

Model for Digital Economy in Indonesia

Vincent Didiek Wiet Aryanto, Soegijapranata Catholic University, Indonesia

Agnes Advensia Chrismastuti, Soegijapranata Catholic University, Indonesia

ABSTRACT

This study introduces the early development of digital economy in Indonesia. e-Business activity is growing at an unprecedented rate in Indonesia as indicated by the number of online real time transactions (Real Time Gross Settlement) recorded by Bank Indonesia (Indonesian Central Bank), the emergence of dotcom companies, and the use of ICT in conventional business (a combination of brick & mortar with click/online). Research was conducted by investigating the digital activities of businesses. Unfortunately out of the 109 businesses approached, response rate was very poor with only 30 responding (27%). This is not uncommon in Indonesia for a variety of reasons. Results from the four variables utilized in this study, e-Distribution Channels, Value Creation, Online Products & Services, and Online Infrastructures, indicate that the development of digital economy in Indonesia is still in its early stages due to a number of encountered obstacles.

Keywords: Digital Economy, e-Distribution Channels, Information & Communication Technology (ICT), Online Infrastructures, Online Products & Services, Value Creation

INTRODUCTION

The rapid development of Information and Communication Technology (ICT) is evident in every aspect of community life. As with other forms of communication technology, the internet has established a strong presence in community life because it facilitates communication, a fundamental need of society. Internet technology has developed into its own 'world' or 'space' often referred to as virtual or cyber-space. In this virtual world people can meet, interact, and conduct economic or business related activities.

The evolution of a virtual community has had a significant impact on the economic society. Early fundamental economic theory was based on the optimization of production factors such as physical, labor, and capital. Now, development of economic science incorporates the intellectual properties, including science and technology, creativity, and innovative forms of capital, recognized as important to the economic society.

Innovative development in ICT or digital technology over the last decade, within the field of economics and business, is referred to by a variety of terms including post-industrial society, knowledge economy, economic of innovation, online economy, new economy, e-economy, and digital economy (Cohen, de Long,

DOI: 10.4018/jide.2011040104

& Zysman, 2000). Digital economy, the term used within this paper, is a complex matter and a recent phenomenon related to micro economics, macro economics, and organizational theory and administration (Orlikowski & Iacono, 2000). Digital economy will explain development and economic growth in the coming decades (Margherio, 1998; Kling & Lamb, 1999), and further to this, the impact of the development of internet and information technology on company and business activities. Examples of this are as follows:

- Impact on small to medium enterprises (SMEs)
- Coordination mechanisms and the impact on markets and organizations
- E-organization and e-banking
- Internet presence
- Impact on organizational structure
- Internet based marketing
- Business models and digital economy

This research is focused on the investigation of the business model of digital economy and its role in the economy of Indonesia. Business models of digital economy have been analyzed in regards to the presence of the internet in business, the use of internet-based marketing (e-marketing), e-banking, and e-commerce.

The concept of the digital economy was first introduced by Tapscott in 1998. It was described as a socio-political and economic system that is characterized by an access to information utilizing a variety of tools, the ability to process information, and a high communication capacity. Early identification of the components of digital economy included the following:

- The Information technology industry.
- E-commerce activities between companies and individuals.
- Digital distribution of goods and services.
- Support of sales, especially sales of goods and services that use the internet.

Zimmerman (2000) proposed that digital economy is the digitalization of information and ICT infrastructure. This concept is often used to describe the global impact of Information Technology and Communications, not only within the Internet, but also in the economic field. In their view on the interaction between the progress of innovation and technology, and the economic impact on macro and microeconomics, Kling and Lamb (2005) argue that the digital economy is the economic sector that includes goods and services in which development, production, sale or supply are dependent on digital technology. Development of the digital economy cannot be separated from the characteristics or nature of the creation of value, the product, efficiency of distribution channels, and the structure of personal services and customization (Zimmermann, 2000).

ONLINE INFRASTRUCTURE IN INDONESIA

Indonesia is an archipelago country of more than 17,000 islands, of which 4,000 are uninhabited with a total population of 245 million people. About 43,000 villages (65 percent of the total) do not have a telephone line. While the number of mobile phone subscribers has grown significantly, Internet and computer penetration is still low. Amongst those with access to the Internet, some online services like e-banking, e-shopping, and e-ticketing are becoming quite popular (Donny & Mudiardjo, 2007).

Satellite

The Indonesian Satellite Association predicted that the value of the satellite service and its derivatives would reach US\$ 480 million in 2007, representing a 15–20 percent increase over 2006 values. By the end of 2007, transponder needs in Indonesia had reached 150 units. However, there are only 97 transponder units provided by domestic satellite while about 40 transponders still use overseas satellites. The capacity of

one transponder is about 50 M.bps. The 53-unit shortage in transponders means a 2.65 G.bps shortage in satellite bandwidth. The shortage is expected to be filled by the Telkom-3 satellite, the *Palapa D* satellite, and the replacement of the *Cakra Warta* satellite. Both the Telkom-3 and *Palapa D* satellites have been launched in 2009. The *Palapa D* has a 40-transponder unit capacity, of which 40 percent will be used by Indosat.

Phone Services

Indonesia's telecommunication sector grew by 48 percent in 2007. Active mobile phone numbers reached 80 million, representing a mobile phone tele-density of about 30 percent. Only about 8 percent of the total population has landlines, of which 3.89 are fixed-line telephones (PSTN) and 4.03 are fixed wireless access (FWA).

Third generation (3G) cellular phone services, which were introduced only at the beginning of 2006, are being aggressively promoted and sales are rising. There were five 3G operators and four million 3G customers at the end of 2007. The majority of 3G customers use the service for video calls and for downloading music. 3G services in Indonesia have grown livelier with three operators (*Telkomsel*, *Indosat*, and *Excelcomindo*).

Compared to other forms of telecommunication, fixed phone penetration in Indonesia is the lowest. Only 100,000 new customers were added in 2007 to the 8.7 million connections registered in 2006. The lack of growth is due to the difficulty of developing and maintaining cable network infrastructure. However, the government does not want to abandon fixed-line services. The target is to increase fixed line telephone penetration especially in the rural areas.

Computers

PC ownership in 2007 increased by about 38.5 percent compared to 2006 figures. The Indonesian Computer Business Association reported a 29 percent increase in personal computer (PC) sales, from 1.4 million in 2006 to 1.8 million

in 2007. Sixty-five percent of the PC sales in Indonesia are dominated by local brands or locally assembled PCs. Notebook sales, on the other hand, are dominated by overseas brands, according to APKOMINDO. PC sales increase by around 39 percent to reach 2.5 million in 2008.

Internet

According to the Indonesian Internet Service Providers Association (APJII), there were about 25 million Internet users in Indonesia by the end of 2007, up by 25 percent since 2006. Many Internet users find the bandwidth cost in Indonesia expensive, particularly since the Internet service provider (ISP) purchasing price for bandwidth has been reduced to US \$ 1,800 per Mbps from a high of US \$ 2,200–2,500 per Mbps. The APJII also noted that by the end of 2007 Internet traffic in Indonesia had reached 5 Gbps for international bandwidth usage and 80 Gbps for domestic traffic.

Local WiMAX

The Directorate General of Post and Telecommunication opens for tender the development of 2.3 GHz local Worldwide Interoperability for Microwave Access (WiMAX) in 2008. The government has set aside about US \$ 1.93 million for this purpose. However, as of September 2008, no significant progress had been made in the tender process.

Cyber Crime

The Indonesia Security Incident Response Team on Internet Infrastructure (ID-SIRTII) is responsible for the control of Internet traffic in the country. Its aim is to discourage and eliminate misuse and misapplication of Internet infrastructure particularly through cyber terrorism and Internet crimes like hacking and cracking. Its activities include collecting logs from ISPs, conducting traffic system analysis, and fostering collaboration for the protection of information security. This team was established to respond the credit card fraud particularly with

Table 1. The number of subscribers, internet users and the growth of new registered domains (cumulative) in Indonesia

Year	Subscribers	% of Pop	Users	% of Pop	New Domain	Total Domains
1998	134,000	0.065	512,000	0.249	1,479	1,479
1999	256,000	0.123	1,000,000	0.481	2,126	3,605
2000	400,000	0.189	1,900,000	0.900	4,109	7,714
2001	581,000	0.272	4,200,000	1.963	3,433	11,147
2002	667,002	0.307	4,500,000	2.073	3,146	14,293
2003	865,706	0.393	8,080,534	3.673	3,628	17,921
2004	1,087,428	0.470	11,226,143	4.859	3,841	21,762
2005	1,500,000	0.619	16,000,000	6.612	N/A	N/A
2006	1,700,000	N/A	20,000,000	8.200	N/A	N/A
2007	2,000,000	N/A	25,000,000	N/A	N/A	N/A

Source: APJII Statistics, 2007.

Note: Access to the Internet can in fact be higher as people can access the Internet via Internet kiosk (50%) or from office/workplace (40%).

regard to the online transaction. Linnit (2008) said that visa international and master card the two significant service providers around the globe, currently, list Indonesia as number two on the list of the worst countries in the world for credit card fraud occurrence by total incidents recorded.

In developing countries, designing an appropriate regulatory framework for e-money and e-payment involves harmonizing different public policy objectives concerning financial system's stability, protection of consumers and promotion of competition and innovation. Therefore, excessive new regulations may not be proper (Stojanovic, 2001). This is true for Indonesia that currently has many regulations regarding the cyber crime, however, as a matter of fact, the regulation implementation is quite so limited.

ICT STAGE OF DEVELOPMENT

Given the above, it is therefore not surprising that while electronic commerce has transformed traditional business and consumer life in western world at least since 1994, in 2007 electronic commerce in Indonesia is still in initial phase

(Silalahi, 2007). Table 1 shows significant leap in numbers of internet users each year since 1998. Nevertheless, the percentage of internet users as compared to Indonesian population of 245 millions in 2006 was still less than 10 percent. Similarly, the growth of internet domain, one of the e-commerce basic infrastructures, has also been high but not significant if put in perspective of Indonesian population and geographical situation. By the year 2004, there were only 21,762 internet domains based in Indonesia. Definitely, not all of them are e-commerce sites since some of them account for private and government sites.

In terms of ICT development, the actual extent of e-commerce transactions is, however, still very limited, and cover only a small fraction of Indonesia's traditional economy, as diffusion hampered by a number of factors emanating from the country's national environment. Geographically, remote consumers are discouraged from purchasing goods by the fact that they cannot inspect them in advance. The rural areas have not experienced impressive social and economic changes following from the introduction of the internet. However, internet has had some positive effects on the

livelihood and education of the rural people. In developing countries such as Indonesia, China, Mexico and Malaysia have similar experiences of ICT development (Palacios, 2003; Kuppusamy & Santhapparaj, 2005; Donny & Mudiarjo, 2007; Zhao, 2008).

In the issue of internet, whether it increased trade relation between developing countries and developed countries, Clarke and Wallsten (2006) came across that developing countries export more to developed, but not other developing countries when internet penetration is higher. The access to the internet does improve export performance in developing countries, although not in developed countries. In other words, improving internet access in a developing countries will stimulate exports from that country to rich countries.

In terms of the bank's role in the digital economy, banks establish a structural function in the entire economy. Normally, under terms give an account of a central banks function as guarantors and distributors of money and as facilitators of all types of transactions. Evolution in the markets for electronic banking services are part of a strategic path in the sector which began before the presence of internet-based e-commerce and in which the internet is more of a stimulus than the prime driver. By and large, however, the primary effects of e-commerce in banking were more efficient operations, cost savings and the provision of additional distribution channels for financial services (de Munck, Stroeken, & Hawkins, 2001).

e-Commerce will create new shapes of competition and force banks to make options about the services they offer, the size of their branch networks and the extent of their support for interbank payment networks (Wenninger, 2000). Since the extent of e-payments and e-transactions from different kind of business activities can be classified as digital economy and those activities were recorded by Indonesian Central Bank, therefore, real time gross settlement (RTGS) could be an indication of digital economy activities in Indonesia.

In Indonesia, amongst those using the Indonesian Rupiah currency, the electronic

transfer system of Real Time Gross Settlement (RTGS) at Bank Indonesia (Indonesian Central Bank) shows significant numbers of e-payments, e-transfers, e-business, e-commerce, e-purchases, e-remittance transfers, e-banking, and ATM and credit card transactions. These are either through the use of conventional banks or shariah Muslim banks, and the transactions recorded by Bank Indonesia across 2008-2009 are displayed in Table 2.

Indonesia has two type banking systems; conventional and Muslim shariah banking. General electronic transfers and electronic transactions are similar but Muslim shariah banking differs within its saving and credit systems by not acknowledging the usury or bank interest. There is a knowledge of a large amount of activity in Indonesia's digital economy, with significant total value, but extensive literature search has failed to produce an example of empirical scientific research detailing the development of digital economy in Indonesia, by either national or international researchers. Publications are limited to existing studies and popular writing. Consequently, the development of digital economy in Indonesia still remains largely unexplored. This research focuses on modeling the development of Indonesia's digital economy. We draw on concepts from the interrelated literature streams of digital economy. Specifically, we focus on the aspects of digital economy such as the characteristic structure and change in patterns of e-distribution channels, the value creation process, the online products and services and the internet infrastructures. We address the following questions:

How has digital economy in Indonesia developed, as viewed from the following aspects?

- The characteristic structure and change in patterns of e-distribution channels?
- The characteristics of the value creation process?
- The characteristics of online products and services?
- The internet infrastructure?

Table 2. RTGS (Real Time Gross Settlement Transaction)

Period	Conventional Bank		Shariah Muslim Bank		Shariah Business	
	Value (Billion Rp)	Volume (Units)	Value (Billion Rp)	Volume (Units)	Value (Billion Rp)	Volume (Units)
July 2009	2,126,141.69	1,081,166.00	7,202.23	10,554.00	9,654.08	6,248.00
June 2009	2,295,417.69	1,073,332.00	6,387.64	10,637.00	11,472.49	6,635.00
May 2009	1,978,972.99	963,412.00	5,644.07	9,251.00	11,022.34	6,001.00
April 2009	2,065,992.73	1,011,238.00	5,765.91	9,091.00	14,118.43	6,573.00
March 2009	1,877,534.80	947,813.00	5,249.34	8,885.00	10,626.23	5,986.00
February 2009	1,663,782.26	896,499.00	4,871.84	7,944.00	11,130.87	5,849.00
January 2009	1,507,809.19	873,518.00	5,874.59	7,898.00	10,987.05	6,018.00
December 2008	1,842,759.82	1,152,696.00	6,150.28	10,093.00	11,977.07	6,312.00
November 2008	1,563,952.24	918,273.00	6,019.69	8,110.00	10,714.24	5,160.00
October 2008	1,821,191.40	857,877.00	5,845.15	6,996.00	8,117.72	4,710.00
September 2008	2,361,319.88	1,099,484.00	7,066.72	9,891.00	9,370.69	6,568.00
August 2008	2,106,610.97	934,443.00	6,579.43	8,580.00	8,360.29	5,247.00

Source: Bank Indonesia 2009, Note: US\$1 is equivalent to Rp. 8,900.00 as of August 2010.

THEORETICAL BACKGROUND

Structure of e-Distribution Channels

According to Zimmerman (2000), Zysman and Weber (2000), and Shaw (2000), various developments and changes occur in inter-organizational relations firms because of the use of ICT resulting in such phenomena as disintermediation. This reduces the role of intermediary personnel. Distribution channels have been shortened in B2C and B2B business. Jennex (2004) argues that worker skill, client interface and technical infrastructure are the most important factors to the success of the B2B e-commerce relationships in developing countries. In regards to e-distribution channels, Rao, Goldsby, and Iyengar (2009) stated that customers reduce their transaction costs by searching for product information on the internet, even though they may intend to purchase the product from a brick and mortar store. In addition, multi-channel retailers are able to cater to a larger stream of visitors, than web

only retailers, by further acting as a medium of information.

Kang and Brewer (2009) proposed a comprehensive model applicable to hotel electronic *distribution (e-distribution)* management. It was guided by three well-established theories: contingency theory, information-adoption theory, and *channel*-power theory. The study evaluated environmental and organizational determinants of electronic *distribution strategy* and their relationship *with* its consequences using the linear structural path modeling. Slack, investment, and innovativeness had significant effects on the Internet *distribution strategy*, while top management involvement did not. Those three well-founded constructs identified as consequences of the electronic *distribution channel strategy*.

Value Creation

In the digital economy, value creation of companies is the process of fulfilling customer-specific requests. ICT has facilitated a redefinition of value creation by collecting, organizing, produc-

ing and distributing information. Organizations can operate more efficiently and effectively (Amit & Zott, 2001).

In the digital economy, companies are offering their services on the basis of specific customized offers; these services are personal and personalized Offers (Bloch, Pigneur, & Sergev, 2006). The same mechanism operates in the internet auction markets that have emerged, such as Ibazar companies, e-bay, or in Indonesia (for example) gado-gado.com, where buyers and brokers can be either individuals or companies.

Nambisan and Nambisan (2008) revealed that companies formed closer links with their customers in the areas of innovation and value creation by establishing technological-based customer forums. Known as virtual customer environment range, these have started from simple online discussion groups and developed in to more sophisticated product prototyping centers. Bowman and Ambrosini (2007) also highlighted that value creation deals with the company's ability to be responsive to its environment, procurement activities, R & D and maintenance activities.

Klijnen, de Ruyter, and Wetzels (2007) composed a model to describe utilitarian value creation in mobile service delivery and examine how this value accounts for consumer usage intention. The study depicted strong foundation for time convenience in relation with transactions and another relative advantages affecting utilitarian value perceptions.

Online Products and Services

Senecal and Nantel (2004) supports the notion that consumers are influenced in their online product choices by online recommendations. However, not all online recommendation sources are equally influential. Recommendations for the experience product have shown to be significantly more influential than those for the search product. Perceived trustworthiness and an inclination to follow the recommendation were not affected by the type of website. This study only investigated consumers' online product choices; it did not investigate online purchases.

Xinxin and Hitt (2008) revealed that online opinion and consumer review sites have changed the way consumers shop, enhancing or even replacing traditional sources of consumer information. With the development of internet, word-of-mouth is no longer confined to small groups and communities but has expanded through large scale consumer networks assuming an unprecedented role in advertising.

Furthermore, he concludes that firms should adjust their product design and marketing strategies to cater to the changing behaviors of the customer population. This supports the value of customer relationship management systems (CRM).

Online Infrastructure

Zysman and Weber (2000) and Kenney and Curry (2000) said the support of information and communication technologies are important to respond an emerging digital advances economic structure such as a variety of vertical markets virtual transaction and virtual vertical markets such as B2B. Inter-company transaction activity was previously common practice in business between large companies, but B2B activities are now carried out by various sized companies. The developments of e-business are now applied to ERP (Enterprise Resource Planning), CRM (Consumer Relationship Management), and SCM (Supply Chain Management) amongst many other examples.

ERP (Enterprise Resource Planning) - in the current research, the extent of ERP implementation is defined as ERP functional scope, organizational scope and geographic scope. ERP functional scope refers to the range of business functions e.g. accounting, manufacturing, sales, marketing, etc that share the ERP implementation. Greater *ERP functional scope* is attained through the implementation of multiple or cross functional ERP modules. It (1) provides data and process integration across functions and insures more benefits than a single function implementation. (2) accommodates the exchange of data between applications for monitoring and managing business activities

across the extended firm, and (3) enables end-to-end computerization of business processes, enabling firms to react rapidly to change in business condition.

ERP organizational scope explains the organizational locations that the ERP implementation can link, such as departments divisions, a whole company, and multiple companies. *ERP geographic scope* refers to the regional, national, and global link of the ERP implementation (Karimi, Sommers, & Bhattacharjee, 2009).

Supply Chain Management (SCM) emphasizes on improvement and innovation of end-to-end processes between enterprises and their stakeholders such as customers and suppliers. In addition, in modern world SCM is digitally enabled inter firm process capability (Rai, Robinson, Patnayakuni, & Seth, 2006).

CRM (Customer Relationship Management) is paradigm or mindset – not a specific piece of technology designed to maximize customer profitability, revenue and satisfactions. To implement CRM, organization must implement policies, processes and technologies to provide personalized and appealing experience that is consistent across all customer interactions (West, 2001).

Subsector in the Digital Economy

Haltiwanger and Jarmin (2000) argue that subsectors, both hardware and software, exist in the digital economy, namely:

- Digital goods and services in the form of an electronic funds transfer, such as online information services, digital news, distance learning, and software sales.
 - Mixed digital goods and services purchased *via* the internet such as books, CDs, DVDs, music, movies, flowers, foods and beverages, and brokerage services.
 - Intensive production of goods and services – market investigations, computer aided design & production of various products requiring ICT.
- ICT industry in the form of hardware, software, communication equipment and services.
- Barua, Pinnel, and Shutter (2001) suggested that the digital economy consists of those companies whose revenue or income is obtained directly, or partly, through the internet. The researchers identified four sub-layers in the digital economy as follows:
- The fourth layer is online transactions such as B2C and B2B.
 - The third layer is the various intermediaries in online businesses such as Expedia, and Travel Web.
 - The second layer consists of internet applications such as IT consultants, multi-media applications, and online education.
 - The first layer is the infrastructure in online business transactions, including telecommunications, fibre optic companies, and hardware companies that support the digital economy.

Related Various Research on Digital Economy

Although not a direct discussion of digital economy in Indonesia, an article entitled “A technology roadmap draft on national information and communication” by Wahyudi (2007), describes the importance of the formulation of a roadmap for information and communication technology in Indonesia. Importantly noted was that Indonesia will not be able to avoid the effects of globalization brought about by the progress of ICT. Problems encountered by Indonesia in the face of ICT progress include:

- The slow response of the government in regulating the implementation of ICT.
- The limitations of ICT service providers even within major cities.
- The rapid growth of ICT not being followed by the community.

- An uneven development of ICT infrastructure limiting the device market (software & hardware).
- ICT devices in domestic products being less competitive with foreign products in both of price and quality.
- The rampant piracy of software products and content in Indonesia.
- Limited competent human resources in the field of ICT.
- The weak purchasing power of people and a limited number of ICT users.

Wahyudi research analyzed the problems of ICT infrastructure and ICT policies in Indonesia, but not the role of ICT and its impact on national economy.

A survey of 68 respondents regarding internet banking in Semarang and Jakarta, conducted by the second author of this study (Advensia & Purnamasari, 2009), indicated that users were patrons of Indonesia's prominent banks such as Bank Mandiri, Bank Niaga CIMB, Bank BNI, and Bank Danamon. Internet banking access varied amongst participants, with the majority (50%) accessing internet banking daily, 28% accessing it once a week, and 13% reporting once a month. Most frequently internet banking was accessed at the office (50%) followed by at home (26%) and internet cafes (12%). These data indicate that at present, the favorite place to access internet, of the participants, is at their offices. Internet banking, such as credit card transaction payments, money transfers, and e-load purchases for mobile phones, were conducted on a regular basis. Participants agreed that the usefulness of internet banking was high, whilst their satisfaction with services remained at a medium level. Internet banking services were considered to be faster, cheaper, and easier to access than conventional bank services. Participants did, however, express concern over the quality of internet banking services, citing unsecure internet banking practices. In some cases perpetrators of internet banking misuse or crime were not convicted.

Aguila, Padilla, Serarols, and Veciana (2003) conducted a study in Spain entitled *Digital Economy and Management in Spain*. This investigated the digital economy in Spain with the research also still in its frontier stage. ICT infrastructure and its impact on the digital economy were analyzed, as was the economic and business activities of the digital economy. Concepts taken from this study were then applied to the four subsectors proposed by Barua et al. (2001).

Park (2002) examined the spatial dynamic economic activities in the Asia-Pacific region. Entitled 'Economic Spaces in the Pacific Rim: A Paradigm Shift and New Dynamics', secondary data was used to analyze the spatial dynamics of the economy taking into consideration the advancement of ICT. Observed was the development of B2C e-commerce activities that spurred efficiency in business transactions due to an efficiency in the distribution and logistics of goods and services.

Clarke and Wallsten (2006) studied whether internet access will increase trade in developing countries vis-a-vis in developed countries. Internet access is so common amongst manufacturing firms in high income countries. In contrast, many manufacturing firms remain unconnected to the internet in developing countries. Since internet access is less ordinary in developing countries, being connected to the internet would be a greater advantage for firms in developing countries with regard to exporting to developed countries.

RESEARCH METHODS

This research is an investigation into the modeling of the digital economy phenomena in Indonesia.

Population

The research population considers all digital economic activities in Indonesia, such as e-banking, e-commerce, e-transaction, e-business, and e-marketing.

Sampling Technique

Given the potential for a vast study field, the population was narrowed to the scope of the digital economy that was undertaken by Haltiwanger and Jarmin (2001) and Barua et al. (2001). Criteria for sample inclusion was determined as, first, those who engaged in e-business activities, such as ICT policy makers and scholars. Second, there needed to be a willingness to be contacted *via* email and to complete an online questionnaire. Third, participants were to be of at least one of the following:

- Representatives of Bank Indonesia (e-banking).
- ICT business users.
- ICT services users such as travel agencies, insurance, and ticketing.
- IT experts.
- SOHO (Small Office Home Online) participants.
- Users of brick and mortar combined with ICT-type business activities.
- Representatives of SMEs (Small to Medium Enterprises).

The questionnaires were distributed *via* e-mail to 109 companies fulfilling the e-business criteria (click business/pure dotcom companies) and a combination of click and brick & mortar business', with company names and addresses sought from the search engine google.com. However, response rate was very low. Only 30 companies were willing to participate even with constant follow-up by telephone, e-mail and facsimile confirmation.

Reasons for objection to participation varied and included that the company was too busy, and that there was no mutual benefit, with some even requesting transactional compensation for their time. The companies that did participate in the research were those of software and IT development, website development & services, and e-commerce. The specific names of participating companies are as follows:

Software house, All business, Rumahbaktisolo, Rudywebdesign, Rentaltoko, Dhezign, Ciptasolusi, Jogart, KioskIT, Prowebpro, Citiwebindo, Pitoyo, Mog-site, and Visimaster. Click and brick & mortar participating companies were PT. Artha Tour & Travel Agent Semarang, Gumaya Hotel Semarang, PT. Indomulti Plasindo (plastics), PT. Indotirta Jaya Abadi (drinking water), PT. Danone (dairies and snack foods), and eight e-commerce users. In addition to the companies and users, three ICT experts and practitioners participated.

TYPE OF DATA AND COLLECTION TECHNIQUE

Primary Data

Primary data was obtained directly from the resource by conducting online interviews and questionnaires.

Secondary Data

Secondary data was obtained from the following unpublished or published documents:

- Indonesia Central Bank (Bank Indonesia) data 2009.
- ACNielsen, e-commerce data in Indonesia 2009.

Research Instruments

The questionnaire solicited data and information from the respondents of each company, usually webmasters or the company's IT officers, to answer the earlier stated problems. A self-administered questionnaire was e-mailed to the chosen companies addressing such issues as their digital business activities regarding e-distribution channels, online value creation, online products offered, and online infrastructure. Information was collected in the form of the five-point Likert scale (depicted below), used to indicate the varying degree of importance of four digital business variables.

Option Mean weight

- Very important 5
- Fairly important 4
- Neutral 3
- Not so important 2
- Not all important 1

e-mails were sent in the first week of February 2009 and the response period ended with the first week of April 2009.

Technique of Analysis

Using the five point Likert scale, qualitative data was collated and analyzed in regards to the digital economy characteristics. The steps performed were as follows (Mayring, 2000):

- Collection of data through in-depth interviews and questionnaires.
- Categorization of the definitions of the selection criteria.
- Revision of each applicable category.
- Collation of the responses.
- Interpretation of the results both qualitatively and quantitatively.

FINDINGS AND RESULTS

e-Distribution Channels

Distribution refers to the activity of transferring goods and services from their point of production to that of consumption. The e-distribution channels include all institutions and activities in the marketing process. The roles of e-distribution include:

- Linking producers to buyers and consumers
- Sales, advertising and promotion
- Pricing strategies of each company
- Branding strategies, policies, customization, and profit generation

Internet-based marketing offers a variety of alternative marketing channels such as promo-

tion through third party websites, e-mail marketing and search engine optimization (SEO). The collected data indicates that the e-distribution channel considered to be very important for improvement is search engine optimization. The more easily accessible search engines are, such as Google, Yahoo!, and Bing, the greater the efficiency of e-distribution. The e-distribution channels considered to be less important to the questionnaire participants included:

- Third party promotion via Indonesian cyber newspapers, such as detik.com and okezone.com.
- Promotions via e-mail marketing to current and potential customers.
- 'Pay-per-click' advertising through google adwords, Yahoo! Search marketing or business dotcom. For a fee, commission is paid to the company every time the company advertisement is clicked-on.
- Improvement of public relations for the promotion of online branding through media such as PRNewswire, Internet media focus and PRAgency.
- Improvement of social networking and reputation *via* such social networking tools as Facebook, Twitter, and Wayn.

Various alternative e-distribution channels were not utilized by respondents for reasons that included a lack of knowledge, awareness, or attention to these alternative channels. These findings differ from previous research, such as that by Geykens, Gielens, and Dekimpe (2002) and Rao et al. (2009), in which they reported that e-distribution or marketing channels had a greater impact for a company's value, particularly in terms of direct access from producers to consumers (B2C).

Online Value Creation

The Internet has opened up new value creation opportunities for organization strategies. Data collected indicates that the average web entrepreneur perceives the internet to have an important role in creating and enhancing corpo-

Table 3. Respondents perception on e-distribution channels

	N	Min	Max	Mean	Std. Deviation
Third party websites	30	2.00	5.00	3.40	1.1326
e-mail marketing	30	2.00	5.00	3.63	.9279
Pay per click advertising	30	2.00	5.00	3.25	1.0046
Online public relations	30	2.00	5.00	3.50	.8200
Search engine optimization	30	3.00	5.00	4.30	.7944
Social reputation	30	2.00	5.00	3.77	.1043
e-distribution channels average	30	2.50	5.00	3.60	.6988
Valid N (listwise)	30				
Interpretation: High 3.8-5 Medium 2.4-3.7 Low 1-2.3					

Source: primary data 2009.

Table 4. Respondents perceptions of online value creation

	N	Min	Max	Mean	Std. Deviation
Click & Brick-mortar	30	3.00	5.00	4.37	.6687
Efficacy & efficiency	30	3.00	5.00	4.53	.6815
Differentiations	30	2.00	5.00	4.33	.9223
Information management	30	3.00	5.00	4.43	.6261
Update	30	3.00	5.00	4.67	.6065
Facilities	30	2.00	5.00	4.67	.8604
Outsourcing	30	1.00	5.00	3.07	1.2210
Value creation average	30	3.30	4.70	4.26	.3459
Valid N (listwise)					
Interpretation: High 3.8-5 Medium 2.4-3.7 Low 1-2.3					

Source: primary data 2009.

rate values (mean 4.26, Table 3). Conventional companies have combined their brick & mortar business with click (online) activities, while click or virtual companies have emerged at an unprecedented rate. Company's engagement in online business has increased their efficiency and efficacy, particularly in terms of reducing

costs of distribution, transactions, information, coordination, and time through-put. Factors considered very important in the process of value creation (Table 4) include:

- The design of websites. Companies have created websites that are more attractive,

interactive and accessible to their users. This has enhanced company uniqueness and consequently the competitiveness of the firm.

- Better information management systems. Such systems have increased company value in the form of more comprehensive information collection, proper information dissemination, and appropriate information organization.
- Updated information in the company's homepage. This factor was considered very important (mean 4.67 with the smallest standard deviation of 0.6065) to enhancing the value of the company. Several previous studies support the value creation of website design, data/information updating, and organized information management systems (Zott, Amir, & Donvely, 2000; Gordijn & Akkerman, 2003; Wonseok & Pinsonneault, 2007).
- IT outsourcing. However, results only placed a medium-average degree of importance on IT outsourcing, with respondents reporting that during initial operations they requested IT outsourcing but later handled day-to-day operations in-house. Companies utilized partial outsourcing for their ICT operations.

Online Products and Services

The Internet allows a closer relationship with the consumer. Accumulated interactive information allows the company to get to know their consumers preferences and consequently align product and special service provision in accordance with the needs of the consumers. Results obtained indicate two factors of products and services that are considered of high importance; (1) through the internet, companies can offer a wide variety of products and services, and options and customizations to the benefit of consumers; (2) the companies have a commitment to communication with customers, and value their feedback for further development of their products and services.

This finding was consistent with previous research; the efficacy of services provided to the consumers depends on the level of such factors as courtesy, modesty, care, helpfulness, competency and flexibility. Alongside physical products, ease of access, communication, credibility, and visual understanding of the products offered via the internet, all contributed to the level of effectiveness (Cox & Dale, 2001). Table 5 shows respondents' perceptions of online products and services.

Pricing strategy was given a moderate rating. Companies are yet to extensively impose strategic pricing through e-marketing. As examples, pricing strategies based on peak and off-peak seasons, establishment of discount price provisions on consumer special orders, and pricing variations when competition is strong.

Online Infrastructure

In the opinion of the participants, the transaction facilities (Table 6) considered essential to be provided in the company's website are: (1) a shopping cart for non-service companies to record the purchased goods. Service companies do provide customers with catalogs to record their suggestions, visits and inquiries; (2) product/service search engines to find particular goods *via* keywords or product/service codes; (3) an order processor to provide product/service information, and electronic transactions that inform customers of how their shipment will proceed.

Web-hosting, website ownership and e-commerce hosting were considered of high importance. However, webserver ownership, either by a leased line connected to an Internet Service Provider (ISP) or co-location ISP, was viewed as less important. In addition, e-payment infrastructures, such as ATM transfer (Automatic Teller Machine), Bank telegraphic transfer, and Western Union payment transfer services, were considered of high value. Earlier research, conducted by Jennex, Amaroso, and Adalakun (2004), has emphasized the impor-

Table 5. Respondents perceptions of online products and services

	N	Min	Max	Mean	Std. Deviation
Products & Services	30	3.00	5.00	4.13	.5714
Pricing during peak/low season	30	1.00	5.00	2.93	1.0148
Discount pricing strategy	30	1.00	5.00	3.43	1.1043
Communication commitment	30	3.00	5.00	4.53	.6815
Average products & services	30	2.80	5.00	3.78	.5744
Interpretation: High 3.8-5 Medium 2.4-3.7 Low 1-2.3					

Source: primary data 2009.

Table 6. Respondents perceptions of online infrastructures

	N	Min	Max	Mean	Std. Deviation
Shopping cart	30	2.00	5.00	4.07	1.049
Search	30	2.00	5.00	4.03	.8503
Order Processors	29	2.00	5.00	3.93	1.0327
Website's server with lease-line	24	1.00	5.00	2.50	1.2511
Web-server with co-location	22	1.00	5.00	2.41	.90812
Web-hosting	30	1.00	5.00	3.80	1.3493
Website e-commerce hosting	22	1.00	5.00	3.55	1.4050
ATM, account's Bank transfer etc.	28	1.00	5.00	4.36	1.1930
Valid N (listwise)					
Interpretation: High 3.8-5 Medium 2.4-3.7 Low 1-2.3					

Source: primary data 2009.

tance of three factors for the success of small to medium sized enterprises in developing countries: skills and expertise; interface or wide access connection facilities; and technical aspects of ICT infrastructures. However, full operation of e-commerce in Indonesia remains restricted by the lack of trust in e-payment facilities, such as credit card or pay-pal payments, due to rampant fraudulent activity.

CONCLUSION

The four variables, e-distribution channels, online value creation, online products and services and online infrastructure, were utilised to develop model on digital economy in Indonesia. Research participants stated that they considered all four variables were of medium to high value. However, several issues were

raised regarding the application of website servers with leased lines and those with co-locations. As ICT infrastructure is frequently imported, the affordability of the investment is considered cautiously by companies. In addition, e-commerce, with the exception of information and communication media, is not yet fully functioning. Most transactions are still undertaken by ATM transfer, bank transfer and money-gram transfer due to a lack of trust in transactions via e-payments, such as credit card or pay-pal. Although cyber laws have been in place since 2007, there is still public concern regarding fraudulent activities. Indonesia was ranked the second most 'credit card fraudulent' country in the world in 2008 (Linnit, 2008).

This research is a preliminary study, concentrating mainly on the supply side (companies) of the digital economy. Further research needs to consider users and consumers for the formation of a thorough model of digital economy in Indonesia. In addition, categorization of companies as micro, small, medium or large is important as there will be considerable difference in their extent of ICT development and contribution to the digital economy. This study focused mainly on small and micro dot-com companies. Further research also needs to address the issues regarding poor response rate to mailed and online questionnaires to benefit subsequent studies.

ACKNOWLEDGMENT

Authors want to thank two anonymous reviewers for their very useful comments and insights to reorganize and complete this article. We would like also to thank Indonesian Directorate General of Higher Learning (DIKTI) in supporting this research.

REFERENCES

Advensia, A. C., & Purnamasari, V. (2009). *E-Banking continuence intention in Indonesia*. Indonesia: Unpublished Research Report, Soegijapranata Catholic University Semarang.

Aguila, R. D., Padilla, A., Serarols, C., & Veciana, J. M. (2003). Digital economy and management in Spain. *Journal of Internet Research: Electronic Networking Applications and Policy*, 13(1), 6–16. doi:10.1108/10662240310458332

Amit, R., & Zott, C. (2001). Value creation in e-business. *Strategic Management Journal*, 22, 439–520. doi:10.1002/smj.187

Bank Indonesia. (2009). *Hasil Survey TSI BI-DPNP, Produk E-Banking*. Jakarta, Indonesia: Bank Indonesia.

Barua, A., Pinnel, J., & Shutter (2001). *Measuring the Internet economy*. Retrieved from http://ai.kaist.ac.kr/~jkim/cs492a/internet_economy-UT.pdf

Bloch, M., Pigneur, Y., & Sergev, A. (2006). *On the road of electronic-commerce- a business value framework, gaining competitive advantage and some research issues*. Laussane, Switzerland: University of Laussane.

Bowman, C., & Ambrosini, V. (2007). Firm value creation and level of strategy. *Management Decision*, 45(3), 360–371. doi:10.1108/00251740710745007

Clarke, R. G., & Wallsten, S. J. (2006). Has the Internet increased trade? Developed and developing country evidence. *Economic Inquiry*, 44(3), 465–484. doi:10.1093/ei/cbj026

Cohen, S., de Long, B., & Zysman, J. (2000). *Tools for thought: What is new and important about the e-economy?* Berkeley, CA: Berkeley Roundtable on the International Economy (BRIE).

Cox, J., & Dale, B. G. (2001). Service quality in e-Commerce: An exploratory analysis. *Journal of Contemporary Marketing*, 11(2), 121–131.

de Munck, S., Stroeken, J., & Hawkins, R. (2001). E-commerce in the banking sector. *TNO Report*, 1-40.

Donny, B. U., & Mudiardjo, R. (2007). *id Indonesia*. Retrieved from <http://publicwebsite.idrc.ca/EN/Pages/default.aspx>

Geyskens, I., Gielens, K., & Dekimpe, M. (2002). The market valuation of Internet channel additions. *Journal of Marketing*, 66(2), 102–119. doi:10.1509/jmkg.66.2.102.18478

Gordijn, J., & Akkerman, J. M. (2003). Value based requirements engineering: Exploring innovative e-commerce ideas. *Requirement Engineering Journal*, 8(2), 114–134. doi:10.1007/s00766-003-0169-x

- Haltiwanger, J., & Jarmin, R. S. (2000). *Measuring the digital economy* (pp. 13–33). Cambridge, MA: MIT Press.
- Jennex, M., Amoroso, D., & Adalakun, O. (2004). E-commerce infrastructure success factors for small companies in developing economies. *E-Commerce Research Journal*, 4(3), 263–286. doi:10.1023/B:ELEC.0000027983.36409.d4
- Kang, B., & Brewer, K. P. (2009). Examination of contingency, innovation adoption and channel power to electronic distribution channels in the US lodging industry: An integrated view. *International Journal of Hospitality & Tourism Administration*, 10(1), 3–24. doi:10.1080/15256480802557234
- Karimi, J., Sommers, T. M., & Bhattacharjee, A. (2009). The role of ERP implementation in enabling digital options: A theoretical and empirical analysis. *International Journal of Electronic Commerce*, 13(3), 7–42. doi:10.2753/JEC1086-4415130301
- Kenney, M., & Curry, J. (2000). *Beyond transaction cost: E-commerce and the power of Internet dataspace*. Berkeley, CA: University of California.
- Klijnen, M., de Ruyter, K., & Wetzels, M. (2007). An assessment of value creation in mobile service delivery and the moderating role of time consciousness. *Journal of Retailing*, 83(1), 33–46. doi:10.1016/j.jretai.2006.10.004
- Kling, R., & Lamb, R. (1999). *IT and the organizational change in digital economies: A socio-technical approach*. Paper presented at the Conference on Understanding the Digital Economy: Data, Tools and Research, Washington, DC.
- Kotler, P. (2003). *Marketing management*. Upper Saddle River, NJ: Prentice Hall.
- Kuppusamy, M., & Santhapparaj, A. S. (2005). Investment in information and communication technologies (ICT) and its payoff in Malaysia. *Perspectives on Global Development and Technology*, 4(2), 147–167. doi:10.1163/1569150054739014
- Linnit, M. (2008). *Danger of credit card fraud in Indonesia*. Retrieved from <http://www.expat.or.id/info/info.html>
- Margherio, L. (1998). *The emerging digital economy*. Washington, DC: US Department Commerce.
- Mayring, P. (2000). Qualitative research in Internet. *Journal of Qualitative Research*, 12, 34–51.
- Nambisan, S., & Nambisan, P. (2008). How to profit from better virtual environment. *MIT Sloan Management Review*, 49(3).
- Orlikowski, W. J., & Iacono, C. S. (2000). *The truth is not out there: An enacted view of the digital economy* (pp. 352–380). Cambridge, MA: MIT Press.
- Palacios, J. J. (2003). The development of e-commerce in Mexico: A business-led passing boom or a step toward the emergence of digital economy? *The Information Society*, 19, 69–79. doi:10.1080/01972240309479
- Park, O. P. (2002). Economic spaces in the Pacific Rim: A paradigm shift and new dynamics. *Journal of Regional Science*, 82, 223–247.
- Rai, A., Robinson, J. M., Patnayakuni, R., & Seth, N. (2006). Firm performance impacts of digitally enabled supply chain integration capabilities. *MIS Quarterly*, 3(2), 225–246.
- Rao, S., Goldsby, T. J., & Iyengar, D. (2009). The marketing and logistics efficacy of online sales channels. *International Journal of Physical Distribution and Logistic Management*, 39(2), 106–130. doi:10.1108/09600030910942386
- Senecal, S., & Nantel, J. (2004). The influence of online product recommendations on consumers' online choices. *Journal of Retailing*, 80, 159–169. doi:10.1016/j.jretai.2004.04.001
- Shaw, M. J. (2000). *Electronic commerce: state of the art handbook on electronic commerce* (pp. 3–44). Berlin, Germany: Springer-Verlag.
- Silalahi, M. N. (2007). *Towards global digital economy: Closing the digital divide and promoting e-commerce in Indonesia*. Retrieved from www.wnlegalpractice.com/article.php?
- Stojanovic, A. (2001). E-money in transitional economy. *Comparative Economic Studies*, 49(1), 101–110. doi:10.1057/ces.2001.5
- Tapscott, D. (1998). *The digital economy: Promise and peril in the age of networked intelligence*. New York, NY: Mc-Graw Hill.
- US Department of Commerce. (2005). *IT and organizational change in digital economies: A socio-technical approach*. Washington, DC: US Department of Commerce.
- Wahyudi, A. (2007). *Sebuah Rancangan Roadmap Teknologi Informasi dan Komunikasi Nasional*. Retrieved from <http://baturaja.com>
- Weninger, J. (2000). The emerging role of banks in e-commerce. *Current Issues in Economics and Finance*, 6(3), 1–6.

- West, J. (2001). *Customer relationship management and you*. Retrieved from <http://solutions.iie.net.org>
- Wonseok, O., & Pinsonneault, A. (2007). On the assessment of the strategic value of information technologies: Conceptual and analytical approaches. *MIS Quarterly*, 31(2), 239–265.
- Xinxin, L., & Hitt, L. (2008). Self selection and information role of online reviews. *Information Systems Research*, 19(4), 456–474. doi:10.1287/isre.1070.0154
- Zhao, J. (2008). ICT4D: Internet adoption and usage among rural users in China. *Knowledge Technology Policy*, 21, 9–18. doi:10.1007/s12130-008-9041-0
- Zimmermann, H. D., & Koerner, V. (2000). *Management of customer relationship in the business media: The case of financial industry: New emerging industrial structures in the digital economy*. Paper presented at the Conference on Information Systems, Milwaukee, WI.
- Zott, C., Amit, R., & Donlevy, J. (2000). Strategies for value creation in e-commerce: Best practice in Europe. *European Management Journal*, 18(5), 463–475. doi:10.1016/S0263-2373(00)00036-0
- Zysman, H., & Weber, S. (2000). Governance and politics of the Internet economy: Historical transformation or ordinary politics with a new vocabulary? In *International Encyclopedia of the Social & Behavioral Sciences*. Oxford, UK: Elsevier.

Vincent Didiek Wiet Aryanto obtained his Ph.D (Commerce) in International Business Management from The Catholic University of the Philippines Santo Tomas in 1998. He was a recipient of a Fulbright Scholarship in 2002 allowing him to complete his postdoctoral studies at Marquette University, Milwaukee Wisconsin USA. He is currently a full-time professor at Soegijapranata Catholic University in the Faculty of Economics and Business Management, at both a graduate and undergraduate level, specializing in e-commerce marketing, international marketing and international management. Professor Aryanto's research interests concern e-marketing and international marketing management and he is a published author of the Journal of Business Administration Online, International Journal of Internet, e-Commerce and Management and the International Journal of Accountancy and Management Research. Professor Aryanto is an experienced research fellow and has presented at many international seminars including in The Netherlands, ISS The Hague, The University of New Castle Upon Tyne United Kingdom, The Chinese University of Hong Kong, Providence University Taiwan, and Assumption University Thailand.

Agnes Advensia Chrismastuti is a lecturer at Department of Accountancy Soegijapranata University. She graduated her B.S at The Gadjah Mada University and her M.S in System Information from University of Indonesia. She is lecturer of accounting and management information systems and information system auditing. Her research interest are in e-commerce and behavioral in information system, e.g., acceptance of information system and dysfunctional behavior in information systems. She is now a Ph.D candidate from Diponegoro State University Indonesia.