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From Walking City to Telematic Metropolis: Changing Urban Form in Bandung, Indonesia

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Introduction: Telecommunications and the City

Since the invention of the telegraph by Morse (*circa* 1844), telecommunications technology has been profoundly implicated in the organization of urban space. This technology has provided an alternative to the physical movement of information and messages. Telecommunications now mediate a whole range of activities negating the need for physical presence in daily activities such as shopping, studying, entertainment and, in some cases, even working. Distance and time constraints are eliminated. This elimination could weaken the very rationale for the existence of the city by dissolving the need for physical proximity.

Telecommunications dramatically alter the significance of distance in the organization of space. For the transmission of information across the space, distance has become a secondary consideration. What does matter is the organization of the network installed to transmit the artifact and its technique; not the physical facts of distance and extent of space (Gottmann, 1990:194).

Yet, as Gottmann (1977) himself has long recognized in relation to the telegraph and the telephone, that telecommunications technologies can promote centralization (e.g. of control functions of corporations) as well as the decentralization of manufacturing and distribution activities. A question of Gottmann's is apt here: "Will telecommunications lead to a 'renaissance' of the contemporary city or do they signal the 'dissolution' of the city?" (Gottmann, 1990:192). Certainly, the telecommunications revolution will bring great impacts, but this should not be seen in terms of the inevitable 'death' of the city. Rather, we should be attentive to ways in which telecommunications are bound up with the ongoing reconstruction of the city. The aim of this paper is to consider city-telecommunications interrelationships through the case of Bandung, Indonesia. This follows a more detailed review of the theoretical literature.

Centralization versus Decentralization

In all utopian visions, the decentralization impacts of communications technology are regarded as unproblematic and self evident (Gillespie, 1992:67).

A common assumption in futurist and utopian writings on cities and telecommunications is that the basic time and space transcending nature of electronic spaces means that we are moving to a world where all information will be available at all times and places to all people. The interactive, integrated and ubiquitous optic fiber network, namely the Internet, is seen as the technological key, with its apparently limitless capacity for mediating entertainment, work, culture, administration, health, education and social interaction. As a result, geography, propinquity and spatial dynamics either cease to matter at all, or have a much-reduced significance. This "anything, anytime, anywhere" dream and the presumption that it will mean the collapse of modern city is central to many futurist visions.

At the most extreme, futurist commentators have seen telecommunications as a tool for engineering the large, industrial city out of existence through radical decentralization and the assumption that social transformation would stem from "wired city" projects. Such approaches often hold up "the image of American suburbia as the ideal human environment" (Garnham, 1994:43).

Will this really happen to the future of the city? Are we already moving into the “post-city age” famously described by Melvin Webber? In declaring that by the 1960s, “society had reached the post-city age,” he looked forward to a day when

for the first time in history, it might be possible to locate on a mountain top and to maintain intimate, real-time and realistic contact with business or other associates. All persons tapped into the global communications net would have ties approximating those used today in a given metropolitan region (Webber, 1968:1091-1110).

Similarly, will urban futures be like Anthony Pascal’s (1987:602) prediction that “with the passage of time [will come] spatial regularity, the urban system converges on, even if it never quite attains, complete areal uniformity”?

Graham and Marvin (1996) identify two key aspects of the transition to a new form of decentralized and dispersed pattern of activities. The first aspect focuses on the “on-line” integration of telecommunications with a range of personal services. The development of *teleservices* delivered electronically into the home – such as retailing, shopping, information, entertainment and banking services – could eliminate the need for physical presence. Instead of travelling to services, the customer-producer relationship is mediated through electronic flows such that there is no need for physical proximity with service providers.

The second aspect is the development of *teleworking* which could shift substantial areas of production from centralized specialist buildings back into the home, which could theoretically be located anywhere. Others have argued that as telecommunication advancements make communication at a distance easier and more affordable, they are likely to encourage people to live further away from their jobs or other places they visit frequently. According to Tarikh A. Fathy, for example,

Improvement in accessibility of activities encourages dispersion of both homes and activities. Telecommunications are speeding this process of decentralization for jobs and services. Thus city centres are no longer favoured over other places (Fathy, 1991:44).

Consequently, cities will not necessarily be the only centres of economic activity as they are challenged by rural areas that are able to attract 'footloose' information services.

Besides utopian/futurist visions, there is an alternative theoretical view from dystopian and critical perspectives. These do accept that by "collapsing the relative distance between locations, albeit unequally and differentially, communication technologies are necessarily implicated in the establishment of new spatial interrelationship and new forms of spatial organizations" (Gillespie, 1992:66). However, they also argue that "it does not necessarily follow that the compact city has been made obsolete and the settlement will disperse throughout the countryside" (Gottmann, 1990:194). According to this perspective, it cannot be assumed that telecommunications will result in a simple one-dimensional decentralizing effect on urban form. Instead, the broader spatial effects will depend on the specific context and processes in which telecommunications are utilized.

There may be decentralization in some aspects, but basically transactional activities are not likely to be scattered throughout rural territory just because technology is becoming able to overcome distance (ibid.:198).

The information services are fast becoming an essential component, indeed the cornerstone, of transactional decision making and of urban centrality (ibid.:197).

Telecommunications, then, are not simply able to compress space and time constraints evenly in every location. Geography is no less important, not least because telecommunications are unevenly developed and physical transportation is still extremely important for the distribution of people, goods and services. There is still friction in spatial and temporal terms, which places important limits on levels of decentralization and dispersal away from the city.

Understanding the City through the Development of Telecommunications Technology

I now turn to how we might understand the city through the development of telecommunications technology. Focusing on the case

of Bandung, a city in Java, Indonesia, this chapter will show the close relationship between the development of telecommunications technology and the development of the city. While the development of telecommunications has often been seen as threatening the very need for, or existence of the city, in this chapter we can see how the development of telecommunications has played a role in the transformation (not the death) of Bandung.

There are two main reasons for highlighting the case of Bandung in the debate on telecommunications and the city. First, contrary to the predictions of some futurists (alluded to above), from an analysis of Bandung we can clearly see that the development of telecommunications has not spelled the end of the city. Rather, it actually seems to have made the city– or certain parts of the city– more important, as the process of expansion of the city and the centrifugal and centripetal forces between centre and periphery continue. In this case study, we can see both centralization and decentralization processes working in the development of the city through the development of telecommunications.

Second, much of the current interest in cities and ICTs is concerned with cities as “nodes” in larger (often transnational or global) networks (Castells, 1996). This is very interesting and important, but often serves to deflect attention from impacts on the spatial development of individual cities. Seeking to address this lacuna, this chapter, using the case of Bandung, considers the way in which telecommunications have impacted upon the spatial development/urban geography of a specific city. The aim is not to provide a general model for telecommunications and Southeast Asian cities, but to attend to the uniqueness of Bandung as a case study example.

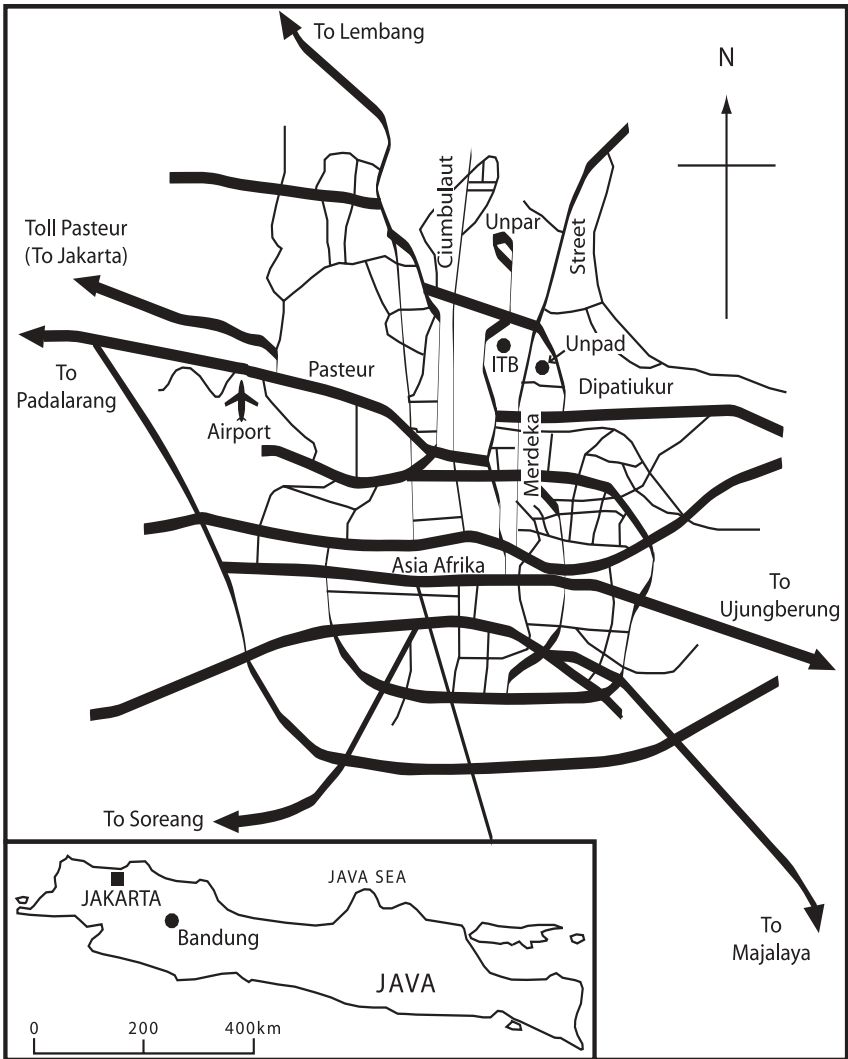
The Case of Bandung: From Walking City to Telecommunications City

Bandung is the fourth largest city in Indonesia and the capital of the Province of West Java (see Figure 4.1). The city is located 200 kilometers from Jakarta, the capital of Indonesia. Bandung is considered here to be a suitable example for understanding the relationship between telecommunications and urban physical forms. Bandung is both an acknowledged educational centre of excellence

and a focus for science and technology in Indonesia. The city has even been termed the future “Indonesian Silicon Valley” with a planning project named “Bandung High-Tech Valley”.

Looking back to the past, we can identify some major reasons that made Bandung a technological city and a telecommunication city. It was not a coincidence that Bandung became the first city to obtain telegraph and telephone connections after Jakarta. Bandung is: the city where the first radio station in Indonesia was built (Malabar mountain); the city where the Post-Department, Telegraphy and Telephony (PTT) central was built (now this is split into *PT. Pos*¹ and *PT. Telkom*², both of which are located in Bandung); and the place where *Technische Hoogeschool te Bandung* (TH, now Bandung Institute of Technology or ‘ITB’) was built and remains a centre of technology until today. Meanwhile the relatively new school of telecommunications, *STT Telkom* (a higher education institution in telecommunication technology owned by Telecom Indonesia) is also located in Bandung. Government policy and the city’s geographical closeness to the centre of national state power (Jakarta), are two further reasons that explain Bandung’s emergence as a technological city.

Figure 4.1: The City of Bandung, West Java



Technology and society are intertwining with implications for the shaping of cities. With new technology there are more chances to steer the shape of a city, consciously or otherwise. This is clearly the case in Bandung that has a huge number of technologists and is identified as a trendsetter of technology. These forces construct

Bandung as a unique city with a particular physical form resulting from technological and social forces.

The next section will describe how the city and telecommunications have been developed synergistically with results that can be traced in the physical urban forms of Bandung. This part of the paper will consider historical forces of telecommunications and their physical impact on city form, starting with a review of the role of the telephone in the development of the city, followed by the role of more advanced telecommunications technology such as mobile and internet.

The Fixed Telephone Era

We can examine the linkages between urban form and telecommunications by historically reviewing the role of the fixed telephone in the development of the city, though many utopian and futurist accounts of the impact of telematics on the contemporary city tend to neglect the role of the telephone in urban development.

The Pre-telephone Era

Cities developed, at least in part, to make communication easier. Just like the early industrial city of the mid-1800s, until the early 1900s communications in Bandung were dependent on the physical movement of people, goods, and services. In this pre-telephone and pre-electricity era, movement was either by foot or horse and all activities required close physical proximity to reduce travel to manageable levels. Consequently, Bandung might be understood, at this time, as a 'walking city', with a spatial limit of three to six kilometers and perhaps double this by horse or bicycle. The concentration of activities in one area helped to generate agglomeration economies in which close physical proximity allowed markets to develop, workers to reach employment and the coordination of urban governance. The necessity of face-to-face communication meant that, in spatial terms, the walking city was densely settled with an intermingling of businesses, residences and factories.

Plantation Networks (Agricultural City), Centralized Business and Segregation of Residential Areas

The development of new-networked technologies including electricity, transit systems, and the telephone, helped to overcome some of the physical limits to the size of the walking city.

Unlike the installment of telegraphy, which was started from the centre of Bandung city, the telephone network was initially installed in the *kabupaten*³ of Bandung. The first telephone company in Bandung, the Preanger *Telefoon Mij.*, was established in 1895 by K.A.R Bosscha, a well-known tea plantation owner in Lembang at the northern edge of Bandung (refer to Figure 4.1). This had 157 subscribers, most of whom were from plantations in the Preanger region and who thus appreciated being able to keep up with events in Bandung or, during their weekend stays in the city, being able to keep track of what was happening on the plantations (Kunto, 1990). This had implications on how the physical structure of the city was developed. Before the advent of telephone, Preanger plantations' landlords needed to locate close to their business contacts. They lived in the plantations and set up their businesses there.

Some people in the core of the city conducted business just in that area. To be able to do business in the city, someone from another area had to endure a relatively long journey. They spent two or more days in hotels in the central area and did business by walking up and down the blocks of their trade centre from their hotels/motels and dropping into one of the places where they might buy or sell. For lunch or coffee, they might have stopped at a restaurant or tavern where their colleagues congregated. Regarding the restaurants, it has been said that before the end of the 2nd World War, Bandung had the highest number of restaurants in the world (Kunto, 1984).

Once the telephone was available, some plantation business could actually be done without moving from the plantations. But the use of the telephone did not, of course, entirely eradicate the need for face-to-face communication. The telephone increased acquaintances and, in turn, the inquisitiveness to meet face to face. The difference was that these meetings could be at a time of convenience in an appropriate place. This meant that those landlords of plantations around Bandung city even travelled more frequently to the city centre. They commuted from plantations to the centre of

the city to do business deals and transactions. Significantly, with the emergence of the telephone, the business community of each landlord was expanded, from the basis of the location, to that of the telephone network.

Alongside this private network for subscribers, the Post and Telegraph services (PT) also developed its own telephone network for administrative purposes. This telephone network was largely seen as an “extension of the telegraph” (Hovig, 1929:24) which, however, was much less expensive to install and also much easier to use (as it did not require knowledge of Morse code). Initially, therefore, the PT used the telephone merely to supplement the telegraph services in small towns where the building of a telegraph office would have been too expensive (*ibid.*). The network grew to a point where, by the beginning of the century, all the districts within the *kabupaten* of Bandung had a switchboard of at least 15 lines, and all could be reached from the municipality (Kunto, 1990:4). The PT referred to these offices not as telephone offices, but as “telegraph branch-offices”, and telephone operators were trained in writing down “spoken telegrams” (Hovig, 1929:125).

This telephone network later grew, becoming the network for domestic use in high-class residential areas, with first priority being given to the Dutch and second to the “*ningrat*”⁴ class. The later development of the telephone network finally covered all of Bandung, including plantation areas, but the lowest social income groups remain unconnected today. The level of social class largely determined the level of access to the telephone. This had implications for the organization of urban spaces, where people from the high-level social/economic class increasingly moved to land with telephone access (clusters of high-class people). The segregation of residential areas was thus created and consolidated.

These above paragraphs graphically describe how the telephone underpinned important changes in the physical structure of the city. In the initial phases, the new networks facilitated the further development of increases in the concentration of activities, both in the centre of the city and the plantation area at the edge of the city.

Decentralization of Manufacturing Centres and Residential Areas: The Industrial City

Later development of telephony brought tremendous changes in urban physical form. The explosive growth of textile and garment factories in Padalarang, Batujajar, Cimahi (West side of Bandung), Dayeuhkolot, Banjaran and Majalaya (South side of Bandung), were good examples that showed that business no longer had to rely on close physical proximity between headquarters and manufacturing to coordinate production and distribution processes. Instead, manufacturing processes could be located outside the city, using the telephone to maintain close contact with centrally located headquarters which, from the late 1970s, were increasingly being located in capital cities and regional centres. New urban patterns were created as new transport and telephone networks overcame the constraints of travel time and distance. The development of downtown areas started to change to what is now very familiar mosaic of land uses. de Sola Pool states that,

instead of an urban pattern of a checkerboard of different specialized neighbourhoods, the new urban pattern entailed a large downtown containing miscellany of commercial and marketing activities that needed to be accessible to a variety of clients and customers, ...for more convenient shopping and services... (1982:452).

The dispersal of manufacturing centres was also followed by the spread of residential areas. The new transport and telephone networks increased access to the rural areas, making them effectively part of the city. The emergence of manufacturing centres in the South and West edges of Bandung had drawn investors to put their money in building residential areas over there. To balance the growth of population at both edges, the more prestigious area (previously occupied by Dutch people such as TH professors, plantations' landlords), the residential area north of Bandung, was expanded to the forest area (e.g. the emergence of housing estates in Dago Pakar, Cihideung, and Lembang). Those inhabitants whose lands were removed were displaced to more remote areas. Besides enlarging the social boundary of the city, they also created longer commuting lines between the city centre (business district) and their homes. Bandung had entered the 'manufacturing era'.

Until today, the main clusters of manufacturing centres are still located in the South and West sides of Bandung, driving the growth of residential clusters around them. In the last decade (up to 1997, before the economic crisis) many new housing estates emerged in and around Bandung in dispersed locations, often far from the city centre. From year to year, land-use in the city centre has gradually changed from residential use to commercial use. Main streets in the centre of the city, such as Asia Afrika, Merdeka, Braga, and Cihampelas have become business and commercial centres.

Wartel⁵: A New Trend of Business – Turning a House into a Small Business Office

With the decrease of telephone-installment prices and the government policy to socialize telephone telecommunication technology, the telephone finally extended beyond luxurious households. Telephone subscription numbers have been increasing rapidly since the 1990s. In 1980, there were approximately half a million subscribers a figure that more than doubled to over a million by 1990. By the end of 1998, subscription rates in Indonesia had jumped to around 6.5 million, though this still represents only around 3 percent of the total national population.

Lack of access for the poor brought about the idea to apply telecommunications technology to existing urban settings, such as the *warung* (shop) and *kios* (kiosk). Unlike the public phone (coin box, card and smart-card) which provides only telephone access, the idea for *wartel* and *kiostel*⁶ was to put public telecommunication devices in much wider areas to provide access not only to the telephone (long-distance calls and international calls) but also electronic telegraph and tele-fax.

Wartel was much more popular than *kiostel*, perhaps because *wartel*, which has more space if compared with *kiostel*, is more convenient for someone making calls. At the end of 1996, there was a boom in wartel business, mainly in West Java, and particularly in Bandung. Many houses were suddenly turned into *wartel*. *Wartel* were often installed in educational areas or shared between two or more universities, as in Dipatiukur street which is located between ITB and Unpad, and also in residential areas neglected from the Telecom telephone installation network (middle to poor class). With

such movement, residential areas near campuses were either turned into clusters of *wartel* or used their front yard for *kiostel*. The number of *wartel* was growing tremendously in the 1990s. In 1992 the density of *wartel* was 2.58 per 100 citizens (Data Consult, 1998), and increasing gradually until 1997 before *warnet* slowly crept in to take over some of *wartel*'s functions.

From the story about *wartel* we can see how telecommunication had shifted the land-use from residential use to commercial use, and how telecommunication had concentrated the commercial telecentres on particular areas. The development of fixed telephones ushered in the telecommunications era, making Bandung a "telecommunications city".

The Mobile Era

The mobile telephone system was actually introduced in Indonesia from as early as 1977. This first mobile was a non-cellular system and because it had some deficiencies it was abandoned in 1993 (Data Consult, 1998). In the early years of mobile telephony the number of subscribers grew sluggishly. In 1993 there were only 32,792 cellular mobile subscribers in Indonesia, compared with 226,000 in Malaysia in the same year. After the government abolished the luxury import duty on handsets and issued a deregulation allowing foreign investors to operate in the telecommunication sector, the market has been opened widely (*ibid.*). In 1994, the market was struck first by the new cellular mobile telephone operator, PT. Telkomsel. This was followed in 1995 by PT. Satelindo and then by Excelcomindo Pratama. Taken together, the GSM system attracted many subscribers pushing up the total number of mobile telephones to 193,000 in 1995 and to 593,000 in 1996 (*ibid.*). Between 1992 and 1996, the capacity of cellular mobile systems rose sharply averaging 101.4 percent a year. The highest annual growth was 226.37 percent recorded in 1995 (*ibid.*). With the birth of pre-paid systems (Simpati, Mentari, and Pro-XL), it is possible that the annual growth in 2000 would reach 300-400 percent. What does this mean for the structure and form of the city, particularly Bandung?

Since Bandung is generally second to Jakarta in most technological trends (sometimes even outpacing the national capital), Bandung is one among five major cities (the other three being

Surabaya, Medan, and Denpasar-Bali) that have experienced an explosion of cellular mobile telephone use. The mark as 'tech trendsetter' made citizens anxious to follow the rhythm of technology. The population of cellular mobile telephone subscribers grew. The mobile telephone came on stream and changes emerged. Considering the potential for portable mobile phones to always be in line with movement of physical body, this technology has separated the body from place. An office with a telephone is not necessary anymore to do business. Some used mobile technology to open their businesses without renting or buying office-rooms. Typically, a business-card, with mobile number has been enough to get started. The ability of mobile-phones to get connected anywhere make an instant appointment possible, though still, of course, limited by the operators' coverage area. New temporary sub-business and sub-community centres were emerging everywhere.

Property investors have also been quick to benefit from this technology, opening new housing estates without telephone connections, and selling them at relatively high prices by ensuring that the residential areas they provided were still in cellular operator's coverage area. Cellular mobile phone technology has thus extended the social and physical boundary of the city even and also created emerging temporary sub-centres.

The Internet Era

Like its Southeast Asian neighbours, the Indonesian government had embraced the information superhighway as part of its development dream by the early 1990s. The National Research Council formed the embryo of the Internet in 1986 and this was crystallized into the design for the information network, IPTEKnet. Universities had been involved in experiments with Internet links since the mid-1980s, pioneered mainly by the Bandung Institute of Technology (ITB). ITB, Surabaya Institute of Technology (ITS), Gajah Mada University (UGM), and University of Indonesia (UI) had collaborated from as early as 1986 in the establishment of an inter-university network, UniNet. By the end of the decade, hardware problems and the high cost of the required long-distance telephone connection stalled the project. In April 1993, the IPTEKNet Planning Committee commenced trials of a Micro-IPTEKnet prototype, involving six government agencies. Several major universities and research

institutes around the country joined IPTEKnet, which began offering global internet access in June 1994. It remains the major non-commercial Internet provider for research and academic work.

Since ITB was a pioneer in developing Internet technology, from its connection with IPTEKnet, ITB has expanded its own technology and started to build an Internet community. Initially, this was based on modem to modem connection, then Radio Internet (Radio Package Network), and finally its own ISP supported by a Japanese satellite corporation. ITB then became the centre of the Internet that provided Internet access for many universities and education centres. ITB has also been involved in extending the Internet to the public. Some ITB alumni then built commercial Internet Service Providers, and formed part of companies trying to push the Internet for corporate use.

The growth of the Internet in Indonesia has been relatively fast, especially when commercial ISPs have been established. Geographically, in 1996 the largest concentration of users was in Jakarta, where commercial ISPs dominate, followed by Bandung, where universities (primarily ITB) provide the service. Although the AC Nielsen Netwatch survey in 1999, conducted in 16 countries and covering almost 150,000 respondents found that the Indonesian Net user rate was just 1.2 percent – meaning that only 12 in every 1000 Indonesians were regular users of Internet – and the latest survey in the Jakarta Post (March 2000) said that now the rate is 2 percent, fieldwork suggests that these may be considerable underestimates. While the conventional statistics come from recorded net users who are registered in commercial ISPs and universities/corporate providers, other surveys have suggested that one computer is used by approximately three users. In addition, students and teenagers who use the Internet from *warnet* are not necessarily commercial ISP subscribers.

If we look at Net-activities in Bandung, there is no doubt that Bandung Internet user rates must be higher than 2 percent. There are more than 100 *warnet* in Bandung each with 25-40 users per day (some have 50-70, even 100 a day). Therefore, the total Internet users per day who get access through *warnet* would be no less than 4,000. That number is not including ones that have a formal account from commercial ISP's, universities, and companies. The number of Net users is growing fast each day and it has greatly impacted on the city.

Warnet⁷: New Community Centre

Access to communities, goods, services and information, to say nothing of employment or government and ways of communicating, is increasingly dependent on one's ability to use information technology and the Internet. But how are people expected to learn about and access such technology? Optimistic commentators assume that it is only a matter of time before everyone will have access to the Internet from their own home, possibly via a "set-top box" on their television. Such devices are expected to be sufficiently "user friendly" so as to present few learning problems for the majority of the population. However, there are reasons for doubting whether such a scenario is plausible in the short or even medium term. Universal infrastructure provision looks unlikely in rural areas or on inner city estates. Meanwhile the cost of computers, modems, and links to Internet Service Providers remains a substantial investment for many. The charged local calls and lack of access to telephone connection are also fundamental barriers. The effective use of technology also requires appropriate skills, know-how and information services in addition to access itself. Nonetheless, the willingness to communicate has been increasing continually. While many of the public spaces in the city have disappeared, the Net seems to be a genuinely interesting place to get together and build new communities.

The spirit of the Bandung people to get connected to/through the net is really high, especially for the, "young telecom generation", some of whom are not among the lucky ones with personal access at home. This spirit is welcomed by the birth of small internet cafès, or *warnet* (see Figures 4.2 and 4.3). Following its big brother, *wartel*, the idea of creating *warnet* was originally to socialize Internet technology, and especially for research and educational purposes. Later in the development of *warnet*, it became "a third place" to "jump" into virtual communities.

Figure 4.2 The Face of a *warnet*



Figure 4.3 The Inside of a *warnet*



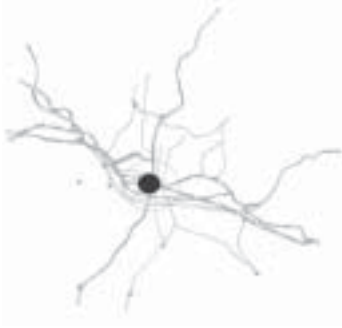
Warnet are growing fast in Bandung. Everyone who deals with *warnet*-business would know that the busiest *warnet* in Indonesia are found in Bandung. *Warnet* in Bandung are mostly placed near educational centres (campuses, computer training centres, language courses, etc.). Others are also placed in or near commercial and business centres, malls, office buildings, and banks. With the birth of *warnet*, the role of *wartel* appears redundant. The most radical example is Dipatiukur street. In this street, almost all *wartel* have been turned into *warnet*. Some are trying to mix the functions as *wartelnet*. Yet, in that short street, we can find more than ten *warnet* on one side alone.

Increasingly, teenagers in Bandung, university students, high school students, and even primary school students, have been spending their spare time, not playing football or walking around city parks (no longer available in Bandung), but either going to *warnet* (emailing, surfing, and chatting) or using play stations (playing computer games) at home. Most *warnet* managers in Bandung say that they do not worry about customers, because almost all *warnet* are busy, especially in the afternoon, after schools close. Most of *warnet*'s users go there for online chatting. Managers said that 70 percent of customers use the Net for chatting and emailing, 20 percent for business, and 10 percent for other activities (e.g. research and education). From this research, we can see that *warnet* has become the third most frequented place after home and work/school. *Warnet* has taken over the role of the public spaces and acts as a place for the community. This means that *warnets* are effectively new community centres in the city, physical manifestations that embody the virtual communities inside. So, has the birth of Internet opened possibilities for Bandung to become a "telematic metropolis"?

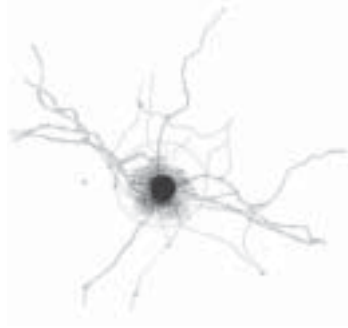
Reviewing historical development: Where to go?

From the historical stories above, we can see how telecommunications have been bound up in the transformation of city form and structure. Figure 4.4 shows how Bandung has been transformed from one form to another. From the "walking city" of the early 1900's, Bandung then became a "centralized city" with the use of new transportation modes. When the fixed telephone was introduced, Bandung had entered a new phase, becoming a city with a plantation network and the development of agricultural centres ("Agricultural city"). Later on, with more advanced uses of telephone, Bandung became an industrial city and then later a telecommunications city with the growth of telephone users (by *wartel*). Internet with *warnet* brings us to the contemporary development of Bandung's urban forms. Bandung is becoming a telecommunications city, a telematic city and, at the same time, the size of the city keeps expanding. It seems inevitable that Bandung will become a "telematic metropolis" in the not too distant future. What does this imply?

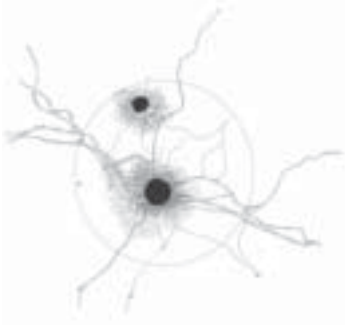
Figure 4.4: Telecommunications and the Spatial Transformation of Bandung



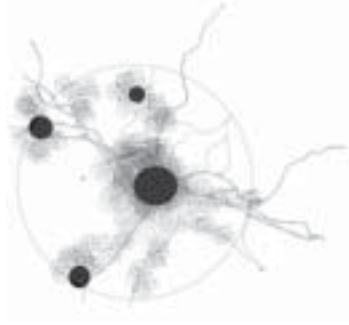
Walking City



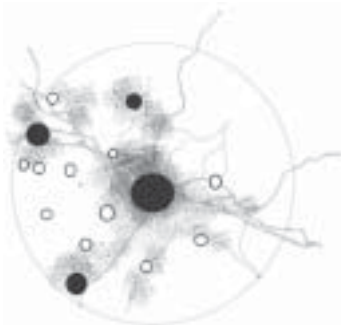
**Centralized City
(City with Transportation)**






Agricultural City



**Industrial City
(Growth of Manufacturing Centres)**



**Telecommunication City
(Growth of Telecommunication Centres)**

-  Business/Commercial centres
-  Residential areas
-  Sub-centres

Note: The growth of plantations, manufacturing centres, and telecommunication centres, were followed by the growth of residential areas.

Speculations on changing urban form in Bandung

Referring to the theories of centralization and decentralization, and looking back to the historical development of telecommunications and the city in the case of Bandung, it is possible to make some speculations with regard to impacts on services production, goods production and social interaction. Each of these is considered in turn.

Services production

This area seems to be the perfect one to be decentralized through telecommunications and linked computer networks. But the potential for the decentralization of activities will depend on the ability to control and manage work in the absence of physical surveillance.

For Bandung, some services which relate to the computer and the Net or, services not much related to social/cultural and trust considerations – computer programming, web-designing, CAD-drafting, accounting, etc.— may be “taken home” without any need for physical business interaction. Some of these services are already running from homes and the work is exchanged electronically. However, for those services involving creativity, legal, social, and cultural aspects, Bandung is still far away from a decentralized position. In these cases, creative energy spawned by electronic interactions could not be equal to that through tacit, personal contact.

This duality may be exemplified in the realm of educational services. On the one hand, the “virtual only” ITB seems unlikely since universities, as educational services, cannot entirely dispense

with contact to “real” physical bodies. On the other hand, however, the idea of “distance learning” is starting to be accepted by society, such that distant students will be drawn to the university by this programme. In other words, for educational services, there will be simultaneous centralization and decentralization. The students of a distance learning programme will be decentralized, they will learn online from home/office, but the university staff will continue to live and work in a centralized area near to campus, with all of those tele-mediated facilities to conduct both real and virtual classes.

Some more services functions, such as recreation areas, special face-to-face delivery activities, hospitals, and high level corporate decisions cannot be transferred into flows. They will still be centralized.

Goods production

In producing goods, manufacturing requires workers physical presence. The type of manufacturing existing in Bandung consists mostly of garments and textiles, mass-produced and run by automated machines. Although automation is increasing, physical presence is still needed to control automated machines. In contrast, for small-scale industries, it seems possible to run the telecommuting idea. Where production is not about “creating” but “duplicating”, and not using heavy machinery (which has to be located in a factory) – an example being shoe production in Cibaduyut or small-scale bakeries – it would be possible to take the work home and get back to the office when all is done. After all, to deliver, exchange, and distribute goods, we still need physical transport, because tangible goods cannot be delivered electronically.

Social interaction

With the fact that “chatting activity” has dominated the use of the Net in *warnet* (and possibly in office/home after working hours), we can see that there is a significant shift from face-to-face interaction to electronically-mediated textual interaction. Has “virtual community” simply taken over the role of “real community”? Have geographical boundaries disappeared with this deterritorialized social interaction? Looking at rooms in Internet Relay Chat (IRC),⁸ we

would find out that Bandung Net-users have some channels, which have been among channels with highest number of inhabitants in the world. *#bawel Dalnet*,⁹ at the peak hours, can have more than 2,000 chatters simultaneously online (Channel Peak Information, 2000). Here we see that geographical boundaries still matter even in cyberspace. The possibility to meet “in the flesh” has boosted the willingness to join a virtual community that is still limited by “physical boundaries”. People want to be “real” in unreal space. By jumping into *#bandung*, *#bawel*, or other # (channels) created by Bandung real community, people feel the sense of reality in such virtual environment. In some way, we can see that “on-line chatting” is used to expand the chances to meet other people. Minimal time constraint and zero space constraint have allowed people to meet “more than one person” at the same time. This is the “beauty” of chatting, and this is the main reason for *warnet* users chatting in *warnet* for hours.

To accommodate the eagerness to maintain social interaction, which barely decreases in this more hectic life, Internet (“chatting”) gives the lost opportunity back. But then, people still also need friendly physical spaces, such as *warnet*, (the intimate term “*warung*”, makes *warnet* more friendly), to manifest the spiritual need to interact socially. We may suggest that this makes the future of *warnet* even brighter and perhaps a more developed community centre, based on advanced technology, can follow in the footsteps of *warnet*. In the near future, sub-centres that function as community centres are likely to be dispersed tremendously, and cover all urban and rural areas of Bandung.

Conclusion: Decentralization and re-centralization of urban forms

What is the urban future of Bandung? There are obviously no simple answers to this question, but following the historical line enables a clearer view on how goods production, services production, and social interaction would be in the future. Certainly, I would argue that it would be dangerous to assume that the direction of future trends is simply one-directional, towards either decentralization or re-centralization of Bandung. The relationship between telecommunications and the physical form of the city is much more

complex than the futurist/utopian vision of the dissolution/decentralization of the city. The city and telecommunications interact in many ways: reinforcing the centrality of the city, facilitating the decentralization of some particular activities, shifting some physical flows into electronic flows, and mediated access to physical space, thus removing the barriers to further urban growth (Graham and Marvin, 1996).

The city centre (e.g. Asia Afrika and Merdeka Streets) will still exist as a centre of business and commercial activities. Urban centrality is still important for some high-level managerial functions that cannot be transferred electronically into flows. These also include some other activities mentioned in part two, such as education institutions (e.g. ITB, Unpad, Unpar, etc.), recreation areas, hospitals, traditional trading, and high-level corporate decision making functions. Sub-centres that provide access to more community groups like *warnet* (and perhaps small-medium-large telecentres someday) will be merging everywhere in the city, and sometimes will be concentrated at education centres and commercial centres (e.g. Dago, Dipatiukur, Ciumbuleuit, Pasteur Streets). Teleworking is possible and this is likely to be focused around the centres for jobs in the city core or Jakarta and other cities. Some teleworking may take off in remote rural centres, and possibly in and around cheap housing-estates, such as the ones in Soreang/Ujungberung. Considering the existence of plantations and manufacturing/industrial centres at almost all edges of Bandung, there is likely to be continued decentralization. The extended Bandung region will see the location of back offices and teleservice centres. With developments in advanced technology, it seems that Bandung will expand its boundary such that, in the near future, places farther than Lembang, Padalarang, and Majalaya will be part of the urban areas of Bandung.

Decentralization and re-centralization processes will continuously restructure the urban physical form of Bandung with the support of telecommunications technology while, at the same time, new sub-centres, some temporary, others more fixed, will emerge. Bandung is not likely to be a purely informational city in the near future. Urban dissolution through widespread telecommuting is not likely in the short to medium term. At the same time, Bandung is clearly not neglecting the use of information and advanced telecommunications technology. Telematic technologies will continue to be bound up with the physical

development of the city. This technology becomes the heart of the life of the city. Rather than speaking of the “death of the city” through the processes of decentralization and re-centralization, Bandung is expanding to become a metropolis networked through telematic technologies. These processes create a complex sketch of different types of spaces: physical and electronic spaces, some real and others crystallized electronically.

NOTES

- ¹ Post Indonesia, state owned company which is in charge in operating postal service in Indonesia. The central office is located in Jl. Banda, Bandung.
- ² Telecom Indonesia, state owned company, an operator of basic telecommunication services in Indonesia. The central office is located in Jl. Japati 1, Bandung.
- ³ Regency, area headed by a *bupati* ('government officer'). Here *kabupaten* refers to the fringe areas surrounding the core of the city.
- ⁴ Noble, aristocrat. Used, particularly in Java, for those born into historical ruling families.
- ⁵ *Wartel* is an abbreviation of *warung telekomunikasi* ('telecommunication shop'). *Warung* is a term for a very small shop or a small café/restaurant, where people can buy either goods or foods. In particular, *warung*, especially ones that sell foods, are places where people can get together for a while to eat, relax and chat. Most of *warung's* customers, know each other well and together they form kind of community. As for *wartel*, they do not sell anything, but provide telecommunications services for the public (fax and telephone).
- ⁶ *Kiostel* is an abbreviation of *kios telekomunikasi* ('telecommunication kiosk').
- ⁷ *Warnet* is an abbreviation of *warung internet*, often translated as Cyber-Café or Internet-café, though neither of them are appropriate. Unlike Cyber-Café, a term used for private businesses providing computer and Internet access on a commercial basis alongside café or restaurant provisions, *warnet* is not part of a café or restaurant, but is simply a small space which provides few computers for public Internet access. (Notes: Some Internet-cafés (in Jakarta) are situated in malls as part of cafés or restaurants, and are known as either 'Cyber-Cafés' or 'Internet-Cafés', rather than *warnet*).
- ⁸ On IRC, several persons can simultaneously participate in a real time or live discussion over a particular channel, or even multiple channels. There is no restriction to the number of people who can participate in a given discussion, or the number of channels that can be formed over IRC. The list of available channels is not static but changes from minute to minute as new channels are

created and old ones abandoned. Channel creation is as simple as typing 'join #channelname'.

- ⁹ *Bawel* can be translated as 'talkative' or 'talking too much'. *Dalnet* is one of the IRC servers that provide space to create a chat-room.

REFERENCES

- Castells, Manuel 1996 *The Rise of the Network Society*. Malden & Oxford: Blackwell Publishers Ltd.
- Channel Peak Information. 1997 <http://www.geocities.com/dalnetbawel/peak.html>.
- Data Consult, Inc. 1998 Market Intelligence Report: Cellular Mobile Telephone in Indonesia and Characteristics of Customer in 10 Major Cities. Bandung: Data Consult.
- de Sola Pool, Ithiel 1982 "Communication Technology and Land Use" in Larry S. Bourne (ed.), *Internal Structure of the City*. Oxford: Oxford University Press, p. 450-458.
- Ellin, Nan 1996 *Postmodern Urbanism*. Cambridge & Oxford: Blackwell Publishers Ltd.
- Fathy, Tarikh A. 1991 *Telecity: Information Technology and its Impact on City Form*. London: Praeger.
- Garnham, Nicholas 1994 "Whatever Happened to Information Society?". In Robin Mansell (ed.),—*Management of Information and Communication Technologies*. London: Aslib, pp. 42-51.
- Gillespie, Andy 1992 "Communication Technologies and the Future of the City". In Michael Breheny (ed.), *Sustainable Development and Urban Form*. London: Pion, pp. 67-77.
- Garnham, Nicholas 1994 "Whatever Happened to Information Society?". In Robin Mansell (ed.), *The Management of Information and Communication Technologies: Emerging Patterns of Control*. London: Aslib, pp. 42-51.
- Gottmann, Jean 1990 *Since Megalopolis: The Urban Writings of Jean Gottmann*. Baltimore: John Hopkins University Press.
- Gottmann, Jean 1997 "Megalopolis an Antipolis: The Telephone and the Structure of the City". In Ithia de Sola Pool (ed.) *The Social Impact of the Telephone*. Mass: MIT Press.
- Gottman, Jean 1982 "Urban Settlements and Telecommunications". *Ekistics* 302:411-416. Sept/Oct.
- Graham, Stephen and Simon Marvin 1996 *Telecommunications and the City: Electronic Spaces, Urban Places*. London: Routledge.
- Hovig, Pieter 1929 "Post-Department, Telegraphy, and Telephony". *De Koloniale Roeping van Nederland (Holland's Colonial Call)*. The Hague: Dutch-British Publishing Company.

- Kunto, Haryoto 1984 *Wajah Bandoeng Tempo Doeloe*. Bandung: PT. Granesia.
- Kunto, Haryoto 1990 *Hallo Dewan Pelanggan PT. Telkom*. Unpublished paper.
- Lyon, David 1988 *The Political Economy of the Information Society*. Cambridge: Polity Press.
- Pascal, Anthony. 1987 "The Vanishing City". *Urban Studies*, 24:597-603.
- SCoT Research Group 1999 *The Social Construction of Technology in the Indonesian Context*. Interim Report, July, nr. 95-CS-03.
- Webber, Melvin 1968 "The Post-City Age". *Daedalus*, 97:1091-1110.