learning process because to improve requires information and information requires an observational presence.

The institutional arrangements in the suggested framework are all evidence based. Singapore's public housing program is a good example of where deliberate efforts had to be made between complementary governmental units and activities to achieve policy implementation. By Government direct intervention in the provision of public housing: at one point 85% of the Singapore's population live in housing build by the Housing and Development Board (HDB). By removing the squatter population and moving them into affordable housing and enabling them to work toward homeownership, it directly move people from access to poor quality water to an environment where they receive water through internal pumping. Malaysia's rural health services are another example with other complementary policies to safe drinking water coverage expansion. By improving access to material health clinics in the rural areas and training midwives to report sanitary conditions back to the sanitation engineers housed in these growing extension healthcare services, the Government is able gain valuable information that otherwise would have required separate dedicated institutions and funds.

From the cases, it become evident that domestic political and institutional developments may erect barriers in setting up effectiveness institutional arrangement which in turn affect timely implementation of policies to increase access to safe drinking water. This was evident in the case of Indonesia, where the regime change following Suharto's fall from power continue to impact the central-local policy implementation dialogue, as the local government seeks to be independent from the influences of the central government even to the technical advisory aspects may be vital to effective setup and operation of local water supply systems. In the case of Vietnam, the Government ran a closed economy prior to *Doi Moi*. Thus, during the time of closed economy, the country was isolated from international technical assistance and multilateral financing.

6. Moving Forward

So what's next? What are the main takeaways and what are outstanding works? The main take away is that by going to the field and collecting primary and secondary data to construct the case studies, it help us advance our understanding on why there are variations in access to safe drinking water in these countries. By comparing the case studies with each other using current developments in implementation scholarship, it pushes forward the dialogue on the pivotal factors. That is, the existing

implementation framework allow us to better categorize the observations and lens us a platform to further refine the framework through theoretical sampling on the fields. By engaging in the reiterating exercises of confirming and eliminating explanations presented by the interviews, this research ends up with a more convincing set of critical factors and their interlinkages. This is done through constructing case studies consolidating the findings from the field, identifying and matching discrepancies across case studies, and building-in variables to construct a new inductive framework that is specific enough to encapsulate in full the mechanisms at play in the safe drinking water sector.

By applying the inductive framework developed through the comparative case studies, few policy recommendations for the lagging countries emerge. First, access to water cannot be separated from a vigilant low-income housing policy. Low-income housing policy is often left to private sector participation. However, recognizing the private sector actors in housing will naturally gravitate towards providing large premium housing units in an underserved market, low-income housing policy falls wayside. A vigilant public sector acknowledgement and response has been effective in narrowing the gap between demand and supply. Also, how the intervention is design is also relevant as seen in the case of Singapore. Desirability in terms of vicinity to employment needs to be balanced with affordability that works towards ownership. As for access to safe drinking water in the rural areas, awareness is vital. Thus, promoting awareness through mid-wives and utilizing that network to inform rural water and sanitation engineers has been effective as seen in Malaysia. Public sector management was vital in maintaining pressure on results. There was clear reporting against goals. However, this was also further verified by publicly broadcasted leadership visits, consolidated project monitoring meetings, establishment of project monitoring centers, and direct reports to top leadership by rural constituents, which is similar finding seen in sanitation (WaterAid 2014). The framework diagram suggests how the various critical factors are interrelated based on evidence.

As for outstanding works, the newly developed inductive framework needs to be tested with additional cases. The five cases are no way representative of all the countries. However, given that the Malaysia, Singapore, and South Korea all achieved universal access to safe drinking water within half a century, the newly developed deductive framework drawing from these case studies should be a close proxy to capturing all the critical factors to catalyzing access to safe drinking water. However, there are clear limitations despite the researcher's efforts to control and eliminate alternative explanations. As for the replication of the study and its findings, it can be reproduced. Adding more observations, through more interviews, is expected to further validate the findings. However, there are certain enabling historical context that cannot be overlooked. This include the low interest rate of infrastructure lending by the US to South Korea to stymie the spread of communism. Malaysia's rural improvement program was spurred with aims to quell communist insurgency in the rural areas. Thus, in the former, there is the intervening variable of low interest rate for infrastructure lending and in the latter it is an exogenous variable, as it established the political exigency. However, as one conceptualizes from the observations, they can still be reflected in the theory-building framework diagram, as low interest rate can be offered through different means, as in the case of the multilateral financial institutions. Thus, it can be controlled. Yet, the political exigency is defined by social economic context and thus cannot be controlled. However, despite the political exigency, the policy design and implementation can still be treated as independent as they can be designed separately in absence of the political exigency. To what extent, political exigency is an if-and-only-if condition requires further research.

Additional testing is always desired to further test its robustness. However, an evolved evidence-based framework is better than none, as the international community is forced to hit the ground running as we transition to the SDGs with many still without access to safe drinking water. This research builds the analytical foundation to address this more specifically on implementation, especially since the new 2017 World Development Report is on Governance and Law yet shrinks implementation into an oversimplified single step (World Bank 2017). Hence, the new implementation framework advocates with good reason and based on evidence that we should not oversimplify

implementation, as it obscures rather and clarifies what the international community needs to do to ensure that people are ensured access to the basic need of safe drinking water.

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