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LOCAL BROADBAND INITIATIVE AND SHARED DUCT POLICY IN INDONESIA

By Yudi Adhi Purnama¹ and Hitoshi Mitomo²

ABSTRACT

The role of government in telecommunication infrastructure provision is important in developing countries as weak demand and high deployment cost exists, limit private initiative. As ICT infrastructure is substantial, some local government implemented a local broadband initiative to provide access both to internal demand as well as public services. The local autonomy Act also grants local government broad authority on regulating the broadband development. The initiative mostly has a positive impact even though some practice hinders broadband expansion, considering the variance of regulation increased administrative cost as well as mandated monopoly in some area. Bandung municipality exercise shared duct policy to accelerating its broadband development and meet city planning as well as gaining direct revenue from broadband business and investment. Despite optimism from the local government, the policy has failed to reach its goal due to the absence of anchor legal framework, diminishing the opportunity for resource allocation and sounded local policy. Moreover, lack of human resources effected on shared duct business sustainability, and discouraged operator in utilising shared duct and questioning the sustainability. The government need to overhaul law on telecommunication, to meet broadband era and provide an opportunity for local authorities in broadband development as well as sounded foundation policy.

Keyword: local broadband initiative, shared duct, local government, broadband policy, infrastructure sharing.

1. INTRODUCTION

This paper presents an overview of the local administration initiative to accelerating and expanding broadband development as well as a particular case of Bandung municipality on optical cable shared duct provision. Indonesia as developing countries views ICT provision especially

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broadband as a leap-frogging tool for transforming its national economy from natural base to knowledge base (The Republic of Indonesia, 2011). Furthermore, ICT positioned as meta-infrastructure, reshaping services provision of other infrastructure such as road, bridge or airport (Bappenas, 2014)

ICT in Indonesia has positive progress along with transportation has achieved an average growth of 10% in last five years and passing average 5% GDP growth, and also become a single sector with double-digit growth (BPS, 2016). Furthermore, ICT contribute around 3% of GDP (BPS, 2016), making ICT substantial to daily life as well as a society or even nation activities.

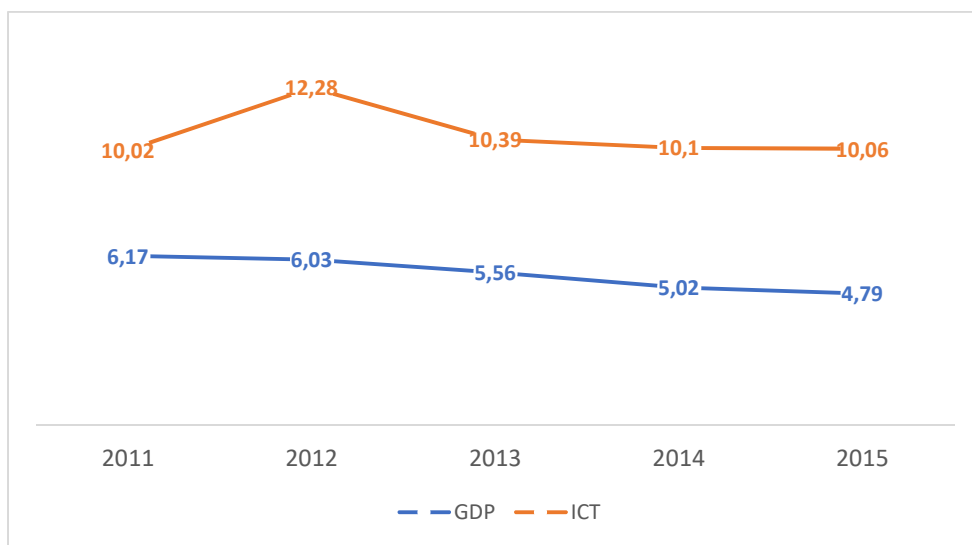


Figure 1. GDP and ICT growth percentage in five years. Source: BPS (2016)

Furthermore, the importance of ICT also shown in high adoption rate in society. Mobile phone use as a form of ICT application reaches 340 million number, while internet user achieved 132 million or 51.8% population by 2016 (APJII, 2016). ICT also facilitate on economic activity such as trade, expected to increase e-commerce valuation to 130 Million USD by 2020 (8Commerce, 2016). High importance also ICT encouraged Government of Indonesia (GoI) to issued Indonesia Broadband Plan (IBP) as national guidance for ICT development in 2014, followed by e-commerce roadmap in 2016.

Indonesia infrastructure establishment including telecommunication heavily depends on government intervention as imbalance development exist. Mandated by Act. 23 years 2014 on local autonomy, local government involved in ICT development especially broadband services.

On the supply side, some local government developed their network, provide free access or subsidizing tariff as well as ICT facility for the public to give a supply of access. In another hand, government play as an end user consumer or demand guarantor for ICT services developed by the operator.

Bandung municipality as one of leading city on ICT implementation moves further by shared duct policy to accelerating the broadband network expansion as well as coordinating and maintaining with city planning. Shared duct policy mandated all operator to cut on air optical cable and move to underground shared duct developed by local government own company. As shared duct already launched in 2013, the project failed to expand network according to initial plan as well as operator reluctant to use shared duct.

Therefore, this paper will discuss local government initiative in broadband development and present case of shared duct policy at Bandung, Indonesia. This article is structured as follows. Section 2 describes research method and data. Section 3, will review municipality initiative in broadband access provision. Section 4, present case on shared duct policy for optical cable. Section 5 provides some analysis on shared ducting policy, while some conclusion and implication presented in section 6.

2. RESEARCH METHOD AND DATA

This paper will employ qualitative approach using document analysis. According to Bowen (2009), document analysis applies structured review to cultivate data from a document such as agendas, minutes of the meeting and background papers and then examined to provide comprehensive information. The document gathered from government sources such as Law, Act, Ministerial/Municipal regulation as well as private sector and community. The study will also review relevant literature to support and develop the argument.

3. MUNICIPALITY BROADBAND INITIATIVE

Broadband development in emerging economy relies on government initiative, characterised by limited infrastructure and weak demand, limited private interest for broadband development. Furthermore, Diffraction Analysis (2016) found the absence of government resulted in opportunity lost, limited affordability, availability and quality of broadband network at national scale.

Variation of government role on advanced communication services, effected by taken intervention degree from supplying infrastructure to provide an incentive for the operator ((Diffraction, 2016; Gillett, Lehr, & Osorio, 2004; The World Bank, 2005). While main initiative usually comes from central government, local government involvement in broadband provision is new (Gillett et al., 2004) and implication of national broadband agenda to local context often unclear (Alizadeh & Shearer, 2015).

In the case of Indonesia, IBP already recognised the local government involvement, especially in adoption and utilisation. As local autonomy exist, Ministry of ICT (MICT) viewing central-local relationship on ICT development by mapping and placed local government as regulator, while Diskominfo (local ICT office) role includes policy formulation on ICT services provision, public service, as well as coaching and cultivation (MICT, 2015b).

Table 2. Role of government institution on broadband provision

Institution	Role
Ministry (central government)	<ul style="list-style-type: none"> • Provide broadband services with infrastructure for priority services such as e-health, e-government, e-education, e-logistics, e-procurement.
Governor (provincial government)	<ul style="list-style-type: none"> • Right of Way (RoW) for provincial infrastructure • Policy and regulation on provincial infrastructure development • Protection policy for telecommunication infrastructure throughout the province. • Optimise provincial owned company • Smart city development
Regent/Mayor (local government)	<ul style="list-style-type: none"> • RoW for municipal infrastructure • Policy and regulation on municipal/regency infrastructure development • Protection policy for telecommunication infrastructure throughout municipal/regency • Optimise municipal/regency owned company • Smart city development

Source: MICT (2013)

Furthermore, Gillett, Lehr, & Osorio (2004) divide local government role to four categories: as a broadband user, policymaker, pioneer, and network developer. As a broadband user, government buying broadband services and become demand aggregator or lead user and utilised broadband for

e-government, e-education or e-health implementation and a substantial amount of officer as a captive market. Empowerment program such as training or USO implementation can introduce broadband to society resulted on broadband as daily need.

Government as policymaker can issue a regulation to answer the broadband affordability challenges. RoW as a critical factor for telecommunication network development is government domain and can help the operator to cut cost as well as accelerate broadband deployment and coverage. Moreover, the government can aid balancing demand with coordinated network planning or zoning system. The government can also formulate infrastructure sharing policy as well as utilising public space such as government office, road, hospital or school for broadband infrastructure deployment. Also, power on policy enabling the government to impose incentive or disincentive for broadband development. For example, tax cuts for broadband services or user equipment in addition to a subsidy for certain society funded by USO fund or state budget.

The advantages of government on policy remaining critical to support broadband rollout ((The World Bank, 2005), as costly broadband deployment and weak demand has limited operator effort to build a network, especially in less populated or challenging geography, resulted in increasing digital divide between urban and rural. The government can finance broadband development with direct investment as well as interest rate subsidy or provide a financial guarantee for the private broadband initiative. Moreover, PPP can implement for financed broadband such as in Palapa Ring project, where government backed-up the project and demand for broadband infrastructure access build by private. The government can also give CPE for free or pay broadband access in public facility, as practised by Mojokerto, Malang, or Bandung at their school or health centre as well as free Wi-Fi access throughout the city.

Table 3. Palapa Ring project funded by USO fund

Area	Western	Central	East
Province	2	5	4
Regency/Municipality	5	17	35
CAPEX	US\$ 92.504.000	US\$ 99.250.000	US\$ 368.884.000
Length of Cable	1.980 km 88.9% submarine 11.1% terrestrial	2.647 km 88.9% submarine 11.1% terrestrial 4.5% microwave	8.454 km 49.8% submarine 45.5% terrestrial 4.7% microwave
Year Accomplished	2018	2018	2018

Source: MICT (2015a)

The government in many occasions apply straightforward arbitration on broadband facility deployment such as build shared duct, optical cable, tower or established ISP and sell access directly to the customer. However, direct intervention should be carefully measured and as the last alternative when no business sector appearance to avoid disincentive or price distortion. The government also needs to evaluate operating, and maintenance (O/M) aspects since ICT is a productive sector and capital-intensive in comparison to limited government capacity and expertise.

As an emerging country, broadband development in Indonesia notably in rural areas depends on government effort. Study by Rohman and Bohlin (2011) shows availability is the main challenge for broadband development especially in mobile access, ringing the bell for government involvement on the supply side. Fixed broadband availability is also limited, even though network deployment has reached 16 million home-pass (Kompas.com, 2017), development is still concentrated in the city centre. Small landline users compared to population also hinder last mile access using xDSL as a transitional technology.

Furthermore, the government launched an e-literacy program with *Desa Dering*, providing basic telephony services for the unserved area and initially funded by public money but continued by USO funds as budget constraints exist. USO regulation launched in 2005, mandated operators to contribute 1.25% of their gross revenue. Funded by USO, telecommunication provision moves further to broadband services with District Internet Center (PLIK) and Mobile-PLIK (MPLIK) agendas, employing cable, cellular or satellite to provide better access. USO programs also targeted to lowering delay on public services as well as a commercial with local internet exchange presence, named Nusantara Internet eXchange (NIX) at designated cities in Indonesia. The program has built 33,184 *Desa Dering*, 5,956 PLIK, 1,857 MPLIK, and 19 NIX (MICT, 2014a, 2014b) but since immature planning and lack of local government engagement, the program failed and halted on 31 December 2014 (MICT, 2014c).

The government redesigned the USO scheme, expanding the target from infrastructure provision to a broadband ecosystem. The new USO uses a participatory approach as a sectoral ministry or local government associated with broadband development by proposing a project and funded by USO (MICT, 2015a). The USO Fund also financed the Palapa Ring project for the unserved area, building optical cable backbone connecting 63 of 517 regencies/municipalities in Indonesia.

Before new USO design, some local government initiated to build an own broadband network. A study by World Bank and National ICT Council (Rees, 2013) describe some regency/municipality equipped with the broadband network in public services delivery as shown in Table 4.

Table 4. Local government broadband initiative

Regency/Municipality	Government Network		
	Wireless network	Optical cable	Main internet connection
Pekalongan, Central Java Province	159 connections in BatikNet, but some transitioned with FO	90% office using FO to connect each other	60 Mbps FO and several ADSL accesses
Jembrana, Bali Province	228 connections in JimbarwanaNet, but down to around 70 in mid-2014	Some short routes between main government building	2 Mbps FO and several ADSL accesses
Banyuasin, South Sumatera Province	Half the district connected	Short routes between main government building at compound	60 Mbps FO
Banyuwangi, East Java Province	24 districts, 178 (from 189) villages, and 45 health centres	18 out of 28 offices, 2015 targeted all offices	30 Mbps international and 200 Mbps domestic, all FO
Balikpapan, East Kalimantan Province		90% offices	60 + 50 Mbps FO

Source: Rees (2013)

From the table above, some cities develop its broadband network aggressively, both using wireless or optical cable. A city like Jakarta, Bandung or Surabaya did not build their grid, but buying access from operator to be more efficient, while small town tends to develop their net as the expensive tariff, and limited coverage by the operator in the rural public service centre.

The government also have the initiative to provide passive infrastructures such as tower, pole or duct. Cellular tower deployed in black spot area, specifically in a border or unserved rural area with a scattered population. Government builds a tower and supporting infrastructures such as site and electricity, while radio equipment and operational become operator responsibility. In addition to operation, some operator lease tower from the government or even paid by the government to held cellular services in the particular area as a manifestation of universal services in telecommunication.

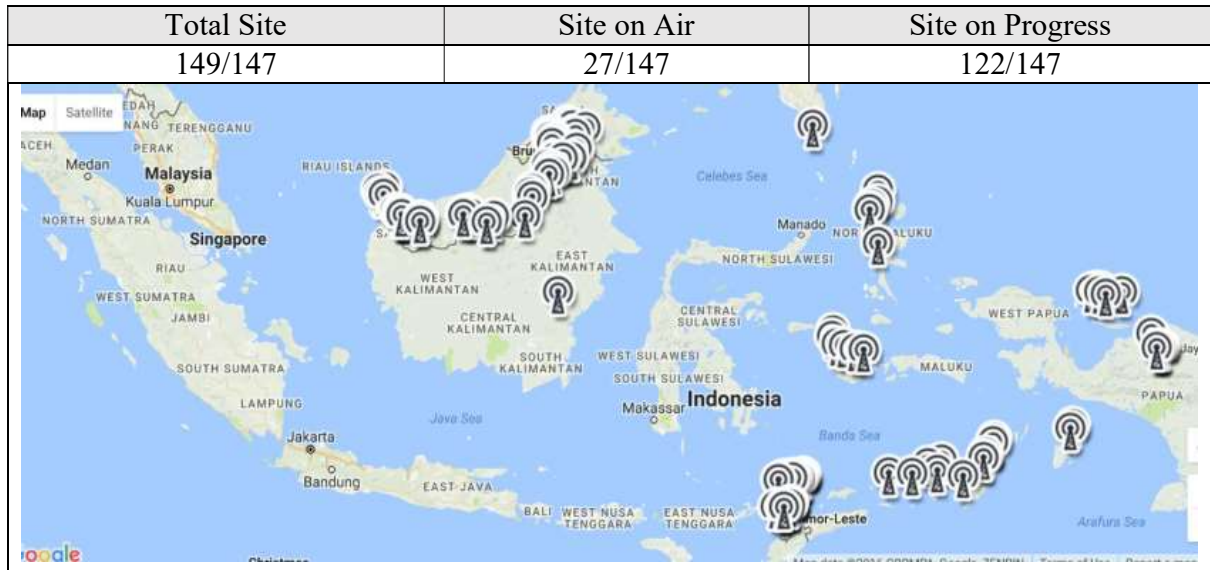


Figure 7. Tower development in border area funded by USO. Source: Bura, Yudarto, Panggau & Mubarak (2016)

Local government initiative on fix broadband such as a duct or pole provision introduced first time in Bandung and Sukabumi (Bandung.go.id, 2013; Jabarprov.go.id, 2014) with shared duct technology. Furthermore, some local government cooperate with the operator to utilise town light pole for optical cable installation or provide free Wi-Fi access to public space.

Local government initiative on supporting broadband development not always in right direction, as some initiative has the reverse effect on availability or affordability. For instance, in 2009 Badung regency issued a regulation to ban telecommunication tower construction, tear down the existing tower, and force operator to lease tower from a specified provider with a high price, even though regulation revoked by the court later but some operator already incurs losses (Detik.com, 2009). Furthermore, some operator obliged to hire E-1 with higher prices although the operator already owns infrastructure (MICT, 2015c).

Moreover, local autonomy as mandated by Law 23/2014 effected on regulation variance in local government such as time framed permit, mandated operator to renew permit alongside repayment or retribution. Optical cable deployment also delayed by RoW, road classification and access to authorised area/building with its license variation from many institutions (Ismail, 2012). As consequence of missing of standard for permit or retribution augmented by corrupt practice make difficult for stakeholders such as government in calculating tax or retribution, and also operator to estimate CAPEX and OPEX as well as an investor to predict investment prospect.

4. SHARED DUCT POLICY IN BANDUNG MUNICIPALITY

The telecommunication infrastructure development in last two decades heavily depends to the telco as the result of deregulation policy in the early 90's. The problem arises when excessive and uncoordinated ICT infrastructure development creates disharmony with city planning, broken public facilities, disrupt city aesthetics, and some accident happens (Abdurachim, 2013; Diskominfo Bandung, 2013). Furthermore, network duplication increasing deployment and regulation cost as well as imbalance expansion concentrated in the city centre and sluggish penetration in periphery area (MICT, 2015c).

In addition to RoW, some telco's have an exclusive contract with building/housing developer resulted in a monopolistic market (Ismail, 2013). Building fixed network also expensive, the operator should dig land for laid off the while excavation cost reach 40-60% from fibre expansion cost (Ismail, 2012). This challenge supports the government on proposing shared duct technology (Abdurachim, 2013; Batubara, 2013; Ismail, 2012), where Bandung city become first implementer (Diskominfo Bandung, 2013). Bandung municipal office initiative to regulate optical cable network with Mayor Regulation No. 589/2013 on underground optical cable shared duct provision, mandated operator to utilise shared duct for their broadband services.

The shared duct policy expected to increase efficiency and effectivity of telecommunication development; harmonise with city planning and maintain city aesthetic; accelerating smart city progress with telecommunication infrastructure provision; and a new source of city revenue (Diskominfo Bandung, 2013; Ismail, 2013). Furthermore, the policy also predicted to optimise competition issues, since incumbent operator hesitant to open its network, in addition to inventorying and optimising supporting infrastructure such as rain track, water or electricity to carry optical cable, therefore, lowering investment cost (MICT, 2015c)

Ducting technology already implemented for public utility such as water, gas, or electricity, but still developed individually, unintegrated and inefficient. Ducting for optical cable slightly different, using micro duct since cable requires smaller room than other utility, and has the advantage to traditional ducting on deployment speed and lower cost.



Figure 8. Shared duct segment. Source: Abdurachim (2013)

Micro-duct using thick walled PVC, designed to be planted directly on road surface without guarding layer. The Smaller size of duct requires less deployment area, no concrete shield, no large utility hole or buried deeply. The implementation also simple, using trencher machine takes less time and didn't obstruct traffic or pedestrian walk (Abdurachim, 2013; Diskominfo Bandung, 2013).

Bandung launches its shared duct project in May 2013, developed in a brown field where some operator already laid their network. Constructed by West Java Provincial Own Company (Jabar Telematika- Jatel) and expected to build 111 Km optical cable duct on the main road in Bandung city (Abdurachim, 2013). Furthermore, the mayor of Bandung instructs all on-air cable changed to an underground cable, but Couple month after groundbreaking, only small number operator migrate their network to underground and deploy a new network in shared duct (MICT, 2015c).

5. ANALYSIS ON SHARED DUCT POLICY

The absence of legal framework become main challenges for shared duct implementation. The Law 36/2000 on telecommunication as telecommunication sector umbrella, developed based on circuit switching paradigm embodied in POTS era while new packet switching technology not sufficiently accommodated. Lack of references on packet switching, hinder optical cable development as well as supporting infrastructure such as shared duct. Furthermore, unspecific rule on sharing duct limited local government initiative as no underlying legal framework, lowering chances to put in city planning and budgeting. Bandung municipality takes a risk by initiated shared duct policy backed only by Mayor regulation, producing criticism as illegal action from some NPO (Pikiran Rakyat, 2014) resulted on Jatel withdraw from project constructor due to the absence of legal framework (Bisnis.com, 2014).

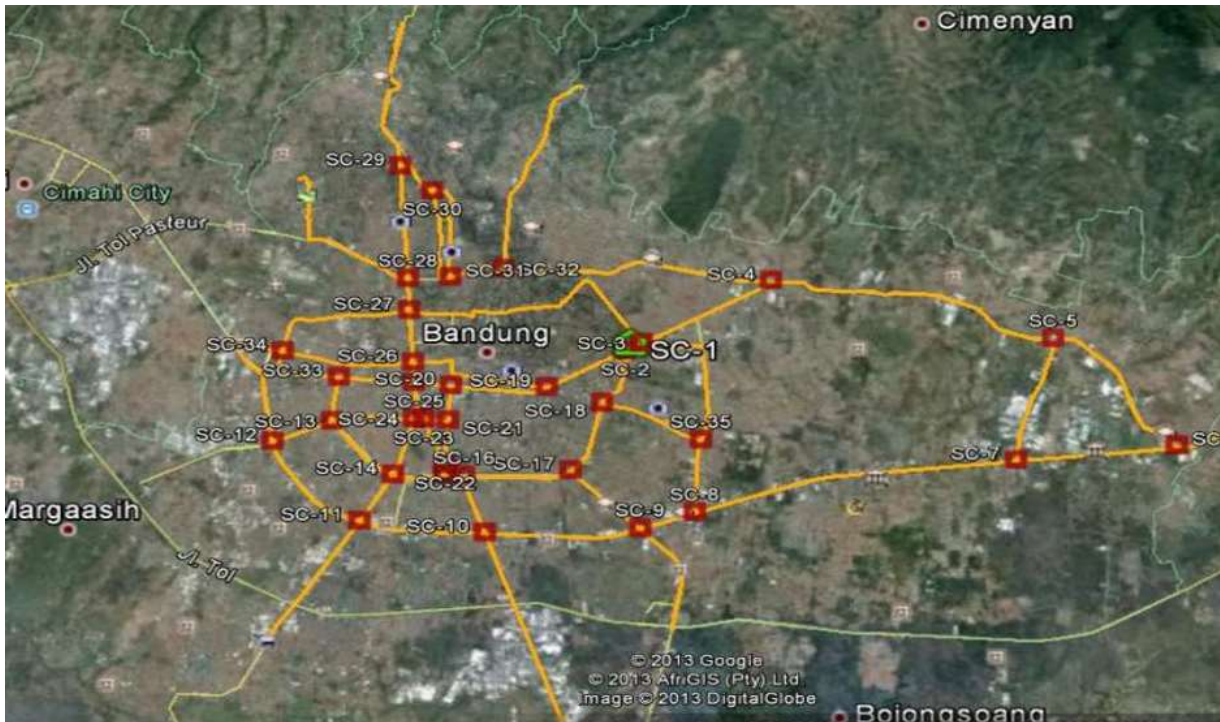


Figure 9. Shared duct development plan. Source: Abdurachim (2013)

Public space utilisation for optical cable deployment such as road also requires specific regulation from a different institution. Road classification implicates division between central, provincial and municipal/regency authorization (Kementerian PU, 2013), resulted in technical variance requirement for duct/pole development. Moreover, road utilisation policy promogulated as conventional duct technology become standard, lowering opportunity for new technology implementation such as a micro duct. Heavy requirement such as duct structure must be buried 1.5 meters with 1-meter distance from sidewalk (Kementerian PU, 2010), challenges constructor and sometimes discourage them to reconditioned or digging as required by law, and too reluctant for coordinating with road authority according to its classification (MICT, 2015c)

Multi-perception on broadband development policy resulted in different policy from Authority (MICT, 2015c), effected on high regulation cost and legal uncertainty for a network operator in addition to mal-administrative by official to gain personal benefit. A study by MICT (2015b) shows local government referring to government regulation on infrastructure sharing suggestion, focused on a cellular network which is very different with terrestrial telecommunication. Furthermore, the existing regulation also lacks municipalities involvement especially on the utilisation of the local administration owned company (BUMD) for broadband infrastructure

development. Moreover, the absence of optical cable network plan on city planning diminishes the chance for optical cable development guidance for the operator in addition to the government as a policy maker.

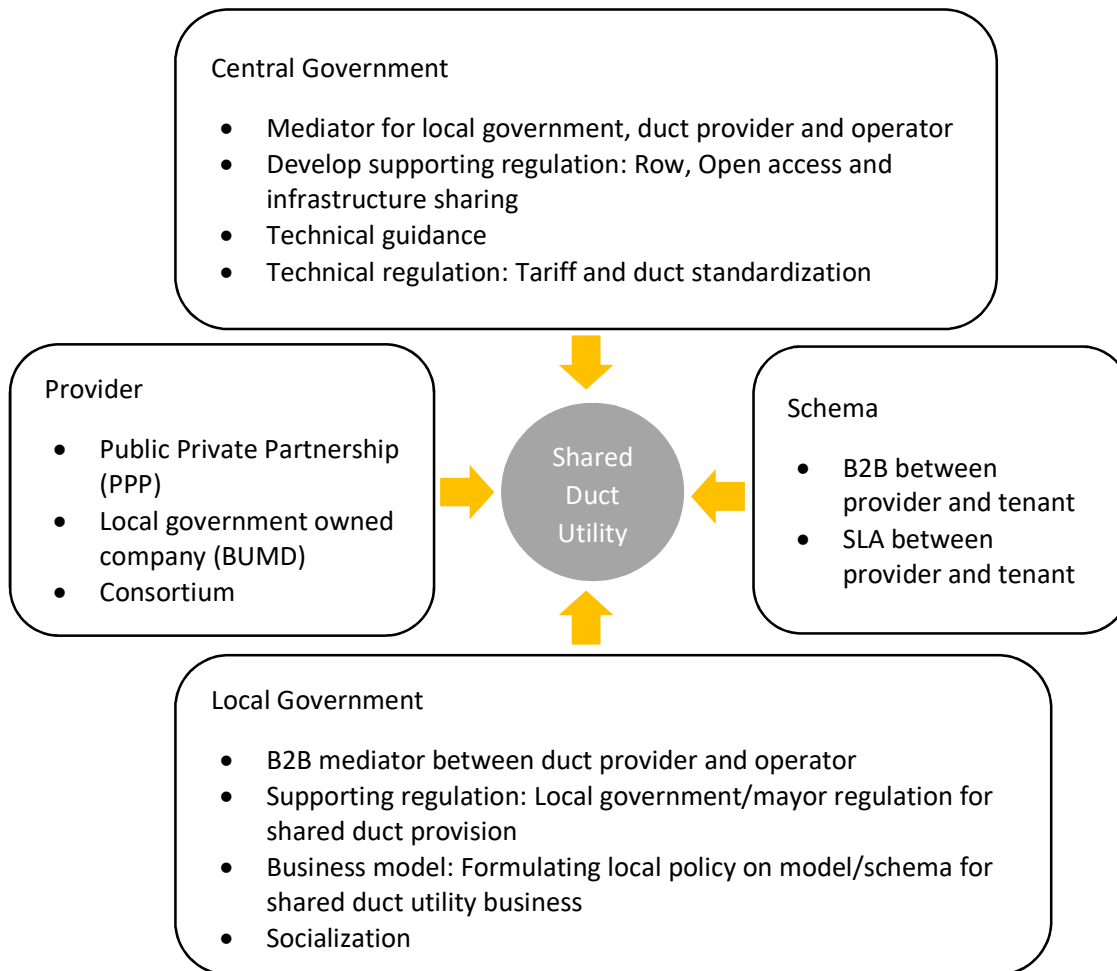


Figure 10. Shared duct stakeholders and their role. Source: Batubara (2013)

Shared duct also lacks a definition for operational level as founded only on Mayor regulation without derivate rules on technical aspect including duct specification, funding or business mechanism. The absence of detailed rule has created confusion to street level bureaucracy as the implementer of shared duct policy and placed them on the vulnerable spot of procurement regulation.

Furthermore, the mayor regulation gives BUMD development rights, expected to provide a financial contribution to revenue and viewed as neutral and fair on infrastructure provision comparing to the private sector. In contrary to BUMD assignment, abundant technical

specification on shared duct expect qualified personnel and expertise, something difficult to fulfil by local human resources and government capacity. For instance, Malang Municipality postpones its shared duct development cause by lack of human resources (Surya Malang, 2015).

BUMD and local government has no experience in telecommunication sector and left business model challenge. BUMD usually held public utility company for basic infrastructures such as water, sanitation or micro-banking services, make productive and technological intensive sector such as ICT as something new. Furthermore, local government enrollment on telecommunication sector with BUMD requires new investment, while BUMD often viewed unprofessionally and has deficit operation (MICT, 2015c) making difficult for budget allocation. As an unfunded mandate shared duct policy facing a budget constraint, and absence of sounded anchor regulation at top government limits the alternative funding option, even though some stakeholder proposes alternative source for finance shared duct project from USO fund to PPP, but only reach discussion table.

Limited BUMD capacity also effected on operator confidence to use shared duct network. Operator questioning business sustainability as their business operation influenced by shared duct policy in addition to increasing operational cost since shared duct developed in Brownfield, resulting in duplicate payment for leasing shared duct and maintaining their network. Multiple problems in shared ducting are lowering enthusiasm from stakeholders and halted shared duct progress.

6. CONCLUSION AND IMPLICATION

Indonesia as emerging country views the substantial role of government in infrastructure provision including telecommunication. Regulation as government tool facing difficulty to catch ICT industry dynamic resulted in weak regulation for ICT development such as broadband services.

Local government has the initiative to develop broadband services in their area to pursue high growth, better public services as well as a revenue source and facilitating smart city ambition. Some city such as Pekalongan, Banyuwangi and Jembrana builds optical cable network, utilised for e-government, public service delivery and increasing e-literacy. Despite strong local e-leadership, limited regulation resulted in local government initiative as well as funding option and project sustainability.

Bandung municipality takes further action with shared duct policy implementation, expected to accelerate network development as well as harmonising with city planning, new revenue sources and facilitating smart city goal. However, shared duct initiative not running well as the vague regulation exist, especially on the division of central and local authority on telecommunication development. Moreover, the absence of specific regulation affected legal certainty left stakeholder in an uncertain situation. The government need to discuss and formulate a specific rule on shared duct, not only to answer jurisdiction but also accommodating special factors such as public space utilisation for telecommunication as well as stakeholder's aspiration especially on shared duct management and fruitful business model.

The absence of regulation also impacts on commercial availability for shared duct development and operation as local government limited capacity, resulted on alternative fund necessity. The government can explore USO and PPP scheme as well as a consortium, enabling operator direct involvement and gaining a sense of belonging. Operator involvement also opens the opportunity for sharing experience especially for BUMD on shared duct management.

Furthermore, operator engagement will be elevating project success rate as well as feasibility in front of investor and bank, lowering financial need challenge. Shared duct policy implementation success marked not only by operator willingness to migrate to shared duct, but also cost efficiency, management credibility as well as business process compatibility and project sustainability. Finally, the synergy between telecommunication stakeholders will contribute to society by affordable and variety of broadband services.

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GLOSARRY AND ABREVIATION

APJII	Asosiasi Penyelenggara Internet Indonesia (Indonesia Internet Service Provider Association)
Bappenas	Badan Perencanaan Pembangunan Nasional (Ministry of National Planning)
BPS	Badan Pusat Statistik (National Statistic Office)
BUMD	Badan Usaha Milik Daerah (Local Government Own Company)
CAPEX	Capital Expenditure
CPE	Customer-Premises Equipment
Diskominfo	Dinas Komunikasi dan Informatika (Local ICT Office)
E-1	A 2.048 Mbps point-to-point dedicated, digital circuit provided by the telephone companies in Europe
GDP	Gross Domestic Product
ICT	Information and Communication Technology
Kementerian PU	Ministry of Public Works
MICT	Ministry of ICT
NPO	Non-Profit Organization
O/M	Operating and Maintenance
OPEX	Operational Expenditure
POTS	Plain old telephone service
PPP	Public Private Partnerships
PVC	Polyvinyl Chloride
Right of Way	The legal right, established by usage or grant, to pass along a specific route through grounds or property belonging to another
USO	Universal Service Obligation
xDSL	Digital Subscriber Line

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