The Anthropology of ICT:
Technology Transfer and Its Socio-Cultural Elements

(Case of Aceh, Indonesia, after the Tsunami 2004)

Nuria W. Eriksson

Univ. Paris VIII, France

Abstract

The term 'hacker' is technically used for a person who writes code and exploits it in issues related to a security system. This paper, instead, will use the term 'hackers' anthropologically, not to discuss the above given matters but to refer to the mindset description of AirPutih, the Indonesian group of young people who arrived in Aceh, Indonesia, only four days after the tsunami hit this devastated region in 2004, and re-established the ICT connection with almost no money at hand. This paper discusses the cultural negotiation behind the success of this re-establishment.

Taking a closer look at the hacker mindset, this paper follows the general description saying that – apart from defining hackers as programmers and security breakers – hackers constantly seek further knowledge, have a strong interest on how things work, like to create and modify things for the enjoyment and the thrill of doing so. They are happy to find and fix vulnerabilities in the network and systems for no compensation at all, freely share what they have discovered, and never intentionally damage data. They also tend to be friends with other hackers and learn from each other.

The above mindset of the hacker embraces the Javanese worldview rooted in everyday life of members of AirPutih who are mostly of Javanese origin. The paper further discusses the matter opposing the Acehnese culture which is quite in contrast to the Javanese. The negotiation of culture is however strongly framed by the situation and the condition of a post-disaster in Aceh, Indonesia. The paper also discusses the intriguing result of the successful work of AirPutih in re-establishing the ICT infrastructure.

***

The Anthropology of ICT:
Technology Transfer and Its Socio-Cultural Elements

(Case of Aceh, Indonesia, after the Tsunami 2004)

Nuria W. Eriksson

Univ. Paris-8, France

The diverse and dynamic relations between the hackers and the local inhabitants arise when a sudden natural disaster that needs an urgent response, such as the tsunami, takes place. This paper attempts to highlight the influence of socio-cultural phenomena around the re-establishment of Information and Communication Technologies (ICT) in the post-tsunami region, with focus on the concept of sharing.

Tsunami and its ICT

On December 26, 2004, a magnitude 9.0 SR undersea earthquake created 30 meter-high tsunami, left more than 150,000 dead in Aceh, Indonesia, and destroyed much of the province's essential infrastructure, such as roads, power plants, and telephone lines. This natural disaster led to one of the biggest humanitarian relief operations in history. Hundreds of organizations tried to provide relief and rescue for thousands of survivors. But the efforts faced problems, since the tsunami smashed the communications infrastructure that was required to co-ordinate efforts amongst and between the organizations involved.

In his online diary, Sollahudin describes the destruction that affected almost all of the telecommunication infrastructure. Power was off, and phone lines were dead. Damage to the telecommunication equipment was terrible and employees of almost all institutions were lost in the disaster. This resulted in the Meteorological and Geophysical Institution (BMG) measuring the earthquake that preceded the tsunami as only 6.5 SR, while the US Geological Survey measured the earthquake as 9.0 SR. The media realized the huge scale of the disaster only a few hours after the tsunami hit Aceh. The press could see the damage but they had a hard time sending their reports back to their bureaus. Reporters could only get their stories out through Medan, the closest big city in the next province, and it took about 4-5 hours by helicopter or 12 hours by car to travel from Medan to Banda Aceh, the capital of Aceh province, and vice versa.

To solve this communication and coordination problem, the Internet Service Provider Association of Indonesia (ISP-AI) and the WLAN Association (both members of the Indonesian

Information Technology Federation (IITF)), together with other volunteers from IITF and the Indonesian Information Technology (IT) community, swiftly acted by setting up hot-spots, called Aceh Media Centers (AMC). The AMC's mission was to deliver a reliable communication system to the relief workers, journalists and officials involved in the tsunami relief efforts in Banda Aceh and northern Sumatra. They provided the wireless Internet infrastructure across Aceh.

AirPutih and the IT community reckoned that the total lack of communications on the ground was a huge problem. This group became the first IT group to assist. Along with an alliance of computer enthusiasts, they were fighting to apply the powers of the Internet so others could coordinate the world's humanitarian operation.

The work of AirPutih, who was physically at the front line, was invaluable to many international organizations, including Indonesian Red Cross, Medicos del Mundo (MDM), the World Food Program (WFP), et cetera. ESA (2005, in Wiryana 2009) noted that even the USNS Mercy, a hospital ship providing critical care to survivors, considered the wireless infrastructure provided by AirPutih as very important to their work.

AirPutih

AirPutih was first an unknown online chat group. It mostly consisted of Javanese young men aged 25-30 years who came originally from Malang, East Java. Almost all of them had graduated from Brawijaya University, from various non-IT departments. Nevertheless, although their educational background had nothing to do with IT, they considered the Internet as their favorite toy to play with. They learned about it by browsing the information on the Internet itself and submitting their questions to those with advanced knowledge of the Internet, especially the Indonesian Internet gurus including the founder of Indonesian Linux community, I Made Wiryana, who at the time was based in Bielefeld Germany, and the leader of Indonesian IT community, Onno Purbo, based in Jakarta/Bandung (capital of West Java province). Open Source Software was their main field. They used it not only because it was (mostly) free of charge, but also because they had the freedom to modify and to improve it. Eagerly and intensely playing with their toy, they became familiar with it, if not necessarily masters of it. They considered themselves to be an ICT voluntary-based community although 'ICT guerrilla' was the name they mostly used unofficially.

When they heard about the tsunami, they were moved to act. They quickly gathered together online, connected to some important people they knew, and collected donations. They also decided to establish an 'official' group to be able to take a leap under one umbrella to assist their

fellow Indonesians in Aceh. They named the group AirPutih, meaning spring water, running freely from the source down to the river. Its relief effort was coordinated from Jakarta by the Secretary General of Indonesian Association of Internet Service Provider (APJII).

One day after the disaster, donated computers and communication equipment began to pile up. Four members were then sent to Banda Aceh (capital of Aceh province) with some clothing and only IDR 13 millions (equal to USD1300) which they withdrew from their own personal bank accounts. They did not bring mattress to sleep on, so they just laid down to sleep on the floor, amongst cables and computers, in a car show room. Yet this did not discourage them. They had one main goal to achieve: to facilitate information distribution so that the delivery of humanitarian assistance to Aceh could be coordinated for maximum efficiency.

It appeared that their goal was supported both domestically and internationally. So between their hands-on assistance on carrying corpses to mass graves, they were able to gather not only information on the previous local Internet use but also to obtain more donated equipment to get the work done. They used local materials, grabbing nearby pipes and using long wooden poles to hook up radio towers. With two technicians equipped with notebooks as access terminal and a 500 VA power generator that weighed about 500 kg, they managed to put up their first 2.4 m VSAT portable dish to transfer data up to T1/1.5 Mbps. Installation was completed in less than four hours. The WLAN was used to create a data-link every 10 km so that the most important spots – such as the airport, refugee camps, NGO offices, and other institutions involved in the aid process – could be connected to share information and to input their own data wherever they were.

That day, January 1, 2005, AirPutih re-established Internet connectivity in Banda Aceh. At first, AirPutih set up free Internet sites at Banda Aceh's main Post Office and the Governor's residence, which served as the headquarters for governmental operations. The team had also set up an outdoor Internet tent. Journalists, volunteers, and officials could use this facility from 8am to 8pm. Their mission to establish "wireless freedom" for all was accomplished. They didn't charge anything as they were already satisfied not only with the good result of the work but also the process of it. Some might disagree but I see this as the work of the hackers.

The Hackers

The term 'hacker' has indeed been in dispute for a long time. It gets used, abused, misused, and overused. In mainstream media and for those who have had the experience of being hacked, the term is often used to refer to a malicious computer security breaker. In the digital society, contrary to its pejorative use, the Free/Open Source Software (F/OSS) community consider the

term ‘Hacker’ as a badge of honor. Hackers are not dangerous security breakers as commonly portrayed in the mass media and in mainstream public usage. In the world of Hackers, the evil-minded ones are called ‘Crackers.’

Some scholars argue that the difference between hackers and crackers is that where hackers use their skills and knowledge to learn more about how systems and networks work and share this knowledge with others for free, crackers will use the same skills to write harmful software (such as viruses, Trojans, etc) and illegally infiltrate secure systems with the intention of doing harm to the system, not to mention receiving plenty of money as rewards. It is said that true hackers do not participate in these activities and generally frown upon them.

‘Hacker’ is technically understandable as a person who writes code and exploits it in issues related to a security system. In doing so, (s)he is having fun, enjoying the computing works, interested to know more and deeper, and love to share her/his knowledge for free. In Torvald’s words, hackers are a group of people who program enthusiastically and who believe that information-sharing is a powerful positive good, and that it is an ethical duty of hackers to share their expertise by writing free software and facilitating access to information and to computing resources wherever possible (in Himanen, 2001).

Although some of them did have the ability (and the job) to either hack or crack, AirPutih might not be called a group of hackers as breaking into some computer security system was not their main duty. Yet, apart from the technical meaning of the term, AirPutih is indeed a group of hackers when referring to the mindset or the ethic applied by each member, which appeared to be critically important in the success of expediting the information infrastructure in post-tsunami area and helping the aid providers delivering urgent assistance to those in need.

As stated in the preface of Levy’s book (1984), there were general principles or tenets developed by the old school of Hacker Ethics. This includes sharing, openness, decentralization, free access to computers, and world improvement. Sharing was the norm and expected within the non-corporate hacker culture. Many of the principles and tenets of the Hacker Ethics contribute to a common goal, the Hands-On Imperative. As Levy described, “Hackers believe that essential lessons can be learned about the systems – about the world – from taking things apart, seeing how they work, and using this knowledge to create new and more interesting things.” Throughout the processes, a common value of community and collaboration is present.

When a new school of Hacker Ethics emerges with new ideals, they still hold on to information-sharing as their basis. Linus Torvalds, who created the Linux kernel, is one of these hackers whose belief in information-sharing is respectfully noted by others, including AirPutih. AirPutih was constantly seeking further knowledge, having strong interest in how things work,

and liking to create and modify things for the enjoyment and the thrill of doing so. They were happy to find and fix vulnerabilities in network and systems for no compensation at all, freely shared what they had discovered, and never, ever intentionally damage data. They also tended to be friends with other hackers and learned from each other. Gratification is given out of impressing each other.

F/OSS

The use of Free/Open Source Software as the running system is one of the supports that held AirPutih in the field. The free/open concepts have created the revolutionary abstractions of 'copyleft,' a hack of what is publicly known as copyright. The concepts have also created creative-commons, a hack which institutionalises an opening dynamic of sharing against the closure of patents and licensing (Dyke, 2008). Copyleft and the creative-commons bring down the position of copyright and intellectual property.

Freedom and openness are two concepts that are central not only in hackerism but also in the social movements it has influenced. To hack is to play and to learn (Himanen, 2001). The hackers support their own being through the application of their individual characteristics in relation to their social and material conditions and gain pleasurable satisfaction in doing so. As McKenzie Wark (-- : 34) puts it in A Hacker Manifesto, the hacker "produces the possibility of production, the possibility of making something of and with the world – and of living off the surplus produced by the application of abstraction to nature – to any nature." Hacking discovers "the nature of nature, its productive – and destructive – powers. This applies as much in biology as in politics, in computing as in art or philosophy. The nature of any and every domain may be hacked. It is the nature of hacking to discover freely, to invent freely, to create and produce freely" (Ibid: 076).

Furthermore, as Coleman (2004: 515) says, F/OSS is one local instantiation of liberal values, a rearticulation centered on reposing the relationship between intellectual property and free speech law by redirecting the use of licenses to protect expressive activity. This helps AirPutih to localize the system appropriately in the devastated region that provided almost nothing.

Disaster Area

United Nation's International Decade for Natural Disaster Reduction (1992) defines disaster as a serious disruption of the functioning of a society, causing widespread human, material, or environmental losses which exceed the ability of affected society to cope using only its own resources. The damage can be extended, depending on the intensity, impact, and characteristics of

the phenomenon, also on how people, infrastructures, and environment are affected by the phenomenon.

Natural disasters are indeed unexpected and unavoidable events. Putnam (2002) recalls that one might know where the earthquake faults are buried or where the climate is conducive enough to tornadoes or typhoons but nobody knows for sure when the earth will shake, what path the tornado will take, where the mud will slide, or where the plane will crash. Yet one does know for sure that when disaster strikes, there will be an urgent need for reliable information. How well information is managed before, during, and after a disaster can have a direct influence on how well the crisis is managed.

Furthermore, Putnam (ibid) also sees that the Internet plays a frequent role in emergency information management. A well defined role will make the Internet able to support crisis managers with new and powerful capabilities. The Internet supplies research material on demand, offers a dynamic system for information sharing and collaboration, and allows nearly instantaneous communication across time zones and national boundaries. However, the Internet can also compound a crisis. Complications emerge when misinformation is e-mailed around the world, when well-intended amateur relief efforts disrupt the business of official relief agencies, and when the network just isn't accessible because of power outages, equipment shortages, language barriers, or government restrictions. Ideally, before an actual emergency occurs, information feeds the research, education, and planning activities that help agencies and individuals prepare for potential disasters. During and after a crisis, accurate information is needed quickly — by officials who must determine the best response, by victims who need assistance, by members of the public who want to find out what's happening or offer support, and by reporters who broadcast the news. Granger (2000) warns us that once a disaster starts to unfold, it is too late to start looking for the information needed to manage it, as the information infrastructure is immediately collapsed.

In short, in a disaster such as the tsunami in Aceh, regulations crumbled and volunteers needed to fix things as quickly as possible, with no materials available in the field. Hackers who, in a normal condition, are usually opposing the authority should eliminate the thought of any resistance. It is important that all the differences are secluded, including the socio-cultural differences. To achieve this, communication strategy and negotiation are needed.

Cultural Differences

Culture is a complex series of interrelated activities, with roots buried in the past, in infra-culture, behavior that preceded culture but later became elaborated by humans into culture (Hall: 1959).

Hall's proxemics (1966) suggests that people from different cultures inhabit different sensory worlds. Experience perceived through one set of culturally patterned sensory screens is quite different from experience perceived through another. The relationship between humans and the cultural dimension (of which proxemics is part of it), is one in which both humans and their environment participate in molding each other.

Should we take any communication as face-to-face interaction then every interaction is not necessarily a communication but a routine social with cultural adjustment. The cultural adjustment is most often unconscious (Hall, 1984) and it is subject to many disturbances which in Serres' word is noise.

For Serres (1982, in Crocker 2007), we are surrounded by noise and we cannot close our door to the reception of noise. Crocker continues by saying that in a usual understanding of communication, noise might be seen as an unwanted third thing that interferes in what would otherwise be a clear connection. On a closer reflection, though, noise is much more complex. It indicates the wider context in which communication takes place, such as the entire social collectivity, including the cultural difference.

Hannerz (1990, in Uimonen 2001) emphasizes that the locals and the non-locals, or as he says 'cosmopolitans,' represent two interdependent categories that have different point of views. To the locals, diversity allows them to stick to their respective cultures while the cosmopolitans find value in diversity as such, the sheer existence of which allows them to feel at home in the world at large, traversing its variety of cultural expressions.

AirPutih, believing in the transformative power of the Internet, spreads its benefits through the society in need. They realign the devastated Aceh region with the changes, embedding the locals in the webs of interaction and communication with the world. AirPutih is thus contributing to the merge of cultural differences.

Javanese World View

Most members of AirPutih come from Malang, East Java. This bestows AirPutih with a Javanese world view that based their action in the field. Typical of Javanese culture lies in the extraordinary ability for the Javanese to let themselves be overwhelmed by the outside wave, and within this flood the Javanese maintains their authenticity. Javanese culture did not grow in isolation but in its typical way of digesting outside culture. Hinduism and Buddhism were embraced, but they were eventually 'Javanized.'

An early form of Javanese religious belief was Queen of Justice or Ratu Adil. Ratu Adil was an idea that formed as a natural reaction toward suffering and represents the hope for a leader that

would bring peace and harmony to the Javanese. It emerged as a natural reaction toward the Javanese way of life, etiquette, and emphasis on harmony. It was the foundation of Javanese custom or Adat.

For Javanese, Islam is complementary to Adat. They believe that the theoretically possible conflict between Islam and Adat does not exist. Nature should be taken as the teacher and in Al Quran there is a passage in which God indicates that He reveals some of His secrets through nature. Many Javanese believe that Adat is based upon religion and religion is based upon Adat. Javanese have taken Islamic practice and made it their own in many respects, resulting in the harmonious unification of various belief systems.

Most of the Java community's religion is considered "Kejawen." They do not apply Islamic religious duties such as praying five times a day, going to the mosque, or fasting in Ramadhan. They do not arrange their lives according to the rules of Al Qur'an. The basis of their views is the notion that the natural order and the community have been determined in all respects. Each individual plays only a minor role in the overall structure. Fundamentals of life and its status have been determined; their fate is determined long before, and consequently, they must patiently endure the difficulties of life. For centuries, the Javanese have emphasized the outward harmonious and peaceful relationship between men.

There are two important principles in Javanese society: the principle of conflict avoidance (rukun) and principle of respect (sungkan). The first one is tied strongly with the social and cosmological harmony. Javanese believe that they will obtain a well-being through a harmonious life, or a social harmony, that they need to secure with the power of the cosmos. Efforts to achieve harmony become a reason to help people in difficulty, even if they are not liked. This principle is therefore considered both as a state of being and a mode of action. This makes all parties, at least overtly, at social peace with one another. It is a process of sharing through collective action. Harmony requires each individual to willingly surrender and release personal interests for the sake of the collective agreement. Man should repress his conflicting emotions that usually are attached to the issues at hand, so open conflicts can be avoided. For this purpose, the Java community develops norms of behavior that are expected to prevent the occurrence of emotions that can lead to conflict. By this, the emotion is expected not to be shown openly.

The second principle, of respect, allows Javanese to believe that man has to know his place in society so that they can act appropriately. The Javanese do not make moral judgments according to abstract moral norms but on the basis of whether a given individual has reacted correctly according to the place he occupies in society. Whether a given action is considered right or wrong depends not on the principles but the results of the action.

The Devastated Aceh

On the other side, Acehnese has their own background of culture and history. Anthony Reid looks at Aceh history under the fierce competition between Dutch and British trade companies and observed that Aceh had endured various regimes prior to Dutch colonialism that helped in forming the Acehnese identity (Reid: 1969, 2005). In its long history, Acehnese is one of the ethnic groups in Indonesia that had never surrendered to any outsiders who wanted to take advantage of their land, including the Central Government of Indonesia in the latest years. They never stop fighting to protect their land and for that, they have always been very proud of being great defenders of their land.

Another issue that has given them pride is the Islamic way of life that has been inherited from their ancestors since centuries ago. The region is even nicknamed the Front Porch of Mecca as an account of this history, designating the region for its close relation to the Holy Mecca, also a reminder that in the early years, Aceh was the point of departure for the Indonesians who set forth to Mecca for a pilgrimage. The region has thus been granted an independent region by Indonesian central government. This means that Aceh is allowed to govern their region themselves without strict watch from the central government, allowing a higher-than-usual official Indonesian respect for Islamic law, custom, and education.

However, friction with the central government of Indonesia began when the latter forced Aceh to hand over nearly all of its wealth of natural resources. Aceh was once one of the richest regions in Indonesia and its largest exporter of oil and gas. Sadly, Aceh did not receive any benefits. The central government appropriated nearly all of the profits from such natural resources. The central government claimed to use some of the profits to develop the poorer regions of Indonesia, and some of the appropriated profits were considered as tax payable to the central government. The benefits of Aceh's oil were distributed at the national level, and not amongst local communities in Aceh.

The contradiction of the special region status and the growing-pain of the prosperity brought Aceh into the Indonesian mainstream of ‘troubled-spots,’ along with East Timor (now Timor Leste) and Irian Jaya (now Papua). Separatists seeking to establish an independent Islamic state in Aceh combined their religious and nationalist appeal with the exploitation of social and economic pressures and discontent continued to cause unrest in Aceh. Free Aceh Movement (GAM – Gerakan Aceh Merdeka) was established and continued to fight, proud to defend their land once again. The defense was so vigorous that the central government needed to create military operation in Aceh and declared the region as a closed-zone.

The long endurance in Aceh history might intimidate anyone who tried to connect with Acehnese but the tsunami made it crumbled. Acehnese, especially GAM, realized outsiders were now showing up to help, not to confront them. This somehow affected how they communicated with people such as AirPutih.

Nevertheless, as Hall (1959) stated, culture controls behavior in deep and persisting ways that many of which are outside awareness. AirPutih and the Acehnese developed communication beyond their consciousness.

Conclusion

The experiences of AirPutih illustrate the complexities of mediation and translation that technological development entails. Concept of Javanese worldview is used to capture mindset of particular group of hackers and movement of social actors who traverse different social contexts. This concept is seen not only as an analytical tool for them to solve problems at work but also as a way of life and a way of appreciating the world. The Hacker mindset (or ethic) is a core characteristic of the activities of AirPutih. Holding this in their heart, they move between countries, organizational contexts, and social categorizations, both online and offline. From their base in Aceh, they are brokering the communication among the involved parties around the world to be engaged into their vision, and share their work in the devastated area. They engage in activities that require them to interact with people from different sectors.

The Hacker mindset/ethic also reflects cultural dispositions. The Javanese worldview activates AirPutih's ability to produce appropriate strategies to successfully engage with various sectors in order to create harmony of the universe. They share a pronouncedly cosmopolitan appreciation of global interconnectedness in the shape of transferring the technology, the Internet. They subscribe to the socially and culturally equalizing ethos of the hacker ethic, their activities being aimed at improving the human condition in general and the plight of marginalized groups and societies in particular.

Acculturated in the knowledge-sharing ethos of the hackers, the visions of AirPutih are not confined to their particular organizational context. Instead, it is the disruption of hierarchies of authority and state regulation.

The use of the open source is a good example of a 'cyber-acculturation' (Baltz 2005) in disaster area. It is not only disseminating knowledge and conceptual use but also the popularization of various urgent activities and creation that are held in the large socio-cultural area between the position of the hackers and that of the local inhabitants.

This discursive perspective offers a broader reflection on the social and cultural issues of a technology. Practical suggestions serve mainly to show that the extension of a socio-cultural reflection of a technology is possible and as important as the technology itself.

***

Bioblurb

Nuria W. Eriksson is Indonesian doctoral student in *Science de l'Information et de la Communication* at the Université de Paris VIII, Vincennes de Saint-Denis, France.

Reference

ALEXANDER, David. (1993) *Natural Disasters*. New York: Chapman and Hall.

BALTZ, Claude. (2005) *Cyberculture : un « driver » obligé pour la société d'information ?* 7° Congrès de la FADBEN : Information et démocratie : Formons nos citoyens ! Nice, avril 2005

COLEMAN, Gabriella. (2004) The Political Agnosticism of Free and Open Source Software and the Inadvertent Politics of Contrast. In KELTY, Christopher M., ed. *Culture's Open Source's in Social Thought and Commentary – Culture's Open Source: Software, Copyright, and Cultural Critique*. Chicago: University of Chicago.

CROCKER, Stephen. (2007) Noises and Exceptions: Pure Mediality in Serres and Agamben. *CTheory: 1000 Days of Theory*. WWW. Available at: http://www.ctheory.net/articles.aspx?id=574

DE JONG. (1976) *Salah Satu Sikap Hidup Orang Jawa.* Jogjakarta: Kanisius.

DYKE, Rob. (2008) *Hacking* the Networked Society. WWW. Availabe at: http://www.lulu.com/items/volume_71/11408000/11408830/1/print/2569836_dissertation.pdf

GEERTZ, C. (1960) *Religion of Java*. Glencoe: Free Press.

GEERTZ, H. (1961) *The Javanese Family: A Study of Kinship and Socialization.* New York: Free Press of Glencoe.

GRANGER, Ken. (2000) An Information Infrastructure for Disaster Management in Pacific Island Countries. *Australian Journal of Emergency Management*. WWW. Available from: http://www.ema.gov.au/www/emaweb/rwpattach.nsf/VAP/(084A3429FD57AC0744737F8EA134BAC

B)~An_information_infrastructure_for_disaster_+management.pdf/$file/An_information_infrastructure_for_disaster_+management.pdf

HANNERZ, Ulf. (1990) Cosmopolitans and locals in world culture. In *Global Culture. Nationalism, Globalization and Modernity,* M. Featherstone (ed). London: SAGE Publications.

HALL, Edward T. (1959) *The Silent Language*. New York: Doubleday.

HALL, Edward T. (1966) *The Hidden Dimension.* New York: Doubleday.

HALL, Edward T. (1984) *The Dance of Life: The Other Dimension of Time.* New York: Anchor Press/Doubleday.

HIMANEN, Pekka. (2001) *The Hacker Ethic and the Spirit of the Information Age.* New York: Random House.

KOENTJARANINGRAT. (1984) Kebudayaan Jawa. *Seri Etnografi Indonesia.* No. 2. Jakarta: Balai Pustaka.

LERNER, J. & TIROLE, J. (2000) *The Simple Economics of Open Source*. WWW. Available from: http://www.nber.org/papers/w7600.pdf

LEVY, Steven. (1984) *Hackers: Heroes of the Computer Revolution.* New York: Anchor Press/Doubleday.

MAGNIS-SUSENO, Franz. (1988) *Etika Jawa: Sebuah Analisa Falsafi Tentang Kebijaksanaan Hidup Jawa.* Jakarta: PT Gramedia.

MULDER, Nies. (1996) *Pribadi dan Mayarakat Jawa.* Jakarta: Pustaka Sinar Harapan.

PUTNAM, Laurie. (2002) By choice or by chance: How the Internet is used to prepare for, manage, and share information about emergencies. *First Monday*, No.11/Vol.7/Nov. Available from: http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/viewArticle/1007/928

QUARANTELLI, Enrico. (2006) Catastrophes are Different from Disasters: Some Implications for Crisis Planning and Managing Drawn from Katrina. *Understanding Katrina: Perspective from the Social Sciences*. WWW. Available from: http://understandingkatrina.ssrc.org/Quarantelli/

REID, Anthony. (1969) *The Contest for North Sumatra: Atjeh, the Netherlands and Britain 1858–1898.* London: Oxford University Press.

REID, Anthony. (2005) *An Indonesian Frontier: Acehnese and other histories of Sumatra.* 2nd Ed. Singapore: Singapore University Press.

SERRES, Michel. (1982) *The Parasite*. Lawrence Schehr, trans., Baltimore: John Hopkins University Press.

SOLAHUDDIN, Pataka. (2005) *Penggunaan Teknologi Informasi Dalam Penanggulangan Bencana.* WWW. Available from: http://www.pataka.net/2005/01/14/penggunaan-teknologi-informasi-dalam-penanggulangan-bencana/#more-27

CHAMIM, Mardiyah. (nd) History Grows in Our Kampong: Starbuck Service a la AirPutih. *Journey to Aceh with Mardiyah Chamim.* Weblog. (Online). Available from: http://acehjourney.net/wp-content/uploads/2009/04/bab-18_1_eng.pdf

FREE SOFTWARE FOUNDATION. (nd) *What is Copyleft?* WWW. Available from: http://www.gnu.org/copyleft/copyleft.html

TUPAMAHU, Ekaputra. (2007) *Review of Javanese Ethics and Worldview.* WWW. Available from: http://tupamahu.blogspot.com/2007/07/review-javanese-ethics-and-worldview-by.html

UIMONEN, Paula. (2001) *Transnational.Dynamics@Development.Net. Internet, Modernization and Globalization.* Dissertation (PhD). Stockholm: Almqvist & Wiksell International.

UNITED NATION'S INTERNATIONAL DECADE FOR NATURAL DISASTER REDUCTION (IDNDR). (1992) *Glossary: Internationally Agreed Glossary of Basic Terms Related to Disaster Management*. Geneva: DHA.

WARK, McKenzie. (nd) *A Hacker Manifesto*. WWW. Available from: http://subsol.c3.hu/subsol_2/contributors0/warktext.html

WIRYANA, I Made. (2009) *A Sustainable System Development Method with Applications.* Dissertation (PhD). Bielefeld, Germany: Technischen Fakultaet der Universitaet Bielefeld.

***