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Future Issues and Research in the Digital Economy Era

Seminar dan Diskusi FORKOMSI • 21 Februari 2018



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AGENDA

Definition, conceptualisation, misconception

What is driving the digital economy?

Digital economy in Indonesia

Other factors to consider

Problems and challenges

Moving forward

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Definition, conceptualisation, misconception

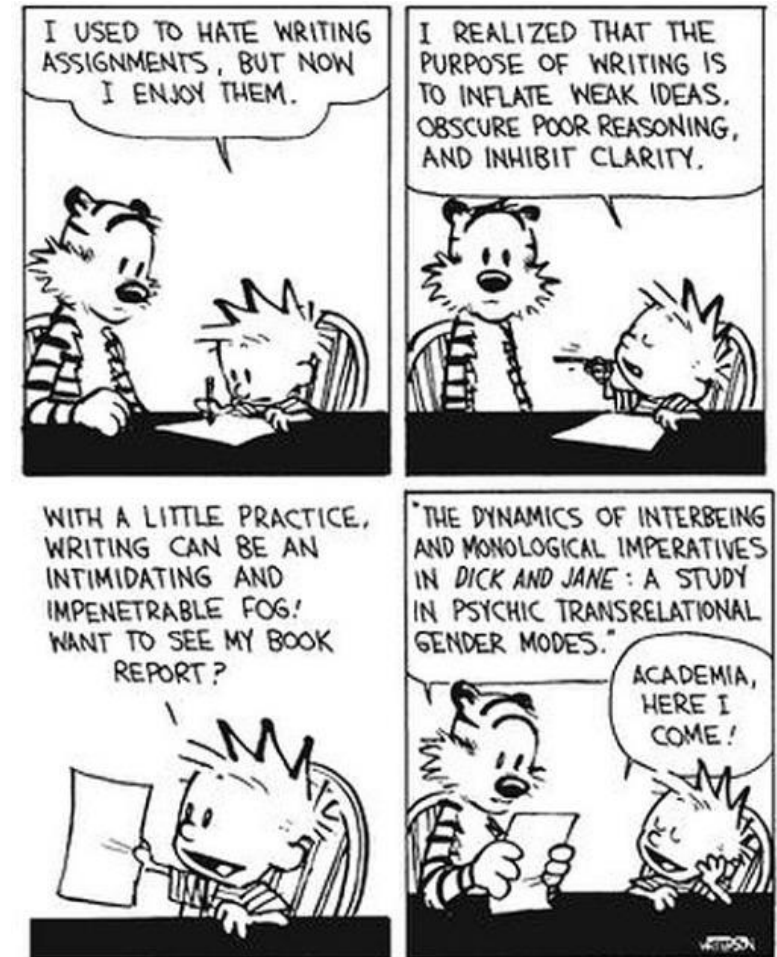
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Beyond jargon and technical terminologies

- Big data
 - Capturing more data, extracting more information, in order to make better decisions
- Fintech
 - Opening up new opportunities in financial services by utilising new state-of-the-art technologies
- Digital economy
 - An economic system that is based on digital computing and telecommunication technologies





Digitalising the economy?

- The term “digital economy” was coined in Don Tapscott's 1995 book *The Digital Economy: Promise and Peril in the Age of Networked Intelligence* – was among the first books to consider how the Internet would change the way we did business.
- It is widely accepted that the growth of the digital economy has widespread impact on the whole economy. It is worth more than US\$ 3 trillion dollars today. This entire value has been generated in the past 20 years since the launch of the Internet.
- Digital economy is about digitalisation of economic activities, but
 - It changes the nature of business, work, careers, etc.
 - The net effects of digitalisation on employment are ambiguous, but job losses in certain sectors are inevitable (job polarisation).
 - Governments and businesses seem slow to comprehend this shift.



What really is the digital economy?

- **Transformation due to technological innovation**
 - Digitalisation + telecommunication = economic potential
 - First by “functional equivalence”, then by functional separation and replacement
 - “Weightless economy” theory has been one explanation: trade, principles of asset control, “zero marginal cost” problem, ownership transformed, and new problems of intellectual property
 - Another explanation rests on critique of neoclassical economics: institutional & evolutionary economics, “innovation” economics
- **Informatisation and commodification:** transforming data
 - First into commercially useful information: customer lists, footfall data
 - Then into commodity products: participant lists determining the value of social networks (e.g. sale of Skype), Viewer numbers (viz. e.g. advertising)
- **Convergence:** of different kinds of data sources, between data sources and data processing
 - Content + processing + communication + services
 - Infrastructure, in relation to communication, services, content
 - Industrial policy and commerce





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What is driving the digital economy?

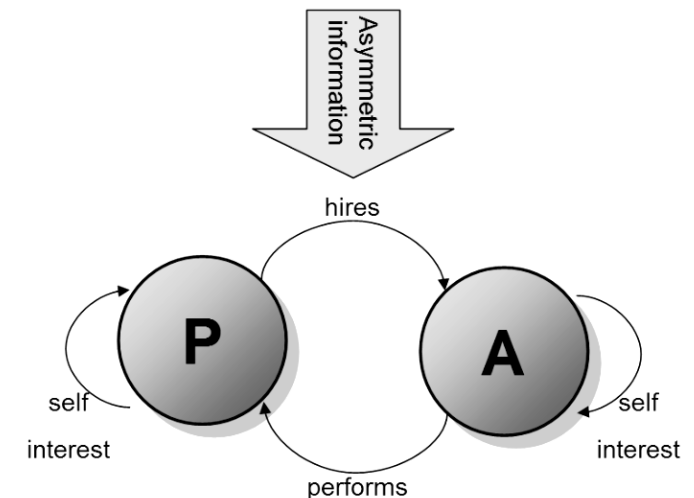
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Agency cost

- Historically, companies were owned and managed by the same people. For economies to grow it was necessary to find a larger number of investors to provide finance to assist in corporate expansion.
- Agency costs are a type of internal cost that arises from, or must be paid to, **an agent acting on behalf of a principal** (Jensen and Meckling, 1976).
 - An agent is employed by a principal to carry out a task on their behalf.
 - Agency refers to the relationship between a principal and their agent.
 - Agency costs are incurred by principals in monitoring agency behavior because of a lack of trust in the good faith of agents.
 - By accepting to undertake a task on their behalf, an agent becomes accountable to the principal by whom they are employed. The agent is accountable to that principal.
- Agency costs arise because of core problems, such as conflicts of interest, between shareholders and management.





Transaction cost economies

- A transaction cost, often known as coordination cost, is a cost incurred in making an economic exchange (Ronald Coase, 1937, 1960; Oliver Williamson, 1981, 1985).
- A number of different kinds of transaction costs exist.
 - **Search and information costs:** costs incurred in determining that the required good is available on the market, who has the lowest price, etc.
 - **Bargaining costs:** costs required to come to an acceptable agreement with the other party to the transaction, drawing up an appropriate contract, etc.
 - **Policing and enforcement costs:** costs of making sure the other party sticks to the terms of the contract, and taking appropriate action (often through the legal system) if this turns out not to be the case.
- Transaction costs consist of costs incurred in searching for the best supplier/partner/customer, the cost of establishing a supposedly "tamper-proof" contract, and the costs of monitoring and enforcing the implementation of the contract.
- In short, transaction costs are all the information processing necessary to coordinate the work of people and machines that perform the primary processes.
- Technological innovations, in general, promotes lower transaction costs.



Network externalities

- Are the effects on a user of a product or service of others using the same or compatible products or services (Katz and Shapiro, 1985; Liebowitz and Margolis, 1994/1995).
- **Positive network externalities** exist if the benefits (marginal utility) are an increasing function of the number of other users. It promotes bandwagon effect or network effect (e.g. Facebook likely confers positive network externalities since it is more useful to a user if more people are using it as well).
- **Negative network externalities** exist if the benefits are a decreasing function of the number of other users. It promotes snob effects or a desire to own exclusive products (e.g. A road probably confers negative network externalities since a consumer of the road creates traffic for other consumers of the road).
- Network externalities can arise through:
 - **Fashion or stylishness:** The desire for wearing jeans by girls is influenced by the number of other girls who have chosen to wear them.
 - **Complementary goods or services:** If the number of people owning DVD players increases significantly, desire for opening DVD store or for manufacturing DVD will increase.
- Metcalfe's Law was one of the first attempts to quantify the network effect, and proposes that the value of a network is proportional to the square of the number of users (n^2).



Disruptive innovation

- A process by which a product or service takes root **initially in simple applications** at the bottom of a market and then relentlessly moves up market, eventually displacing established competitors (Christensen, 1997).
- A smaller company with fewer resources can unseat an established business by targeting segments of the market that have been neglected, typically with new or innovative technologies to deliver products or services better suited to **the incumbent's overlooked customers** at a lower price.
- Then it **moves steadily upmarket** until it is delivering the performance that the established business's mainstream customers expect, while keeping intact the advantages that drove its early success.
- Disruption happens when the incumbent's mainstream customers start taking up the start-up's products or services in volume.

Disruptor	Disruptee
Personal computers	Mainframe and mini computers
Wikipedia	Microsoft Encarta, Encyclopædia Britannica
MOOC (edX, Coursera, Khan Academy)	School and universities
Ride-sharing (Uber, Grab, Go-Jek)	Conventional taxi/ojek
Low-cost airlines (Ryan Air, Lion Air)	Full-service airlines (British Airways, Garuda Indonesia)



Other considering technological factors

- **Moore's law:** It refers to an observation made by Intel co-founder Gordon Moore in 1965. He noticed that the number of transistors per square inch on integrated circuits had doubled every year since their invention. The number of transistors per square inch has since doubled approximately every 18 months. (speed)
- **Kryder's law:** It is based on the work of Mark Kryder, Seagate CTO, which claims that the density of information it can record has swelled from a paltry 2,000 bits to 100 billion bits (gigabits), all crowded in the small space of a square inch. In short, the density of computer drives increases by a factor of 1,000 every 10.5 years or doubling every 13 months. (memory)
- **Nielsen's law:** Jakob Nielsen, a web usability expert, predicted many years ago that the bandwidth available to high-end broadband connections will grow by 50 per cent every year, or double every 21 months, leading to a 57x compound growth in capacity in a decade. (bandwidth)
- These laws suggests exponential growth, and possibly are going to continue indefinitely.

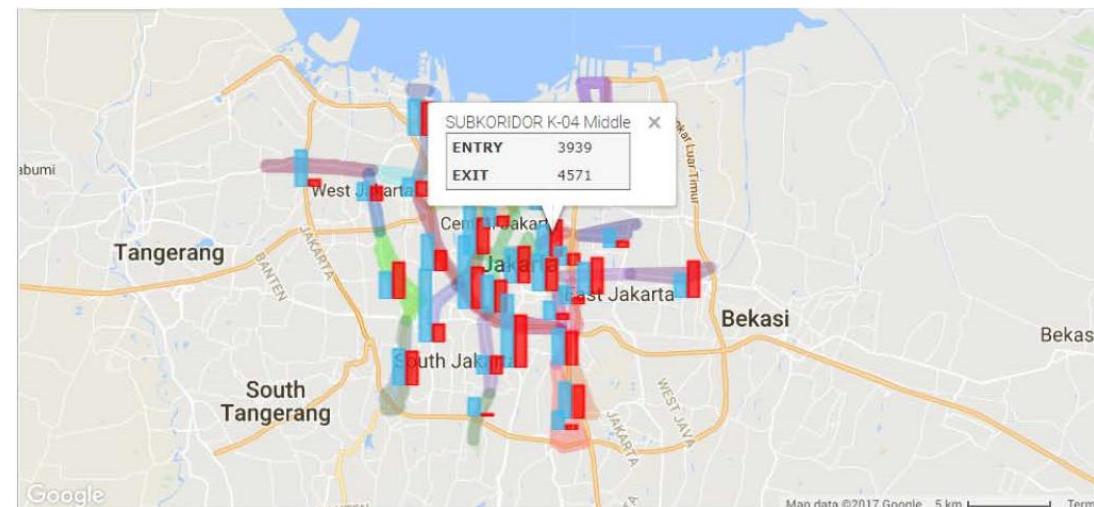
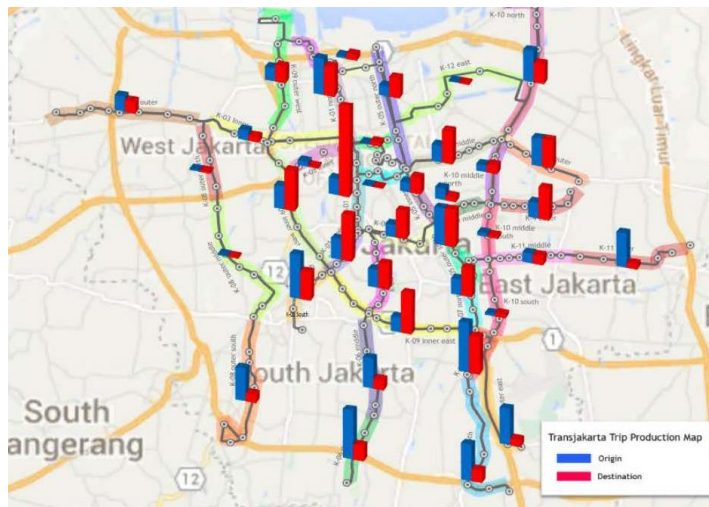
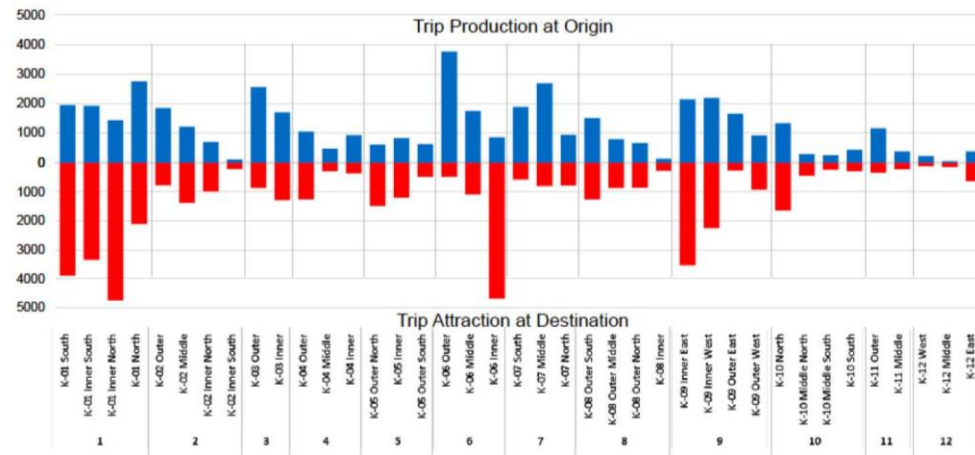


And then, comes big data ...

- Big data means datasets that are too large for traditional processing systems and require new technologies (Provost and Fawcett 2013)
- Big data is high-volume, and high-velocity and/or high-variety information assets that demand cost-effective, innovative forms of information processing that enable enhanced insight, decision making, and process automation (Gartner, 2015)
 - **Volume:** comes from a variety of sources (business transactions, social media, sensor or machine-to-machine data).
 - **Velocity:** streams in at an unprecedented speed and must be dealt with in a timely manner (RFID tags, sensors and smart metering, etc.).
 - **Variety:** all types of formats – from structured (numeric data) to unstructured (text, email, video, audio, etc.).
 - **Variability:** data flows can be highly inconsistent with periodic peaks (e.g. trending in social media, seasonal and event-triggered peak data loads).
 - **Complexity:** comes from multiple sources, which makes it difficult to link, match, cleanse, and transform.
- According to IBM, 2.5 billion gigabytes (GB) of data was generated every day in 2012.
- The size of the article text in the English Wikipedia, grew steadily from 1 GB in 2006 to 9 GB in 2013 to 11.5 GB in 2015. As of June 2015, the dump of all pages is about 100 GB compressed and 10 TB uncompressed. As of 20 February 2018, there are 5,574,349 articles in the English Wikipedia.

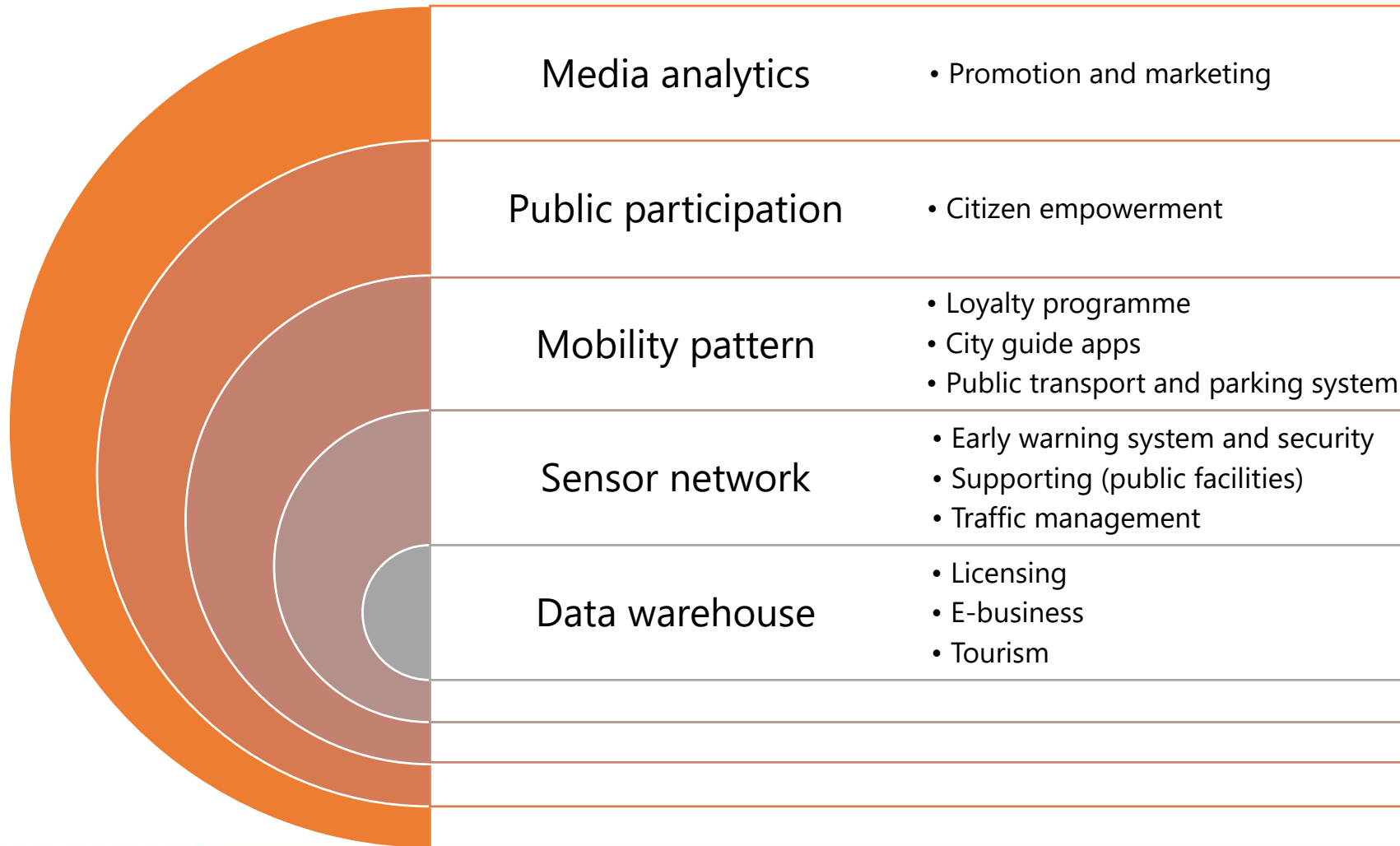


Big data for better decision making?





Big data for policy and governance?





Data, information, decision, policies ...

- IT (big data included) matters in everyday social and economic practice (Orlikowski and Iacono, 2001). ICT can improve bureaucratic procedures—so-called e-bureaucracy—is not a new observation (Cordella and Tempini, 2015)
- What is the role that institutional capacity has within organisation to utilise big data analytics?
 - Technology is viewed as complementary to existing organizational and administrative practices but is hardly viewed as capable of triggering changes—the change has to go beyond a mere improvement of existing services and procedures (Bannister and Connolly 2014)
 - Existing administrative and institutional structures define the way data is collected, analysed and used due to limited institutional support and data silos.
 - The capacity within government plays a role in how data is dealt with or used at all when looking at specific policy domains.
- How the information that this data contains enters the policy process and ultimately affects policy decisions as well as regulatory frameworks directing data collection efforts and sharing of information?
- Big data is perhaps here to stay, but that its utilisation by organisations could take some time due to institutional barriers and capacity bottlenecks



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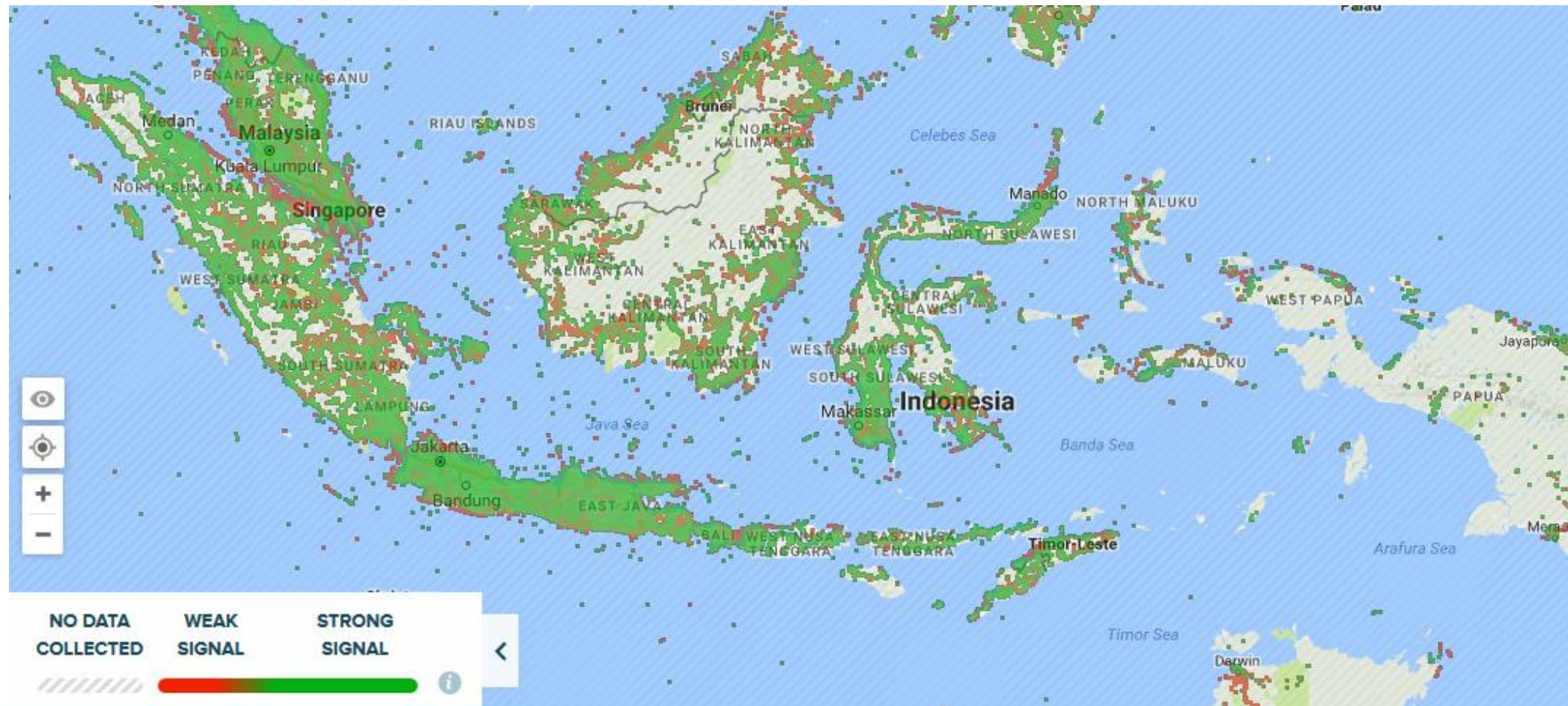
Digital economy in Indonesia

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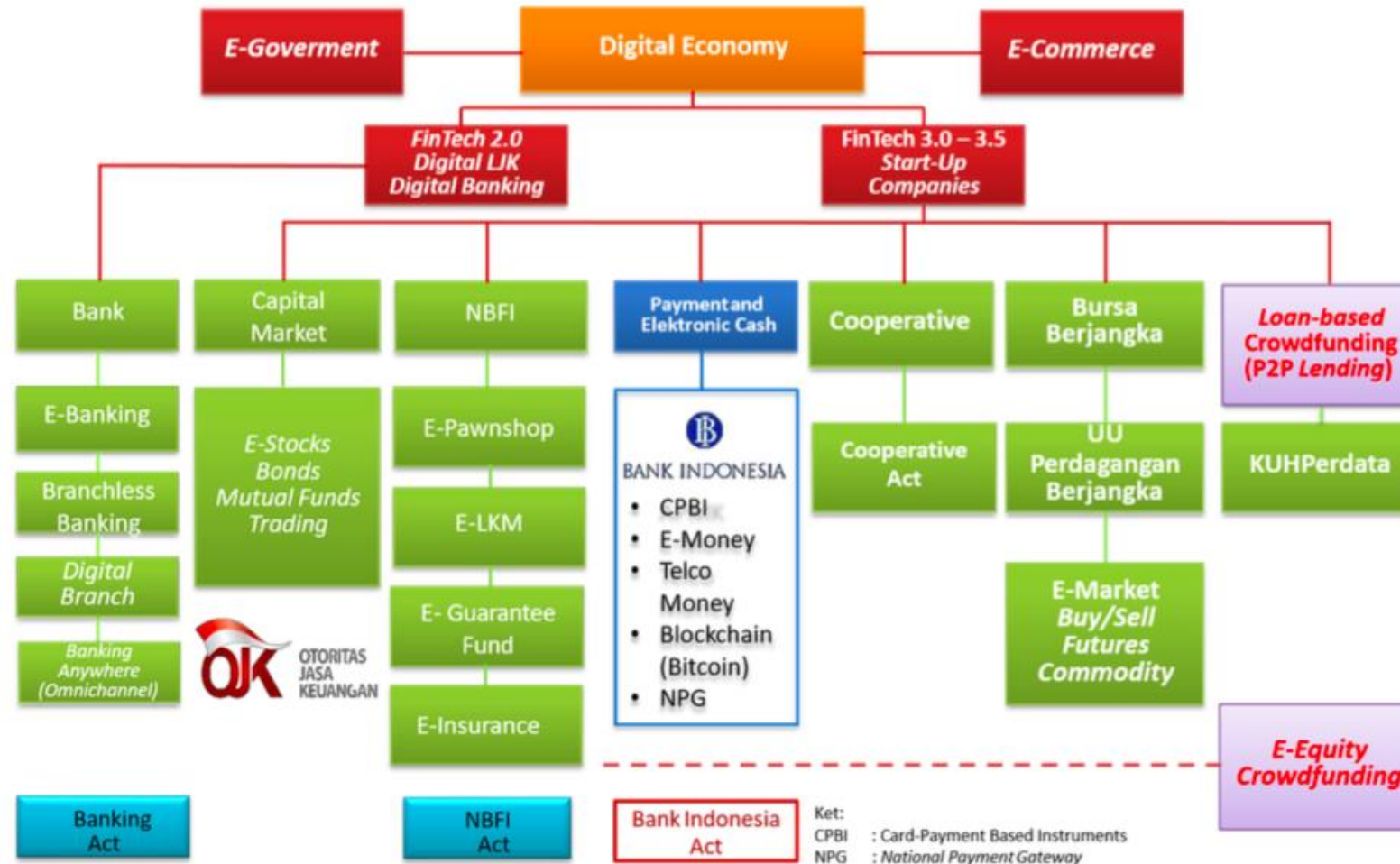


Despite all of these unequal infrastructures development ...





Visi ekonomi digital Pemerintah Indonesia



Source: Bank Indonesia & Otoritas Jasa Keuangan



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Other factors to consider

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Demographic development and societal change

- The rise of emerging countries, including Indonesia
 - By 2030 the world's population is projected to become over eight billion
 - 97% of this population growth will come from emerging or developing countries
 - People in all regions are tend to be living longer and having fewer children
- Millenials are becoming the most dominant forces shaping the way we live
 - Those between the ages of 18 and 30
 - Usually university educated, sometimes graduated overseas
 - Professional workers or lifestyle entrepreneurs
 - Relatively well paid, tech savvy and more globally minded
 - Relatively high expectations and more demanding
 - YOLO (you only live once) spending habit – work hard, play hard



Demographic development and societal change

- Declining extreme poverty, but rapidly rising inequality
 - Over the last 30 years, extreme poverty (living on \$1.9 a day or less) has been cut in half (World Bank, Our World in Data, 2013)
 - People who live below the higher poverty line (\$5.04) was cut by 18% from 1980 to 2012, and the poverty headcount at the lower line (\$2.52) was reduced by 37 percent
 - Millennials, born in the 1980s, only have a 50% likelihood of earning more money than their parents did
 - The top 1% of earners captured less than 21% of total income in the late 1930s, rising to 22% today (Piketty, 2013)
- Ageing populations and retirement
 - Asia has nine people of working age to support each elderly person on average. By 2050 that number will more than halve to four people (UN Population Division, 2015)
 - Addressing that shortfall will require greater workforce participation by two groups: women and the elderly themselves
 - Greater participation in the workforce by people in their late 50s, 60s and 70s could have a significant impact on GDP
 - An ageing population and lower asset returns could double the annual cost of maintaining retirement standards



Demographic development and societal change

- Increasing diversity and gender equality
 - Global pressure towards increasing racial and ethnic diversity
 - Affirmative action to achieve equal opportunity, including those with disabilities
 - Favor towards greater female participation, expand the number of women in the workforce
 - Women are having fewer children and having them later in life
 - Women already control two thirds of the household budget and will continue to rise
 - Globally 85% of consumer purchases are made by women, equivalent to a worldwide spend of \$20 trillion (PwC, 2017)
- Living in a post-truth era
 - Objective facts are less influential in shaping public opinion than appeals to emotion and personal belief
 - Driven by a combination of the 24-hour news cycle, false balance in news reporting, and the increasing ubiquity of social media



Platformisation of business

- There are two broad business models: pipes and platforms (Gawer & Cusumano, 2002)
 - **Pipes:** Firms create stuff, push them out and sell them to customers. Value is produced upstream and consumed downstream. There is a linear flow, much like water flowing through a pipe (e.g. manufacturing, television and radio, education systems, services industry, etc.).
 - **Platforms:** Do not just create and push stuff out. They allow users to create and consume value. Users (producers) can create value on the platform for other users (consumers) to consume (e.g. YouTube, Udemy, Wikipedia, etc.)
- This is a massive shift from any form of business we have ever known in our industrial hangover (e.g. Evans & Schmalensee, 2005)
 - Platforms will displace high cost gatekeepers with meritocratic crowds.
 - Platforms will aggregate disconnected players in fragmented industries.
 - Platforms will unlock new value from spare resources and user-generated content.



Shifts in the regulatory context

- Banking institutions and organisational isomorphism
 - New fundamental reform initiatives of Basel III & Basel IV
 - Better capital planning and stress-testing program
 - Extensive liquidity requirements
 - Better consumer protection, including KYC and credit quality concerns
 - Fintech firms and regulatory sandbox
 - Financial risk compliance, including AML and CFT
 - Cyber risk as part of the operational risk
- Challenges to develop an optimal distinctiveness?



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Problems and challenges

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Measurement problems

- **Solow residual:** rising productivity as rising output with constant capital and labour input. Sharing economy (AirBnB, Uber, etc) increase Solow residual. A house/car can be utilised by a large number of people/hour/day than before. Productivity increased but do not reflected in the GDP.
- **Consumer surplus:** a measure of the welfare that people gain from consuming goods and services. We used to pay to call abroad, now we can do it for free using Skype, LINE, WhatsApp, etc. We benefit more from the technological advancement, but do not reflected in the GDP
- We need more accurate/different measurement—to see how our society/country has progressed



Several problems emerge

- **Simplistic view:** "digital economy is only about digitilising economic activities." » It is not.
- **Shortcut economy:** "digital economy can be used to overtake developed economies. " » We cannot simply move to the digital economy and abandoning agriculture economy and manufacturing economy.
- **Download society:** we are focusing on enjoying and consuming (demand side). » We also need to be on the supply side of the market.
- **Digital divide:** huge disparity in terms of internet and communication accessibility. » It is important to close the gap.



Root cause of the problem?

- **Human evolution = arithmetic sequence.** The gestation period for human babies is 9 months. It takes years for a human to learn a new thing.
- **Technological innovation = geometric sequence.** Each year processing power became twice as fast and cheaper.
- This creates significant gap.





Potential risks and catastrophes

- **Black box corporatism:** Who will monitor and audit how Google, Facebook, Dropbox, Uber, GO-JEK, Grab, Bukalapak, Traveloka, etc. operate and utilise our data? What about cross-border corporate intelligence? Is there going to be no longer customer privacy? Corporate tax and national sovereignty?
- **Singularities:** At the end of the day, technology (artificial intelligence) will have progressed to the point of a greater than human existence (human intelligence). It is no longer we control the technology, but the technology controls us.



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Moving forward

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Research challenges: the big picture

- Translating technological potential into **applications**
 - Understanding, applying, normalising, disseminating technology trends, triple-helix collaborations
- Designs for **economic benefits**
 - e.g.: payment systems, applied AI, IoT; pricing, competition, business model innovation
- Understanding **social changes**
 - e.g.: online life, social networks, learning
- Problems of **infrastructure**
 - How ownership matters, rights and responsibilities



THANK YOU

Comments, questions, suggestions? Email nofie.iman@ugm.ac.id.

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