

THE SOCIAL CONSTRUCTION OF TECHNOLOGY AND THE DEVELOPMENT OF SATELLITE TELECOMMUNICATION IN INDONESIA

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Technology has increased the ability of human beings to process matter and information. Information technology (IT) increases the amount of information preserved or in circulation and it is also contextualized by the social structures. However, more likely is the ability of information technology to enhance the social structures which contextualized them, implying that social relations are merely a reflection of the new technology. The electronic technology has certainly shifted and will change the political, social and economics system, or Toffler claims these changes as the "third wave" or the "power shift".

This essay discusses the development process of satellite telecommunication in Indonesia through the creation of "Visi Indonesia: Nusantara-21" program [Indonesia's Vision: Archipelago-21], and analyse it from a social construction of technology perspective.

The Social Construction of Technology (SCOT) Perspective

Raymond William (1981:227) defines technology into two parts. First, technology is defined as "the body of knowledge appropriate to the development of such skills and application". Second definition mentions that technology is "a body of knowledge and condition for the practical use and application of a range of devices".

Thus, these definitions examine technology is the application of knowledge and it is designed for the practical purposes.

Meanwhile, Rogers (1986:2) defines communication technology as "the hardware equipment, organizational structures, and social values by which individuals collect, process, and exchange information with other individuals." This definition seems complex because Rogers means technology not only the hardware, but also including other systems such as social institutions and values that support the invention of technology itself. This idea parallels with Hughes's opinion which states that technological systems include not only the physical artifacts, but also include the social organisations (Hughes, 1993:31).

All the components of technological systems are socially constructed in order to function in systems. Moreover, he says, "An artifact-either physical or nonphysical-functioning as a component in a system interacts with other artifacts, all of which contribute directly or through other components to the common system goal" (Hughes, 1993:31). Communication technology devised and its components, as the technological systems, are socially constructed artifacts. Therefore, this technology has changed in many ways significant to the social change in the society.

The social construction of technology emerges from the studies of the sociological of technology. Technology,

which is invented through its history and its development, can be seen not only from its artifact (hardware of technology), but also from its social aspects. This is because technology actually is a social construction of man for supporting the man's purposes. In other words, technology is interpreted as the flexible artifacts in which one can design a various property (hardware) of technology in order to meet the need of technological practices. Therefore, the use of technology depends on how a social group sets the meaning of a specific technological artifact.

According to Pinch et.al (1993:35), the development of technology is stimulated by the rise of some conflicts such as the conflicts of the technical requirement by different social group (the need of speed, safety, and so on), the conflicts of solutions to the same problem (the convenience of technology usage), and the moral conflicts (deal with gender matter). Other aspects, which also have stimulated the development of technology, are political (power) and economics aspects. Hence, technology is designed or created as an alternative solution for the problem arising among the people who take advantage or take benefits from the use of technological artifacts. Furthermore, Winner (1994:192) states:

Economic benefits are supposed to trickle down: the less wealthy segments of society may not benefit and may even be harmed by technological innovation, but they can look forward to jobs, income, and improving social conditions as technical improvements and economic prosperity reverberate.

For the social constructivist, the developmental process of a technological artifact is described as an alternation of variation and selection (Pinch, et al. 1993:28). This proposition is used explicitly in many innovation studies and much in history of technology. Moreover, Pinch et al. (1993:40) state, "technological artifacts are culturally constructed and interpreted, and

the interpretative flexibility of a technological artifact must be shown". It means that there is the flexibility in how people think of or interpret technological devices, but there is also the flexibility in how the artifacts are designed.

Furthermore, every different social group has also a different interpretation to one technology artifact. For example, the social meaning of television varies and depends upon the social context in which it is employed. The different interpretations by the social groups toward the content of technological devices lead by means of different chains of problems and solutions to the different further developments that involves in the content of the artifact itself. Therefore, how the artifact of technology get grouped or built together depends on the use of particular social reality of the social groups. In other words, how we understand the technologies and how we behave toward them depend on the social reality in force.

According to Pinch and Bijker (1993), the development of technology also depends on how people value the cultural change in which it is emphasised. For the social constructivist, technology is negotiable. It means that the hardware of technology is not "hard" or strong as its form, but it socially constructed for the human convenient. Moreover, Pinch et al state, "the social constructivist view not only seems to be gaining ground as an important body of work in its own right, but also shows every potential of wider application in which technology is considered as the application of truth (Pinch et al., 1993:10). As Lazonick (1979), cited in Pinch et al, examines that the aspects of technical development can be understood in terms of the relations of production rather than any inner logic of technological development.

In the following section, I will discuss how satellite as one of techno-

logical devices is socially constructed for the means of communication. The development of satellite technology has rapidly improved. Each domestic satellite has a distinct specification to one another, and it is created to meet the need of the satellite users. As Menser and Aronowitz (1997:9) state, "technology challenges us in such a way that it has displaced both its users and critics...".

The Social Construction of Satellite Communication Technology

Since the end of the 20th century, our earth surface is coated by a unique coating called "an electronic coating". The earth surface is covered by the tremendous electromagnetic wave. This "coating" began when Marconi for the first time introduced the experiment of wireless communication across Atlantic in 1901 (Bittner, 1989:333). Since then the information technology has developed rapidly not only for local use, but also for international purposes. However, there were only some industrial countries, which took advantage from the invention of information technology since the 1930s. In contrast to this condition, the invention of new technology newly began in some development countries since the end 1950s.

According to Bittner (1989:271), the new era of satellite telecommunication was introduced in the 1962 when NASA-A.T.&T. launched the satellite called "Telstar". Telstar made an international history for connected some parts of the world via satellite, and it had transmitted the event in one nation throughout the world. Since then there are numerous domestic satellites have been created not only by America as a major, but also by other countries like Indonesia.

The satellites have an important

sophisticated system and guidance system that is its orbit. Bittner (1989) points out that the engineers from Hughes Aircraft Company launched the first orbit satellite called a "synchronous orbit" in 1963. He states that this satellite orbit was designed to reach a point in space where it would rotate at a speed, which would synchronise with the speed of the earth's rotation. Unfortunately, this attempt was failure. However, those engineers tried again in the same year and it was successful to achieve 22,300 miles in space over the equator and the Atlantic. This success has been followed by other companies to take an active interest in satellite development.

Since the invention of satellite in the 1960s, human communication space seems more expand and become wider. Moreover, the arrival of satellite has shifted the communication technology from the simple ways to more sophisticated. All the inventions of satellite communication technology, like other technologies, are socially constructed to provide the ease and convenient for the humankind.

Formerly, satellite was used for supporting the television broadcasting. The advance use of satellite and the arising need of people to communicate in long distance have encouraged the effort to improve the technological devices of satellite. For example, satellite utilised improved technology called "beam separation" which allows the same frequency to be used for transmitting a signal both to and from the satellite, creates a more efficient use of frequency. Moreover, the improvement of antenna systems permits a more directed beam to an earth station.

A further development of domestic satellite was conducted by RCA American Communication Incorporated. According to Bittner (1989:274), in order to improve the power of satellite, this company attempted

to create the antenna system that faces the sun whenever it is in view. For instance, when the sun is not insight, the satellites then are powered by nickel cadmium batteries.

Meanwhile, the Western Union attempted to operate a domestic satellite, which called "Westar", which is capable to carry the different types of information including data, video, and voice together. The satellite was also constructed by the engineers with the mobile facilities, sending and receiving earth station which operate in major metropolitan centres.

In early 1990, United State's space station added a new dimension of satellite to space-based communication systems. In order to give a capability and availability for engineers to build and provide maintenance for communication facilities in space, the satellites use the space shuttle to create the space station. Therefore, the space station is designed to contain pressurised modules for allowing people to live and work in space.

All these advance development on satellite technology have been constructed to improve much larger and more powerful space communication system which could change the technology that we use to receive the signal on earth. For example, the potential for using smaller antenna systems like small satellite dish antenna, has replaced the larger consumer models in use, and it may change the media habit on how people use both mass and personalised communication systems.

Moreover, the social construction of satellite communication has taken on greater significance in business and industrial areas. This is because satellite able to transmit data over long distance. For example, in the 1980s, the xerox system proposed the new service such as document distribution, data transmission, and teleconferencing by using satellite (Bittner, 1989:275). Furthermore,

the use of satellite in business has supported the advance printing devices and mail distribution centres which allowing the rapid delivery of document. With the document distribution function, a variety of sending and receiving terminals and work stations are connected together with the satellite being coordinating relay device.

All these examples are attempted to examine how satellite as a communication technology has been socially constructed for enable people to move to a higher stage of growth and development and quality of life. As Ellul states that technologies appears as the motive force and the foundation of the economy. Without technologies, there is no economy (1964:149). Therefore, the need of national economic and political action is also significant contributing the speed of development of information technologies between the East and West and even among Asian countries.

In the following section will examine the new program of satellite telecommunication system, which is socially constructed by the New Order Indonesia in order to anticipate the era of information age in the 21st century.

The National Telecommunication Program: "Visi Indonesia: Nusantara -21" and How It Is Socially Constructed in Contemporary Indonesia

Nowadays, the information society has become the global phenomena. Through the growth of computer and information technology, the delivery system of messages has shifted from the traditional convention ways to the use of modern technology like satellite. This phenomenon has been claimed by Frederick William as a communication revolution, or as McLuhan (1962:326) stated as a global village.

Electronic technology has brought back an aural, or hearing, predominance. The Gutenberg technology created an explosion in society, separating and segmenting individual from individual, but the electronic age has created an implosion, bringing the world back together in a global village.

Telecommunication is viewed in Indonesia as an important economic aspect. It has become a significant for national investment. According to Latief and Ibrahim (1996:199), in 1988 Asian Communication noted that Indonesia imported telecommunication devices for US\$ 300 millions. From this amount, the Japanese industry imported no less than US\$ 100 millions, France gained US\$ 46 millions, and the rest of US\$ 46 millions was gained by Germany, America, England and Hong Kong. This phenomenon has been followed by the new regulation in 1990 in which the government gave its authority to operate the latest type of satellite Palapa to the private companies like PT Indosat and PT Satelindo. PT Satelindo, which is owned by Bambang Suharto one of the former President Soeharto's sons, has a privilege from the New Order government to handle the operation of satellite Palapa type C in recent years.

Nusantara-21 is the Indonesian government program in order to achieve one of national objectives that is the information society. This program is launched by PT. Indonesia Satellite (Indosat) in 1996. According to Natanagara (1997), the objective of Nusantara-21 is to develop the national information infrastructure in facing the information super highway era of the 21st century. It is also intended to improve the capability of information processing and the usage of information nationally and internationally. However, the most important objective of this program is to

support the development of telecommunication system like digitalisation of telephone and the computer systematisation. PT Indosat has built the physical infrastructure by dividing Indonesia islands into six major regions called "lingkar" [ring].

The six rings are Sumatera, Kalimantan, Sulawesi, Java, Bali, East Timor and Southwest Nusa, and Maluku and Irian. These rings are designed as a geostationary orbit control of satellite Palapa. Each ring region has at least one gateway with earth station, except Maluku and Irian ring which has two gateways with earth station to cover Bali, East Timor and Southwest Nusa ring. Moreover, every capital city in each province has a gateway. There are also three cities, which become a central transmitter for the countries outside Indonesia: Jakarta as a central gateway station Sub-Marine to Singapore, Colombo and Australia; Medan is designed to Singapore and Malaysia; and Surabaya is designed as a Sub-Marine to Hong Kong, Malaysia, and Bombay. Surabaya gateway was planned in 1996. All these cities in 27 provinces are formed as a multimedia city and become the central access of national multimedia societies.

As I mentioned that the most important objective of Nusantara-21 program is supporting the development of telecommunication system in Indonesia like digitalisation of telephone and systematisation of computer. Although telephone as technology was introduced since along time ago and digitalisation of telephone has existed in many industrial countries, technology of telephone had been used widely in Indonesia since the 1970s. The growth of telecommunication system in Indonesia increased rapidly since the launch of satellite Palapa in 1976. Formerly, the use of telephone was only popular for business purposes. Since the 1980s the use of

telephone as private usage has becoming to grow. Digitalisation of telephone in Indonesia started in 1990 when some of the telephone numbers were changed from four/five digits to six digits, and it has been continued to seven digits since the end of 1996. From this phenomenon, we see that the digitalisation of telephone as the advance communication technology seems "new" for many Indonesian people compare to other industrial countries.

Despite Indonesia is still facing such problematic situations as the problem of corruption, high consumption of luxury goods, and a widening gap between the haves and the have-nots, I view that technology in Indonesia has rapidly developed. The development of communication and information system in Indonesia has shifted rapidly since the first launch of satellite Palapa for television broadcasting and for telecommunication system. As Chu, Alfian and Schramm (1991:257) state:

The launching of Palapa 1 in 1976 represented an important philosophical milestone in the thinking of the Indonesian leaders. Effective communication is essential in order to bring the vast rural population into the national development efforts, encouraging them to participate actively. Effective communication channels are also crucial if the Jakarta government is to receive prompt feedback information so that timely corrective actions can be taken.

There is the fact that liberalisation in telecommunication, diversification telecommunication service, and reduction of telecommunication cost are supported by the rapid development of satellite technology. This development gives us the flexibility to communicate instantly around the world. Meanwhile, the introduction of optical-fibre has produced the progressive acceleration in the quality of telecommunication system. The development of new satellite

communication technology offers the simultaneous access to information, and it has deleted a factor of time of information flow.

Latief and Ibrahim (1996:198) point out five factors of achievement of the simultaneous access to information. Firstly, the numbers of satellite system "geostationary orbit" have increased both the uses of a C-band satellite, which is connected with 2.5-3 meters parabola and Ku-band satellite, which is connected with 0.75-1.2 meters parabola. Secondly, the rapid improvement of technologies of outer space and communication has led to the creation of a smaller parabola and video compression, which can improve a capacity of transponder up to eight level of television channels per transponder. Thirdly, there has been a development of commercial satellite remote sensing system, which can observe the object that less than five meters long. Fourthly, there has been also a development of world spanning satellite telephone system, which can reach many locations everywhere in the world. Finally, the numbers of companies, which have a capability and experience in using of satellite data, have increased rapidly. In addition, all these factors have been attempted by the development of satellite Palapa type C-1 and C-2 for supporting the national satellite development program of "Nusantara-21".

All those achievements then, are supported much more by the growth of computer technology, which able to send the information from all over the world through the process of digitalisation. This process has stimulated the operation of Integrated Services Digital Network (ISDN) system. ISDN was designed to be the digital replacement for conventional analog telephone service. This system facilitates the electronic message channel of texts, data,

graphics, video, and sound through the fibre-optic cable. The ISDN system also provides a conversion from text to sound or from data to image, hence the interconnectivity and integration more become a real (Green, 1997:60). The ISDN then stimulates the development of networking systems such as Local Area Network (LAN), Metropolitan Area Network (MAN), and Wide Area Network (WAN). These networks are developed rapidly to a creation of global integrated communication system, which use a satellite system. This global telecommunication system has led to another system of information called global super highway system.

The use of satellite Palapa type C is intended for the advance development of telecommunication system in Indonesia. This satellite is constructed by the New Order Indonesia not only for national achievement, but also for international purposes. In other words, the aim of the development of satellite telecommunication is to contribute the national achievements in social, economics and political sectors, which have been stated in the General Guidelines of the State Policies (GBHN). It is also to maintain the international image on the "open sky policy" of Indonesia. Furthermore, to a certain extent, I argue that the Indonesian government has revised its concept of development not only to pursue economic growth but also to emphasise equity. The development of satellite telecommunication in Indonesia is directed to the creation of democratisation sphere, the improvement of a quality of manpower, and the achievement of the technological society, as the "imagined community", by the year 2020.

To sum up this paper, in order to understand both critically and deeply about the usage of technology devices and its consequences, we might not be ignored the

socio-cultural context of technology with its link to the social and political structure of the society. As Raymond William (1981) said that technology is always, in a full sense, social; or as Mahjid The ranian (1990:xvi) states:

Technologies are thus viewed as neither good, nor bad, nor neutral. To understand their role in society, we need to contextualize their uses and abuses.

The social construction perspective describes how technological artifacts are interpreted in different ways by the different social groups. The meaning given to the technological artifacts is influenced by the socio-cultural and political situation of social group shapes its norms and values.

New communication technology is favourable and enables mankind move to a higher stage of development and quality of life. The invention of technological artifacts has also created the emergence of the technological society. As Jacques Ellul (1964) described the technological society as the essential tragedy of civilization increasingly dominated by technology. According to him, the technological society is a description of the way in which an autonomous technology is in the process of taking over the traditional values of every society without exception, subverting, and suppressing these values to produce a monolithic world culture in which all non technological differences and varieties are more appearance.

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