Do productive uses of ICT connect to income benefits?

A case study on Teleuse@BOP4 survey in Indonesia

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The importance ICT-enabled devices to support
gender empowerment, entrepreneurships,
financial inclusions of indigenous societies,
product design (mobile money, mobile
banking) for business activities

GAP: **Impacts assessment**
on how to identify and measure the effectivity
from access and uses of ICT, or ICT policies in
general?
ICT/telecommunications and development

Wider dissemination of market information
  More timely market information
  Lower coordination costs in market
  Improved public services, health, education

Higher level telecom infrastructure

Increased ability to invest in telecom infrastructure
  Demand for wider access of telecom services
  Demand for more advanced of telecom services
  Increased telecom need for service sector

Higher level of economic activity

Source: Dutta (2011)
Mobile telephony and development

Leap-froging process
Cheap way to increase penetration rate (Sridhar & Sridhar, 2004)

Right target
Best suited with the rural telecommunication needs (Reynolds and Samuels, 2004; Galperin, 2004; Proenza 2006)

Digital divide
Not only for voice but also for data (ITU, 2011)
INDONESIA IS NOT only JAKARTA!
INDONESIA
Indonesia socio-economics

- **Nugraha and Lewis (2013)** ➔ Indonesia: high growth, relatively high poverty, increasing Gini ratio
- **Dartanto and Nurkholis (2013)** ➔ balanced-panel data sets of 2005 and 2007
  - 28% of poor households are classified as chronically poor (remaining poor in two periods)
  - 7% of non-poor households are vulnerable to be being transient poor.
  - Poverty determinants: educational attainment, household members, physical assets, employment status, geographical area (Java and Bali are more vulnerable to the external shock)
Aim

How ICT / mobile telephony contributes more for societies.

This study aims at measuring the impacts of the access to mobile telephony and the productive uses of the device on the household income of the Bottom of Pyramid Users (BOP) in Indonesia.
Flow of study

Access impact

Usage impact

Yes

No

Productive uses

Yes

No

Banking account
Method

Treatment effect

• In many areas there are interests to investigate the effect of treatment/cause in a model called *treatment effect*.
  – Drug $\rightarrow$ illness
  – Educational program $\rightarrow$ academic achievement
  – Economic policy $\rightarrow$ GDP
• Once the effect is found, policy makers can adjust and intervene the treatment to obtain a desired level of response.
Method

Treatment effect

- Investigating the impact of drug (a treatment variable) on blood pressure (a response variable) by comparing two people – with treatment (drug) – without treatment.

- If two people are exactly the same other than the treatment status; then the difference in their blood pressure can be inferred as the impact of drug treatment.

- However, if they are different in many ways, the difference in blood pressure might be as the result of many aspects (other than the drug treatment).

- Hence, the treatment effect is "comparing comparable things" where comparable means "homogenous on average" (Lee, 2010).
Method
Treatment effect and Propensity Score Matching (PSM)

• If the treatment group (T) and control group (C) are hugely different in many observed variables (X), e.g., socio demographic aspects (ages, gender, education, geographical area, etc.), the difference in outcome (y) cannot be associated with the difference in treatment.

• The solution is possible only by comparing the member of C and T with similar in X. To facilitate such comparisons, an index with a single value is constructed, so-called propensity matching estimators.
  – Matching by the propensity score can be done by selecting two individuals with the same propensity score, where the first individual receives treatment and the second does not. The level of propensity score p(x) is obtained by a random model (probit).
  – Ignorability of treatment hold!
Previous studies

• Beard, Ford, Saba, and Seals (2012) estimate the effect of Internet use on job search. The study indicate broadband use at home or at public locations reduces the probability that the unemployed cease job search by over 50% relative to unemployed persons who do not use the Internet at all.
  – As policy implication even public connections (e.g., at libraries) in unserved and underserved areas may produce substantial social benefits.

• Grimes, Ren, and Stevens (2012) investigates the role of broadband for increasing productivity level in large micro-survey of firms. Employing propensity score matching to control for factors, the study indicates that broadband adoption boosts firm productivity by 7-10%; effects are consistent across urban versus rural locations and across high versus low knowledge intensive sectors.
## Bottom of pyramid

<table>
<thead>
<tr>
<th>With a mobile phone connection</th>
<th>Without a mobile phone connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using it for productive usages</td>
<td>Not yet</td>
</tr>
<tr>
<td>Bank account</td>
<td>Not yet</td>
</tr>
</tbody>
</table>
## Sampling methodology

<table>
<thead>
<tr>
<th>Strata</th>
<th>Population</th>
<th>15-60</th>
<th>Proporsional</th>
<th>Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Java</td>
<td>59,094,940</td>
<td>702</td>
<td></td>
<td>700</td>
</tr>
<tr>
<td>Rural Java</td>
<td>41,913,343</td>
<td>498</td>
<td></td>
<td>500</td>
</tr>
<tr>
<td>Total</td>
<td>101,008,283</td>
<td>1200</td>
<td></td>
<td>1200</td>
</tr>
</tbody>
</table>
Descriptive statistics

![Bar chart showing mean of income_urban and mean of income_rural for different education levels:
- elementary
- junior high school
- senior high school
- diploma
- undergraduate
- graduate

Mean of income_urban and mean of income_rural are represented by blue and red bars respectively.]

DKI Jakarta
West Java
Central Java
Yogjakarta
East Java
Banten

Mean of income_urban
Mean of income_rural
Results

USD Monthly HH income

With mobile access: 26.7
Without mobile access:
Results

USD Monthly HH income

With mobile access urban: 34.2
Without mobile access urban: 25.9
With mobile access rural: 25.9
Without mobile access rural: 25.9
Results

USD Monthly HH income

With banking account

Without

66 urban

66

Rural 92
# PSM results

<table>
<thead>
<tr>
<th></th>
<th>Comparison</th>
<th>Average Treatment effect on Treated (ATT) (Monthly household income in USD)</th>
<th>Number of common support</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>All sample</td>
<td>26.668</td>
<td>269/688</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Among poor urban</td>
<td>34.237</td>
<td>90/171</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Among poor rural</td>
<td>25.977</td>
<td>148/344</td>
<td>NS</td>
</tr>
<tr>
<td>2</td>
<td>Access to mobile telephony</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Productive use of mobile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td>36.889</td>
<td>183/27</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>-19.764</td>
<td>295/61</td>
<td>NS</td>
</tr>
<tr>
<td>2.2</td>
<td>Mobile internet</td>
<td>40.574</td>
<td>566/64</td>
<td>NS</td>
</tr>
<tr>
<td>3</td>
<td>Access to financial sector</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Access to the bank</td>
<td>66.744</td>
<td>761/297</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td>66.877</td>
<td>248/84</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>92.732</td>
<td>383/167</td>
<td>1%</td>
</tr>
</tbody>
</table>
Conclusion and policies

• The access to mobile telephony is significantly increasing the likelihood to earn a higher income for BOP users.
  – Urban poor people get more benefits than the rural ones ➔ more economic activities in urban areas.
  – The government plan to introduce ”tax for luxurious goods” (PPNBM) – especially for smartphones—will be likely to degrade the impacts. The plan should be revisited.
• The productive uses of mobile telephony are significantly increasing the likelihood to earn a higher income (however no distinctive impacts between urban and rural).
  – BRTI/MCI should ”force” operators to stop lying to customers by offering ”cheap products”. They should start to provide more productivity-driven contents and to be more inovative. Remember; They make (have made) a lot of money!!
  – Bring back the fixed-line period in 1980’s
  – More local content devcelopers should be invited to join forces.
Conclusion and policies

• Access to the bank is more important for rural people than the urban ones (remittances).
  – In the absence of bank branches, the role of mobile telephony and ICT should be promoted in remote areas (outer Java areas).
  – Governments (Bank Indonesia and MoF) should start to take into account the importance of mobile banking and its related regulations.
    • The initiative, for instance, by BTPN (Pension Bank) should also be replicated by other major banks that have a wider connection.
THANK YOU