Internet Center (Warnet) Diffusion in Rural Villages to Sustain Economic Development or Part of Global Big Data Trend?

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ABSTRACT

Internet evolved very fast, while developing and emerging economies still struggle with diffusion of Internet access in the rural villages and remote districts following World Summit of Information Society (WSIS) declaration and commitment for 2015 target year, asymmetrically, on the other side, developed countries have already harnessing the power of Big Data and Cloud Computing.

Will these trend caused development in these two different world converged post 2015 by the popularity of Social Networking and Over The Top (OTT) applications? Since these trends were based on the Metcalfe theory of Network Value raised by the square number of Network size, will it have any impact on diffusion in rural villages globally, especially in developing economies?

Focus was on the challenges and difficulties of diffusion of Community Internet Center in Villages (*Wardes*) projects that only reached rural districts level for case studies in several provinces in Indonesia despite the impact of Big Data and Cloud Computing. Secondary data and References supported the theories explain whether development in Rural villages in Developing countries is feasible or even sustainable?

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1. INTRODUCTION

2013, Only two years before the World Summit on Information Society (WSIS) 2015 target [6], in which 50% of the World Population should be part of the virtual Information Society and all villages in the World will have Village Internet Center (VIC) or *Warnet Desa (Wardes)* in Indonesian language. This WSIS action plan was also the means to achieve MDG (Millennium Development Goal) in 2015 as target year to eradicate poverty, literacy and increase health and welfare to humankind all over the World, inclusively rural - urban through Public Private Partnership (PPP) or Multi-stakeholder Partnership (MSP) approached.

Indonesian Delegation to the WSIS Geneva in 2003 and Tunisia in 2005 was MSP, led by Government of Indonesia (GOI) ,Minister of Communication and Informatics (*KEMKOMINFO*), which followed up the commitment by diffusing and deploying several VIC or *Wardes* projects at the district level using USO (Universal Service Obligation) funds (1.15% from Tel-co Operator and ISP Revenue) installing 5,748 *PLIK (Pusat Layanan Internet Kecamatan* or District *Wardes*) and 1,907 Mobile Version of *PLIK* called *MPLIK* operation until 2014. These *PLIK* and *MPLIK* are centrally monitored through Private Cloud by *SIM* (System Information Management and Monitoring via *Nusantara* Internet Exchange or *SIMM-NIX*). Other follow up projects by *KEMKOMINFO*, using World Bank's Grant has installed 112 *Wardes* in West Java and Banten, 110 *Wardes* in Lampung at the districts level from 2011 until 2014, which is this paper's case study [9].

Internet penetration mostly in urban, suburban cities or town in Indonesia, commercially by private sectors, started after the 1998 crisis. In 2012, there were 30,000 Internet Cafe (also called *Warnet)* in Indonesia, mostly in urban, operated commercially by SME, some were nonprofit *Warnet* Association

member, called *APWKomitel* (Association of Community Internet Center) established in 2002 [10] [11] [12].

Urban *Warnet* Lifecycle model according to Association: After 2000, High Growth period, *Warnet* multiplied very fast and became popular lifestyle in urban area by young e-generation and SME until 2008 (Maturity period)[5]. But after 2008, some *Warnet* closed down in urban, then the number in urban declined, which some said Sunset period for Urban *Warnet*, because of fierce competition from mobile phone Internet access as product substitution, which started to florish with the Blackberry Messenger (BBM) population in indonesia, having largest population of BBM outside Canada. [10][11] Followed by Apple Ipad, Samsung and other cheap tablet converged with Android Smartphones as urban lifestyles replacing also Nokia feature cell-phones. *Warnet* lifecycle almost similar to PC Lifecyle, which some believed after 2011, it was the sunset or declining period for PC industry due to fierce competition from Tablet and Smartphone convergence. If Desktop PC moved to Enterprise Server and backoffice, Urban city *Warnet* moved to Rural Villages and Periphery *Wardes*.

Cellphone diffusion was very fast Globally and in Indonesia. By 2001 the number of cell-phone users had already surpassed the number of fixed phone at 4 % penetration in Indonesia[8]. In 2011 penetration of cellphones have already surpased the number of Indonesian populations, indicating as if everybody had phone in Indonesia, unfortunately this data is misleading due to the uneven distributions and digital divide between rural and urban. There were still many GSM blankspot in Indonesia and even today in Jawa, many of the BaseStation are still limited to 2G receiver, which could not take advantage of the 3G smartphone features. Mobile Internet access is still very limited and too slow in many remote rural villages, even at district level, despite cell phone penetration has already exceed the Indonesian population number today. This fact was surveyed during implementation of *Wardes* project in West Jawa, Banten, Lampung and East Kalimantan border by author in 2010, which hindered rural Internet and Warnet diffusion. Cellphone diffusion in rural is not spread equally, some remote villages still had no access (blankspot), despite of the 33,184 'Ringing Village' (*Desa Berdering*), first USO funded cell phone projects prior to 2009 GOI General Election[9].

Electricity as rural infrastructure is also big handicap in rural ICT diffusion and was not evenly distributed, electricification still below 80% according to WB data in 2012 [13]. Some villages in remote island (ie. in Kalimantan border) are still inaccessible by terrestrial transportation such as road, land, sea or river and communication, adding serious Connectivity infrastructure handicap, thus increasing the complexity in determining success factors in rural ICT diffusion projects, which varies from one villages or districts to others. These rural access infrastructure deficiencies caused big divide between urban and rural villages Internet penetration, which sometimes lead to 'blessing in disguise' and brighter prospect of *Wardes* implementation projects in rural villages. It also preserved the rainforest and environment, with less threat from product substition, due to tablet or smartphone lifestyle and urban technology diffusion.

Despite recent trend of Big Data, Cloud Computing and Over The Top (OTT) Applications (ie.: Facebook Account is over 40 millions in Indonesia and one of every seven people in the World), that pushed Urban Internet growth at enormous speed in the World. Internet population reached 2.7 Billion globally [2] and 45 Million (18%) in Indonesia in 2011[4][7] , but sadly many countries still cannot meet WSIS 2015 target of penetrating rural districts and villages with Villages Internet Center or *Wardes*. The challenges faced by developing countries still on diffusion of Public Internet Center (Wardes) in Rural Villages, while advanced countries had to cope with the trend of Big Data (that grew by 2,200 Petabytes of data each day) and Virtual World of Cloud Computing, which required different approached and governance policies due to asymmetrical conditions and diverged needs between developing and advanced economies [2].

On the other hand, this article's scope also covers GOI 's commitments as emerging countries to cope with Rural *Wardes* diffusion , uneven access and infrastructure problems in rural villages. There are still many blank spots (or villages with no Internet access), even in the rural hinterland of USA, Canada, China, Rusia or Australia in 2015 ? Evidently, Google recently launched a solar powered balloons circling the Earth high above in space to give Internet access to area underserved non-terrestrially and not covered by Internet access via incumbent Telco Operators and ISPs worldwide [2]. Converging the needs of penetrating rural villages for both emerging and developing economies.

2. THEORIES RELATED TO RURAL ICT DEVELOPMENT AND WARDES DIFFUSION

2.1. Information Power determined by Moore's law [4][3]

At the end of Industrial Revolution, after WorldWar II, Thomas Watson former IBM CEO famously estimated that the long demanded computer sales would be only 3 units per year? The computers back then was enormously huge dinosaur with thousands of brittle vacuum tube that needed massive air conditioning systems and by today standard were considerably less powerful than average cellphone. With the needs and funding of US Defense Department, many semiconductors companies emerged in Silicon Valley. Intel founder Prof. Gordon Moore famously declared using basic key substance of sand, oxygen and aluminum as

the most common earth crust elements into silicon substrate that later be used as microchip giving computing power to billions of computers and gadget in the world today, which based on his Moore's theory[3]. **Moore's** law initially said that number of transistors that was placed inexpensively on a semiconductors devices will double every eighteen months, which determine that the IC architectural space got smaller, more portable, cheaper and later processing power would double every year until today, the theory still works consistently.

As computer proliferated in every offices, household, school and public places by millions causing enormous broad based economic value and productivity gain associated with these more powerful and cheaper computer and database server, the "Power of Information is at your fingertips and every desk" said Bill Gates during the launched of Windows 1998, Information is power and the cream of Big Data, which marked that Information Technology (IT) Era was just started [3] .

But IT revolution did not solely progress due to Moore's law alone, another silent law and force dealt with 'Network' also provided multiplier effect to the birth of Knowledge Network Economy and Revolution. It all started with the first commercial access to Internet in 1988 by Netscape, opening the World Wide Web and Cyberspace ever since to mankind, increasing further the revolutionary economic and social impact of daily networked computing power or Information and Communication Technology (ICT) era[3].

2.2 The Value of Networking, Internet and Metcalfe Law [4]

In a network based system, computers talk to computers which propagated enormous information stored in millions of data base servers that are networked together containing data, information, documents, accessible from anywhere, anytime within the Network of Network. Creating enormous values as the data and information becomes knowledge and further enhanced productivity and value to the economy of the biggest network in the World, the Internet (Figure 1) [5].

In this virtual cyberspace, the layer of information converges and communication distant or proximity is not a constraint anymore with minimum delay (ie: *satellite latency or circuit switch cost*). The binding constraint of today Big Data era is not finding information anymore, but with how much Information (Big Data) can be analyzed, and then converts to knowledge and creating economic value by action?

This is the huge forces that drive the stock valuation of Internet giant Facebook, Google. Also, one of the reason that UN Task Force regarded 2003 WSIS declaration in Geneva and 2005 commitment in Tunis, as very strategic to implement the MDG Goal of eradication of Global poverty and Sustainable Development. GOI and Kemkominfo delegation also committed resulting the Wardes diffusion projects [6]. Unfortunately, a decade later lack of coordination and understanding among GOI internal departments and institution hindered many rural infrastructure projects, almost halting the PLIK, MPLIK projects today.

The theory behind the Value of Networking is **Metcalfe's** Law, which said that the Value of a network is proportional to the square of the number of Terminal, Application, People or Device attached to it, which during invention started as LAN (Local Area Network). It then grew to a tipping or breakeven point at a certain number of users added to the network, exceeding the value over the cost and multiplied beyond imagination in a huge network, the Internet. Imagine how Facebook was valued based on its number of account? How significant was Indonesia as developing countries and Facebook forth rank's account?

Imagine how to value the Internet, if database servers and network of computers also counted as the number of users of terminals from the point of creation of the Internet, which cause the Internet to grow wildly in only a matter of decade connecting almost every major organization and majority of people in this World since its commercialization in 1988, only less than three decades ago?[3]

Based on these two theories, the enormous Growth and Economic Value of Internet and its stakeholders was analyzed and derived by many researchers and this article, using data application, network and access parameters, despite of its complexity with no boundary, developing or advanced economies. George Gilder, the writer of Telecosm derived Gilders law by combining the Moore's doubling computing power with Metcalfe's networking value increased, to come up with his theory that bandwidth grew at least three times faster than computer power and as computer power doubled every eighteen months, communication power doubled every six months or quadruple every year[3].

3. RESEARCH METHOD

Several literatures surveyed and referenced, such as from De Loitte, which studied the economic impacts of Internet for Google investment in Indonesia using several resources available from ITU, UN, Kemkominfo which provides significant secondary resources data for this paper. De Loitte did intensive research and study on the role of Internet in Indonesia ordered by Google that regards Indonesia as very strategic, similar to other Internet giants such as Facebook, and other Internet Giants that regarded Indonesia as top ten, such as Linkeln, Yahoo mail and mailing list, Twitter [1].

Primary data collections as Case studies from *Wardes* projects in Rural Villages in *West Jawa, Banten* provinces (112 districts villages); District Telecenter project in *Long Bawan Hinterland Districts* that involving author and associations compared and validated with secondary data. Deductive methodology from the above theories explaining the phenomena what happened in realities in rural districts and will Big Data growth be significant. Solution is derived to close gap and analyze to overcome the barriers.

4. CURRENT CONDITIONS OF WARNET IN INDONESIA

Verkanantra's DIKAR model in Figure 1 shows better explanation how important Big Data is in the transformation process of information ecosystem from raw data into information in context, knowledge and Action, which determine the value and competitiveness of an institution or nation, which later in section 4.3 can be quantified as Economic Value and GDP Growth using De Loitte methodology [1] [5]. This is the technology view or path valuing Big Data in the Internet OTT Supply Chain.

The Diffusion Strategy of Village Internet access via Wardes explained by Metcalfe's law which said that the more Rural Villages Internet penetration, the more Value of the Network, System and Big Data from the Business view or path. The DIKAR model theory explained why WSIS Goal is to increase Connectivity (ICT Infrastructure) and inclusiveness of Information Society to achieve MDG Goal. It was stated as "To Connect Villages with ICTs and establish Community Access Point (CAP)" (B.6.a) in WSIS Geneva Plan of Actions point B.6.a, followed up by World Bank as Rural Districts Wardes (Telecenter) projects [6][7].

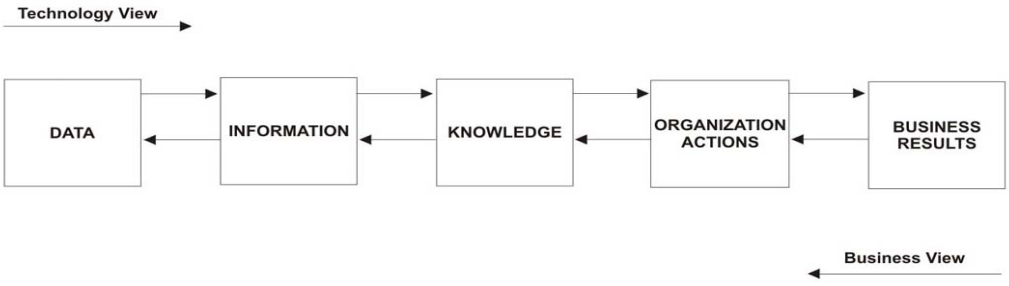

Figure 1. Information in Context (Verikatraman 1996) [5]

4.1. Diffusion Statistic of Urban *Warnet* and *Wardes* in Rural Villages

Amazingly, according to De Loitte report for Google Indonesia [1], Intenet cafe or *Warnet* had traditionally been the most popular way and lifestyle unique for Indonesian youth and SME to access the Internet prior to mobile broadband era in 2008, since it was the most affordable Internet access. The author as *Warnet* Association chairman also often shared *Warnet* success in multilateral ITU and WSIS related forum prior to 2008. De Loitte report [1] even mentioned staggering 260,000 *Warnet* across Indonesia. Alternative data from *Warnet* Association (*APWKomitel*) and Kemkominfo, the number of *Warnets* was around 30,000 (2011), thus the reconciliation is that 260,000 was not the number of *Warnet*, instead the total number of Terminals IP (Internet Protocol) Address in *Warnet*, which was average around 5 to 9 Terminals per *Warnet* with IP address connected in a *Warnet* LAN through proxy IP to the Internet. These numbers of Terminals then are multiplied by the number of *Warnet* (30,000) in Indonesian territory to come up with 260,000 units in DeLoitte report.

These commercial prospective business *Warnet* was popularly dispersed and diffused in the urban and suburban before 2008, when there was not yet fierce competition from smartphone. Nowadays the number of *Warnet* in the cities declined (sunset period in section 1) and many local SMEs migrated to rural villages to participate in Government funded USO or Donor Grant projects.

World Bank's *Wardes* projects since 2011 extended to 2014 in West Jawa, Banten and Lampung Province in cooperation with *KemKominfo.* Each *Wardes* had 1 Server, 10 Terminals consist of 6 ACCESS brand Netbooks and 4 Nettops. [15] Kemkominfo used USO fund to diffuse 5,758 *PLIK* (District Internet Center) in 2010-2014 and 1,907 unit of Mobile version of PLIK 2011-2015, while Indonesia territory in 2012 has 6,793 districts and 79,075 villages (in which 42,000 are rural villages) scattered in 17,000 islands. Practically, PLIK, MPLIK, Wardes projects has diffused evenly across Districts level in Indonesia, but still far from reaching most Rural Villages level as what targeted by WSIS in 2015. Unfortunately, with the recent legal action, the *MPLIK and PLIK* projects might be postponed or even stop. Detail discussion in section

4.4.4 Note: *PLIK* has 1 Server and 5 PC while the mobile version, *MPLIK* has one server and 6 notebook complete with generator and VSAT [9] .

4.2. Infrastructure and Connectivity Infrastructure Financing Challenges

The WorldBank and KemKominfo only implemented and maintained *Wardes* projects, thus *Wardes* still relied on Internet access from existing national ISP or Telco Operator. When Speedy ADSL is unavailable in the particular district, there is no reliable Internet access as well [8]. Since Donor provides no funding for Telco or Electricity infrastructure, many *Wardes* owners in districts must rely on self-finance for both CAPEX and OPEX to provide VSAT or WLAN Tower or Diesel Generator for Electricity. Most *Wardes* could not afford VSAT, so they operated their *Wardes* limited as Computer rental business to Student with no Internet access, which lead to low performance income, merely survival and just to meet their contract commitment. The Operation cost to use Electric Power Generator (*Genset*) is normally not feasible, since cost of gasoline fuel (Rp 6,500/ liter) is expensive, considering that these Wardes could only charge standard tariff of Rp 3,000 per hour, resulting in poor business performance calculated nationally in section 4.3.

4.3. Economic Contribution of Internet in Indonesia [1]

The Calculation Method of the direct economic impact by these Rural Wardes projects in Indonesia used various Donor and Government rural district projects, similar to De Loitte Access Economics report, which adopting BCG (Boston Consulting Group) Internet impact calculation method in UK[1]. This article gathered major Indonesian Rural District Internet Center or Wardes projects within the last 3 years such as Wardes, *PLIK* and *MPLIK* projects by GOI Kemkominfo to follow up WSIS Plan to diffuse Wardes:

Table 1. Rural ICT Investment – CAPEX (ICT equipment and Infrastrucuture installed)

No	Investment (CAPEX) Indonesian Rural Districts	Quantity	Value (USD)	Total (USD)
1	*PLIK*	5,758	10,000	57,580,000
2	*MPLIK*	1,907	50,000	95,350,000
3	*WARDES* (Lot 1Java, Lot2 Lampung Province)	222		1,250,000
	SUB TOTAL (Covering districts level)	7,887		154,180,00

Table 2. Rural ICT Consumptions -OPEX - Operation Cost GOI, Donor, Local Partner

No	Consumption (Yearly OPEX)	Quantity	Value (Year USD)	Total (Yearly USD)
1	PLIK	5,758	200x12 = 2,400	13,819,200
2	MPLIK	1,907	150x12 = 1,800	3,432,600
3	WARDES (Lot 1Java, Lot2 Lampung)	222	300x 12= 3,600	66,500
	SUBTOTAL (Covering districts level)	7,887		17,318,300

Net Export: Assumption are eCommerce are still not popular in the rural and there is insignificant Net export and import resulted from this Rural Wardes project in the rural districts and villages [10][11]

Table 3. Total National Rural District Projects Contributions (Table 1+ 2):

No	National Rural Internet Center Economic Contribution	Total (USD)
1	Investment – CAPEX (PLIK, MPLIK and Wardes)	154,180,000
2	Consumptions – OPEX (PLIK, MPLIK and Wardes)	17,318,300
3	Net Export – Import (Assumption for this research)	0
	TOTAL Contributions (Covering All Rural districts level)	171,498,300

Thus the total contribution of Rural Districts Wardes is USD 171, 5 Million or Rp 1.71 Trillion. Not many researchers studied the contribution of Internet activities to the Indonesian economy. De Loitte report for Google in 2011 said that Direct Internet Contribution to the Indonesian economy Rural and Urban is 1.6% of GDP or Rp 116 Trillion (US$ 13.3 Billion) by measuring the amount spent by consumers,

business, government and net export, and expected to grow to 2.5% of GDP over the next five years (2017). [1]

This means that Rural District *Wardes* Projects contributes only 1.3% of the Total National Direct Internet Contribution (1.6% of GDP), which is the economic contribution of Rural Districts Internet Center, that is still consider too small. This article put big hope on further Government policy and actions to overcome the hindrance and challenges in Section 4.4.1 to 4.4.4 to increase future Rural *Warde*s contribution.

Other non-calculated and observable direct economic value can be derived using Metcalfe law that says: "Network value grow as the number of terminal grow". In this case, the terminal IP address (6) times number of *Wardes*, PLIK and MPLIK (7887 Wardes) totaling to 47,322 IP. This is also the reason Google had initiated a big projects Internet high altitute Balloon in many under-served rural villages in the World, to bridge digital divide and increase connectivity in the World today[2] . The more people wired in Rural villages, the more significant, the value of the Network, System, Application and Big Data (Metcalfe Law).

This all mean that *Wardes* in Rural Villages still have good future prospects post 2015 and the diffusion of *Wardes* in rural villages will still grow depending on the availability of USO Fund for CAPEX, Government Policy, since these area are not commercial viable for rural SME investment [11].

4.4. Challenges in Developing and Sustaining Rural Internet Center Economy

4.4.1. Connectivity Infrastructure

Some Wardes projects were not successful due to the lack of reliable Connectivity infrastructure such as lack of ADSL or good quality 3G lines. In some districts such as Leuwidamar, Banten province (where the Badui indigenous tribe lived) and PasirKuda, West Jawa Province still had no ADSL. Worldbank insisted Wardes to use Wireless broadband 3G connections, unfortunately many Base Tower Station (BTS) in rural districts are 2G until today (2013), thus Wardes cannot deliver proper Internet bandwidth for normal Internet Cafe operation, forcing these Wardes acted only as document typing station or school labs instead, with no Internet access. Some of these villages could only survive with great difficulty or closed down and must be relocated to other districts with ADSL connections, while VSAT option is too luxury for local district SME, thus Government subsidies is still needed for VSAT Capex[15] .

In some districts, the quality of electricity from State owned Power Station (*PLN*) also very unreliable, often experienced daily black out and diesel generator must be self-provided. The reality despite of ITU data, around 30% of district villages in Java islands still had no ADSL connections and unstable electricity for standard normal Rural district Wardes operation. Note: No access technology issues, since Satelit foot print covers all 17,000 islands in Indonesian territory accessible by any villages VSAT [11][12]. Other important connectivity infrastructure are logistic access, which are often blocked by landslide, flood and mud in some rural border villages (Long Bawan district village in East (North) Kalimantan border with Sarawak). There is simply no road/river terrestrial access from other districts city or town, except by special Cessna plane or by foot. This is the facts found in Indonesia and developing countries rural hinterland [15].

Solution for future projects is comprehensive subsidy including Connectivity (Internet access) and Electricity Power Infrastructure is a must for remote Rural villages Wardes project.

4.4.2. Non Commercial and Deserted Rural Villages

Many districts Wardes located in low population (deserted) area, thus operations are almost commercial not viable and sustainability of the center depends on comprehensive government subsidies on Connectivity Infrastructure (VSAT, Solar Energy), since usually these area have no terrestrial (road, river, telecom) access, so gasoline or diesel and electricity are scarce and expensive. Some districts villages due to provincial merging and expansion (*Pemekaran*) suddenly became commercial town with many new Warnet, which usually create another parliament auditor's suspicion as if Government did not conduct proper selection and priority to remote and rural villages.

4.4.3. Human Capital, Entrepreneurship and E-Readiness

Some *Wardes* lacks of good qualified Internet operator or SME owner, local partner has no entrepreneur skill to manage Wardes or *PLIK*. Mobile *PLIK (or MPLIK*) is a *Wardes* on a Big Van which requires driver skill to drive this Big Van and also requires telecommunication engineer to set up/ pointing the VSAT when this MPLIK arrived in adistricts to start serving the villages. E-readiness of the Village youth and SME is also a success factor [15].

4.4.4. Policy (Legal) Uncertainty and Institutional Coordination

Euphoria of democracy after 1998 reformation (crisis) followed by anti-corruption movement caused many NGO and Parliament members suspicion on many National and large scale infrastructure projects, due to lack of understanding about WSIS commitment and goal. Even within Government official (Attorney General Officer (AGO) and State Finance Controller (*BPK*)) accused *PLIK* and *MPLIK* of corruption activities, which caused further high cost operation for many rural infrastructure projects due to lack of trust and coordination among Government departments[9]. PLIK and MPLIK as object of

development and WSIS target were often under investigation and legal and financial audit, which might hinder or even stopping the rural project. If this happened, GOI would fail in meeting the Rural Village Wardes diffusion level target of WSIS in 2015. While UN Expert Jeffrey Sachs in 25 September 2013 meeting will urge all member nation to move from MDG (2000-2015) to SDG (Sustainable development Goal) beyond 2015 to 2030, Indonesia will still struggling for the MDG post 2015 to deliver Internet access via Wardes to all 79,075 villages, if no remedial policy and actions are taken by GOI, Kemenkominfo and the Internet Community [14].

5. CONCLUSION

Majority of the hindrances faced by Rural District *Wardes* Development projects are non-technical related issues such as legal uncertainty, human capital (entrepreneurship), Inter-department Coordination, Basic Infrastructure Funding, which in economy development called exogenous factor to the System and less Technical Access Infrastructure obstacles.

It is clear now why Google and other Big Data enterprise are also interested to fund and implement Rural Internet Access on a Huge global scale high altitude balloon in developing countries to satisfy Metcalfe law that the value of the Network, Big Data and Cloud Computing expands with the diffusion of Internet access in villages across the World. This paper also show the big commitment of Indonesia as developing nation to meet the WSIS target of diffusing Internet access or *Wardes* in Rural Districts Villages.

Unfortunately due to some basic nontechnical issues (exogenous) , Indonesia might fails to meet the Target of diffusing Internet access to all rural villages level (42,000 rural villages of total 79,075 villages), but only up to district villages (6,793 districts in 2012), level in 2015 [9][10][11][12]. Converging and Common needs of Emerging and Developed economy unified by WSIS Goal. Knowing these obstacles and challenges in section 4.4.1 to 4.4.4, might prevent future failure and solve the village level diffusion to close the gap and reaches village level in 2015 and progress further to SDG.

Ongoing Author's further study and dissertation will focus on rural districts field survey within Worldbank *Wardes* Projects as Case study to get more detail empirical data and statistic on the challenges and economic formula of Rural ICT infrastructure development and methodology to close WSIS 2015 target gap.

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GLOSSARY – ABBREVIATION :

APWKomitel – Association of Community Internet Center – *Asosiasi Pengusaha Warnet*
BP3TI – Institution under Ministry Kominfo that manage and govern *PLIK* and *MPLIK* projects
Desa – Village *; Kecamatan* - District
KEMKOMINFO – Ministry of Communcation and Informatics – *Kementrian Komunikasi dan Informasi*
PLIK – District Internet Center - *Pusat Layanan Internet Kecamatan. MPLIK* is the Mobile version
WARDES –Village Internet Center (VIC) or Community Access Point (CAP) - *Warnet Desa*
WARNET – Internet Cafe usually also refer as Telecenter by donor – *Warung Internet*

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