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Title: From RangKom and JARING to the Internet: visions and practices of electronic networking in Malaysia, 1983-1996.

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Abstract

Early electronic networks were established for a variety of purposes, to serve different kinds of people and needs, and in vastly different political, social, and economic contexts. Examining some of the earliest electronic networks established in Southeast Asia provides us with a glimpse of the contrasting and diverse aims for which they were established and used. At the time electronic networking began to be developed in Malaysia (during the 1980s) its potential was far more open-ended. Although networking pioneers in Southeast Asia were influenced by North American experiences, they quickly developed their own ideas about what networks could be, could do, and how they could serve national or local purposes. This essay uses the concept of a “networking imaginary” to conceptualize the ways in which networks became associated with particular ideals, goals, and futures. The pioneers of electronic networking in Malaysia articulated a unique networking imaginary that anticipated networks playing a critical role in Malaysia’s developing economy. Networking, in the vision of its Malaysian founders, would play a key role in propelling Malaysia forward as a wealthy, stable, and harmonious society. These visions continue to impact the ways in which networks are imagined and used in Malaysia today.

Introduction

The World Wide Web is now, by design, a largely homogenous space. A website served from next door can be viewed in much the same as one viewed from half way around the world. But this homogeneity can cause us to forget the remarkable diversity of early electronic networks. This is what Kevin Driscoll and Camille Paloque-Berges (2017) have called the Internet's "inherent plurality." Networks were established for a variety of purposes, to serve different kinds of people and needs, and in vastly different political, social, and economic contexts.

The approach here draws on recent work in the history of technology that explored the development of electronic networking in non-Western contexts. Most notably, this includes Eden Medina's work on "Cybersyn" in Chile (2011), Julien Mailland and Kevin Driscoll's account of Minitel in France (2017), and Benjamin Peters's work on the Soviet Internet (2016). Likewise, Goggin and McClelland's volume (2017) has provided a range of accounts of networking from Poland, Estonia, Israel, and Mexico, as well Japan, Taiwan, South Korea, Papua New Guinea, and the People's Republic of China. Such histories have aimed to show the diversity of political and social visions associated with networking (see also Chon 2021). As well internationalizing histories of the Internet beyond the typical Anglophone narratives, these diverse accounts show how networking has developed "in relation to different cultures of use, which are influenced by language, culture, and geographical location" (p.8). What is more they reveal much about a nation's relationship to and ambitions for science and technology. Sheila Jasanoff and Sang-Hyun Kim (2015) have articulated the concept of "socio-technical imaginaries" as the ways in which "visions of scientific and technological progress carry with them implicit ideas about public purposes, collective futures, and the common good." In other words, imaginaries of what sciences or technologies can do are part of broader political and social visions for making and re-making societies and nations in particular ways. Electronic networks conjure particularly powerful visions – visions of bringing people together or of sharing information or of universal education or of liberation. Such "networking imaginaries" range from the cyberlibertarian visions of Silicon Valley to

the kinds of socialist networked imaginaries of Allende's Chile, to the image of the network as a critical public infrastructure (managed by the post office) in 1980s France.

Examining some of the earliest electronic networks established in Southeast Asia provides us with a glimpse of the contrasting and diverse aims for which they were established and used. In the Indonesian case, Joshua Barker has demonstrated how early networks were developed largely in ways that were oppositional to state power and control. Such "guerrilla" networks were developed "bottom up" and became a site of activism and "liberation" (Barker, 2015; Tremblay, 2018; Hill and Sen, 1997). Much like France, Singapore attempted in the 1980s to develop its own state-led electronic network – known as Teleview – to cautiously guide its citizens into the digital age (Stevens, forthcoming).

The history of networking in Malaysia has received less scholarly attention. This is perhaps because the story appears to be a rather straightforward one, reprising narratives of government-led technological development. The Malaysian case certainly shares much in common with Internet development elsewhere. Many non-Western nations from Brazil (Davis et al. 2017) to Papua New Guinea (Logan and Suwamaru 2017) saw networking as a key technology that would promote and accelerate economic development. However, the specific ways in which networking was imagined to support Malaysia's postcolonial economic and social development remains unique. In particular, I argue here that electronic networking was part of an imaginary for producing a "fully developed" and cohesive society.

Background

Malaysia achieved independence from Great Britain in 1957. In 1963, it absorbed neighbouring the states of Singapore, Sabah, and Sarawak, subsequently expelling Singapore in 1965 to take on its current geographical boundaries. A multi-ethnic and multi-cultural state, Malaysia is comprised of a majority of ethnic Malays (many of whom are practicing Muslims) with substantial minorities of Chinese, Indians, and indigenous peoples. Formally a federal representative democracy, Malaysia was ruled by a coalition of political parties known as the "Barisan Nasional" from

the nation's founding in 1957 until 2018. This led to a relatively high level of political stability that contributed to consistent economic growth from the 1960s to the 1990s (Andaya & Andaya, 2016). Conversely, the ruling party has sought to maintain this growth in order to retain political legitimacy.

This growth has been driven by both Malaysia's natural resources (petroleum products), agriculture (palm oil, rubber), as well as manufacturing (including in high-tech sectors such as integrated circuits, semiconductor devices, computers, and medical and scientific instruments) (Drabble, 2000; US Department of State, 2016). As this suggests, technology has played a particularly important role in Malaysia's economy and society. After a period of import substitution industrialization in the early post-colonial period, by 1969 Malaysia's "New Economic Policy" turned the nation towards export-oriented industrialization. This included processing of raw materials, such as tin and rubber, but also saw the establishment of semiconductor and microelectronics assembly plants owned by foreign multi-nationals (Jomo, 1993). These high-tech firms played a significant role in Malaysia's economic growth in the 1970s and 1980s.

Scholarly literature on networking and the Internet in Malaysia has focused on the Internet's economic impacts on Malaysia as part of its broader development of high-tech and information technology industries (e.g. Salman, 2013) For the most part, such scholarship articulates triumphalist and deterministic narratives that celebrate Malaysia's achievements as part of an inexorable global technological "progress." However, Malaysia's success in developing the Internet and other information infrastructures was by no means inevitable nor did it take a pre-determined path. The specific history of RangKoM and JARING, as described in detail here, have played a central role in setting the parameters for what the Internet is, what it means, and how it is perceived in contemporary Malaysia. Rather than seeing early Malaysian networks as just stepping stones on Malaysia's (or the world's) path towards information-technological development, this history demonstrates how these technologies were developed not for mass communication but for fostering particular socio-economic aims.

The first of these aims was a decolonial one. As Leong (2004) has shown, technology has always played a central role in Malaysia's story of decolonization. Both import substitution and export-oriented industrialization strategies placed manufacturing technologies, in particular, at the centre of Malaysia's economic independence, establishing a "causal relationship between nation and technology" (p. 52). Prime Minister Mahathir Mohamed's "Look East" policy in the early 1980s, further strengthened the connection between Malaysia's technological progress and its independence from the West (Leong 2004, 53). Within this context, despite its western origins, networking was imagined as a further technological tool for fuelling indigenous development and economic growth.

The second aim was to use networks to bring into being a particular form of social cohesion. Cohesion and unity, especially across ethnic and religious lines, had always been a key concern of the postcolonial state (Tarling 2004). Media technologies in Malaysia, particularly television, have long been associated with the aim of creating "national integration efforts in a multi-ethnic society" (quoted in Zaharom 1994, 185). The links between electronic networking and Mahathir's "Vision 2020" (1991) suggests how networking was imagined a tool for further developing a "Bangsa Malaysia," a Malay ethnic national identity.

These elements – decolonialism and social cohesion – form the core of what I call here Malaysia's "networking imaginary," a way of envisioning a future society through the technology of electronic networks. Significantly, they are linked together particularly by an ethnic or racial-nationalist vision of a prosperous Malay nation. Within this imaginary, a unified but Malay-centric society would comprise the basis for the cooperation that was necessary for Malaysia's full economic development.

This vision remains far from reality. As Bunnell (2002) and others have pointed out, information infrastructure in Malaysia (and elsewhere) has not offered benefits to all Malaysians. In practice, the development of networks and connectivity is insufficient and incomplete. My argument here is that the pioneers of electronic networking in Malaysia articulated a unique networking imaginary that saw networks playing a critical role in Malaysia's developing society. Networking, in the vision of its Malaysian founders, would play a key role in propelling Malaysia forward as a

wealthy, stable, and harmonious society. In other words, Malaysia's networking imaginaries were not cyber-libertarian or socialist, but rather they were deeply entangled with decolonial, ethnic, and economic-developmental goals. These visions continue to impact the ways in which networks are imagined and used in Malaysia today.

Materials and methods

This essay is based on a variety of historical sources including oral history interviews (largely conducted by email), Malaysian government documents (including published reports, planning documents, and policy documents), newspaper and media reports, and memoirs written by those directly involved (including those published on social media platforms). Some of these sources have been translated from Bahasa Malaysia by the author's research assistant who is a fluent speaker in that language. These sources have been collected from local libraries and archives as well as from some of the historical actors themselves. The result is the most detailed reconstruction the "pre-history" of the Internet in Malaysia.

Nevertheless, this account is far from complete, relying almost exclusively on government and "elite" stories, including those emerging from Malaysian networking's self-styled pioneers. As Internet historians have shown repeatedly (eg. Hauben and Hauben, 1997), networks are also shaped by their users. As such, a more complete account would also include accounts of how Malaysian networks were actually utilized by citizens and publics. Moreover, such top-down accounts risk obscuring other narratives and alternative voices, presenting all-too-unitary and unilinear of an image of networking in Malaysia. These problems are substantial, but the aim here limited to understanding these elite stories on their own terms and in their own context. As restrictive as this may be, it sets an important backdrop for future historical accounts of Malaysian networking.

The next two sections details the history of early networks in Malaysia, the first focused on RangKoM and the second on JARING. The discussion section takes up the longer term consequences of these histories.

MIMOS and RangKoM

The pioneer of electronic networking in Malaysia is Dr. Mohamed Awang Lah. I emphasize his story here because of his particular influence in establishing the imaginary for networking in Malaysia. Dr. Mohamed was born Kota Bahru, in the Malaysian state of Kelantan in 1952. After attending local schools, in 1973 he enrolled at King's College London to pursue a degree in electrical and electronic engineering. After continuing to a PhD (which he received in 1980), he returned to Malaysia to take up a lectureship at the University of Malaysia.¹ By 1983, this role included managing some of the university's computer systems including its VAX750 minicomputer. One task was to migrate the mini-computer systems to an open source operating system. The University chose BSD Unix. Although based on proprietary code from AT&T's version of Unix, BSD Unix, designed at Berkeley, was widely and more permissively licensed. As part of his task to get the operating system up and running on the machines – a difficult task that took a month of non-stop work – Dr. Mohamed began familiarizing himself with some of the source code (Mohamed 2015, part 7). Here he saw the word “Internet” and began to learn about how Unix contained some utilities to make connections to other computers. In fact, BSD Unix was the first version of the operating system to include libraries supporting the Internet protocol (McCusick, 1999). The so-called “Berkeley sockets” made it straightforward to read and write data across a network. Dr. Mohamed began to experiment (Mohamed, 2020). As he recalled later, “I came across this technology [computer networks] for the first time while working at the University of Malaya in 1983. My heart was moved to try it myself, no one helped” (Mohamed 2015, part 6). Although this is no doubt a self-serving and far too “heroic” account, it provides a sense of the motivations of worldview of Dr. Mohamed as he began to consider the prospects of electronic networking in Malaysia.

¹ For biographical details on Dr. Mohamed see his Facebook page (https://www.facebook.com/mohamed.awanglah/about_places) and his LinkedIn page (<https://www.linkedin.com/in/dr-mohamed-awang-lah-7577a753/?originalSubdomain=my>). Malaysian names usually do not include family names. Most names consist of a given name followed by the individual's father's name. Here I identify individuals by their full name on the first occasion and then by their first (non-honorific) name on subsequent occasions.

At the same time, Dr. Mohamed was thinking about how to deploy research in science and technology to make Malaysia more globally competitive. From the early 1980s, a few academics, including University of Malaya's Dean of the School of Engineering, Dr. Tengku Mohamed Azzman Shariffadeen, Dr. Muhammed Ghazie Ismail (Universiti Sains Malaysia), Dr. Mohamed Arif Nun (University Teknologi Malaysia), Dr. Mohamed Zawiwi Ismail (University Teknologi Malaysia), and Dr. Mohamed (Awang Lah) began discussions about the formation of a government-backed institute for microelectronics research and development. They worked from the realization that although Malaysia had significant electronics and electrical industries, this mostly consisted of foreign designs, brands, and companies using Malaysia as a manufacturing base for exporting products. "Back in those days," Prime Minister Mahathir Mohamad remembered in 1999, "the Malaysian electronics industry was as Malaysian as Disneyland. Although it was physically located in Malaysia, Malaysians were just *kaki tangan* [minions]" (Mahathir, 1999). Azzman in particular was a staunch advocate of designing chips in Malaysia. An institute for microelectronics research could contribute to the development of indigenous products for local industry. He promoted his idea but at first got nowhere (Chong 2003).

But Azzman was persistent and in 1984 he got a break. Invited to a tea party by his uncle, Tengku Ahmad Rithaudeen, the Minister of International Trade and Industry (MITI), a casual conversation led to a suggestion that he present his idea to the Prime Minister. Leaping on this suggestion, the group of academics quickly wrote a concept paper which they submitted to MITI. This paper was subsequently submitted for consideration to Malaysia's Prime Minister, Dr. Mahathir Mohamad.

In August [1984], Azzman met Dr Mahathir. He recalls that the PM was silent throughout the 20 minutes of the presentation, which made him a little uneasy. "The first thing he asked was, 'How much do you want?' I said 'For the first year of operations, I'll need RM5 million' and he said 'Ok, I'll give you RM5 million. When can you start?' (Chong, 2003).

The proposal was approved by the cabinet in October 1984 and the Malaysian Institute of Microelectronic Systems (MIMOS) was established as a unit of the Prime Minister's Department on January 1st 1985. It had a mission to "provide a critical

infrastructure for the advancement of local E&E industry so that the nation can design, produce and market high quality electronic products utilising indigenous capabilities” (MIMOS, 2020). By May 1985, the Institute had established operations out of a bungalow house in central Kuala Lumpur.

Dr. Mohamed was seconded to the new Institute to manage its computing resources (Mohamed, 2020). At MIMOS, he continued to develop his interest in networking, now at a larger scale, and now in support of the Institute’s mission. In particular, Dr. Mohamed believed that networking between researchers could encourage them to communicate and collaborate. As with the original plan for the ARPANET in the United States, a Malaysian network would connect together researchers, allowing them to share resources. Facilitating communication between researchers (both in research institutions and universities), coordinating access to public databases, and creating a platform for conducting research in information technology would serve to enhance Malaysia’s research and economic capacity, especially in electronics (Mohamed, 1987).

In 1987, MIMOS established Malaysia’s first electronic network, Rangkaian Komputer Malaysia (Malaysian Computer Network) or RangKoM. RangKoM connected together the VAX mini-computer at MIMOS with computers at universities in Malaysia, including those at University of Malaya, Universiti Pertanian Malaysia [now University Putra Malaysia], University Teknologi Malaysia, and Universiti Sains Malaysia (figure 1). Since most of these universities already had computers with Unix operating systems, the system would use UUCP running over both TCP/IP and X.25 protocols. Connections between the campuses were a combination of leased lines, dial-up modem connections, and the Malaysian Packet Switched Data Network (MAYPAC) (Mohamed, 1987). Dr. Mohamed had some difficulties convincing organizations to join – many feared that their network would result in others using their resources for their own purposes. But he managed to convince key individuals within the institutions who then championed the establishment of connections (Mohamed, 2020).²

² This aspect of the story deserves further research and elaboration. Accounts from other institutional actors would shed light on why particular organizations decided to join the network.

Part of the funding for RangKoM came from international sources. In particular, the ASEAN-Australia Economic Cooperation Program (AAECP) sponsored some of RangKoM's earliest equipment. This program, begun in 1974, channelled funds from Australian government to various research and development efforts with ASEAN.³ One of the goals of the program was to encourage cooperation in research and development, including in microelectronics. This meant that coordinating internationally via a computer network might contribute to their mission. In the end, the only successful connections were between Malaysia, Indonesia, and Australia, but nevertheless this international partnership proved critical to RangKoM's success.

The network itself consisted of modems and leased telephone lines. One line connected users to a Unix machine at the Universiti Kebangsaan Malaysia's Bangi, campus, for example. There users could access the machine's Computer Aided Design Graphic Centre (Rahmah & Arfah, 1999). CAD was an important part of MIMOS's mission to assist the electronics industry in fields such as VLSI (Very Large Scale Integration) chip design (Rafee, 2020). In addition to the local connections, MIMOS also linked RangKoM via X.25 connections to four international nodes (in Australia, Indonesia, the US, the Netherlands, and South Korea). Although the network only provided access to email, file transfer, and USENET newsgroups, it was a functioning international electronic network.⁴

By late 1987, parts of the network were up and running stably and databases related to electronics and agriculture were already available. At first network speeds were limited to 9600 bps over dialup or leased lines, but even as the network was being rolled out, Dr. Mohamed had plans to increase its capacity to 64kbps and to expand it to a handful of government department and research organizations (Mohamed 1987). Dr. Mohamed also worked to increase Malaysia's visibility and recognition within international networks too. With the help of Rick Adams (a network pioneer in

³ Between 1974 and 1979 the program had invested \$AUD 94 million (AusAID, 2004).

⁴ The USENET, a systems devised in Tom Truscott and Jim Ellis in North Carolina in 1980, utilized the Unix-to-Unix Copy Protocol (UUCP) to copy messages from computer to computer as and when they were connected to one another (Hauben & Hauben, 1997). This method allowed a group of users to form a continuous thread of questions and responses, with new messages simply appended to the end of the text file.

the US and founder of UUNET), he registered the “.my” (Malaysia) domain with the ARPANET’s Network Information Center and assumed responsibility for its management (Mohamed 2015, part 6).

Dr. Mohamed also envisaged RangKoM as the proof-of-concept for a much more substantial “Educational Computer Network.” Although in 1987, the notion of comprehensively linking together all schools, colleges, universities and research organizations seemed too ambitious, Dr. Mohamed saw that, in long term trends in technological development made the necessity of such a network “inescapable” (Mohamed, 1988). Such a network would span the entire nation, with “multi-tasking, multi-user” computer nodes in each state being linked together via high speed lines. These nodes would all be linked to a central gateway that would provide access to networks in the rest of the world. Such a network, Dr. Mohamed argued, would be “part and parcel of our efforts to enhance our technological capabilities and competitiveness in the era of the information age” (Mohamed 1988). By this time, Dr. Mohamed was not the only person in Malaysia working towards the construction of electronic networks. Nevertheless, his central position at MIMOS allowed him to exert a strong influence over the form and visions of networking in the country.

One of Dr. Mohamed’s long time colleagues, Mahizzan Mohd Fadzil, saw Dr. Mohamed’s contributions to RangKom primarily in nationalistic terms: “We were the 15th country in the world to obtain and manage our own domain... The significance of this is that if we had not fought and managed this domain, it would have been hijacked by a third party... He saw this as his Patriotic duty to fight for his country...” (Mahizzan, 2018). This suggests how RangKom was particularly important for its symbolic value: “it was successful as an experiment and a show case,” Dr. Mohamed commented in an interview (Mohamed, 2020). It showed that Malaysia could participate in and contribute to the domain of advanced information and communication technologies. It demonstrated that Malaysia, even as a developing nation, could aspire to become a player in the global information age.

RangKoM’s position within MIMOS – a government-backed institution dedicated to promoting the development of indigenous technologies -- was particularly significant. In 1991, Dr. Mohamed presented a paper on the “information age” to a conference in

Kuching, “The Way Forward: Malaysia Year 2020.” He saw the necessity for developing information technology through education, the mass media, and “information infrastructure”:

The infrastructure, consisting of data communication networks and well-integrated information databases, can be used to develop trained manpower to create innovative environments for the enhancement of indigenous capability for producing new, more competitive, high-value added products and services. National and international information networks will serve to expand the markets for these products and services (Mohamed 1991a).

RangKoM was imagined as technology that could help achieve this aim, bringing greater resources to researchers and fostering collaborations that would lead to innovations and inventions. Such innovations would, it was hoped, drive Malaysia’s future technological and economic development. Of course such an association between networking and economic development was not unique to Malaysia. But the close associations between technology and Malaysia’s decolonial project meant that networking in Malaysia did take on specific meanings. In particular, networking would support the development and modernization of the nation’s industrial base by contributing to “indigenous” education and research that would free Malaysia of its dependencies on foreign companies, both in the semiconductor industries and beyond.

Despite the top-down view that this account offers, it depicts clearly the view of the “pioneers” who sought to establish Malaysia’s first electronic network. What stands out here is the attempt to utilize networking as a decolonial technology, developing Malaysia’s economy in ways independent of Western powers. Of course, there was a paradox here since networking itself was a western technology. Nevertheless, networking was marked as a “patriotic” act. Like Japan’s assertion of technological independence in the 1970s and 80s, Malaysian networking served as an example of a new-found technological confidence through which it could stand up to the West (see Ishahara and Morita 1992). It is also significant here that all of Malaysia’s networking pioneers were ethnic Malays themselves. This alone suggests much about how and where networking was envisioned within the Malaysian polity. This

link between networking, nation, and ethnicity was to become even stronger as electronic networks were expanded further.

JARING

By the late 1980s, Dr. Mohamed was seeking approvals and funds to expand RangKoM into larger network. Interest in electronic networking had grown and a more expansive and higher bandwidth network was now necessary to support a broader range of activities and collaborations. On 24 January 1990, MIMOS established the Joint Academic Research and Integrated Network (JARING). Funding for JARING once again came from the Prime Minister's office. His Economic Planning Unit approved the allocation for an expanded network as part of the "Sixth Malaysia Plan" (Mohamed, 2015, part 3).

In many ways, JARING was an expanded version of RangKom. Like its predecessor, its main aim was connecting together researchers across Malaysia, as well as networking computers in the government sector. JARING also had an expanded mission to coordinate access to databases related to science, technology, and education (Sharifah, 1995). JARING was not able to develop its own infrastructure but rather relied on 64 kilobits per second lines leased from Telekom Malaysia. Nodes would be installed in various parts of the country, linked together by dedicated leased lines of 9600 bps to 65kbps. Although users would have to pay for the cost of connecting to a local node, the cost of the network itself was covered by a \$US 10 million government allocation (Mohamed, 1991a).⁵

At first, JARING deployed the X.25 protocol, favouring an international standard that was an alternative to the Internet's TCP/IP. But this changed rapidly when JARING became linked to the expanding global Internet. MIMOS's deputy director of the department of computer science, Rafee Yusoff, had studied in the United States and had friends and colleagues in who worked with NSFNET (National Science

⁵ Users had to pay a one-time registration fee (RM200 for government bodies, RM300 for private corporations, RM50 for individual users and RM20 for students), an annual subscription fee (RM600 for dial-up, RM3000 for leased lines), as well as data volume charges for international data (RM300 per 120 megabytes; domestic data transmission was free) (Prasanna, 1993).

Foundation Network). In 1992, he attended the Internet Society (INET) conference in Kobe, Japan, persuading his friends to help him to build a link to Malaysia (Rafee, 2020). In November 1992, MIMOS was linked via satellite from Kuantan in Malaysia to the NSFNET node in Stockton, California, providing JARING users a direct link to the Internet. This not only allowed connections to the US, but also to 140 other countries (via NSFNET links). The cost of the connection was approximately RM 350,000 (\$US 140,000) per year (Mohamed 2015, part 3).

The development of JARING was a key element of Malaysia's broader vision for economic and social development. In 1991, Prime Minister Mahathir Mohammad outlined "Vision 2020" that established goals for national development. Central to this vision was the establishment of "a scientific and progressive society, a society that is innovative and forward-looking, one that is not only a consumer of technology but a contributor to the scientific and technological civilization of the future" (Mahathir, 1991a). In a speech, Mahathir expressed his view that such technological development was a national necessity: "In a world of high technology Malaysia cannot afford to lag behind. We cannot be in the front line of modern technology but we must try to catch up at least in those fields where we may have certain advantages" (Mahathir, 1991a). But these goals were never merely technological; "Vision2020" also articulated distinct social goals for Malaysia. These included a "unified" Malaysia, "at peace with itself," but also "psychologically liberated" from any sense of inferiority. This Malaysian society would be a "mature consensual, community-oriented Malaysian democracy," "fully moral and ethical," as well as "liberal and tolerant" (Mahathir, 1991a). Such goals were presented alongside economic goals such as the achievement of prosperity and the furtherance of technological development. These "social" goals were closely tied to the development of Malaysia's electronic networks. Networks could not only provide the basis for a more prosperous society, but could also lay foundations for harmony, cohesion, equality of opportunity, tolerance, and consensus.

Such goals were part of the network from an early stage. In 1991, when planning for JARING, Dr. Mohamed was already aware of the potential dangers posed by the free flow of information that could be used "*against* an individual, company, or

nation.” But, offsetting this, electronic networks could also contribute to the improvement of social values by improving people’s living conditions:

Perhaps the only way to bring ourselves in control and in harmony with the explosion of information is by going back to the basic social “values” – honesty, sincerity, trustworthiness, etc. and to create better and more conducive living environment... By instilling good social “values,” the creation of *bad information* could be minimized and the information about the *bad information* would be more forthcoming for appropriate action. There is no doubt that good social “values” can be achieved by improving our quality of life – which can be characterized by adequate food, good health, and reasonable shelter (Mohamed, 1991a).

Networks therefore could contribute not only technologically and economically, but also morally and socially, to the nation’s development. A more prosperous society, powered by technology, would also be a more ethically developed society, Dr. Mohamed believed. JARING was helping to build exactly such a society – its contributions to education, for example, demonstrated how networking could serve national social interests. At the opening of “Jaringan Ilmu” (Educational Network) in 1996, the Deputy Minister for Education, Dr. Michael Toyad, explained how the network would contribute to improving society: “A modern country that we hoped for is a Malaysian society of vision that is equipped with knowledge, mastery of languages, and also a good mastery of information technology.” Networking would build an well-informed and culturally rich society (Bernama, 1996).

In 1992, JARING was privatized, essentially becoming Malaysia’s first Internet Service Provider. The popularity of the network grew rapidly. According to a 1996 government report, while JARING had only 30 subscribers in 1992, by 1995 the number had over 14000.⁶ Throughout the 1990s, JARING also rapidly upgraded its backbone infrastructure, increasing both the number of nodes and the capacity of its lines (to 1.5Mbps in 1994 and to T3 45Mbps lines in 1997).⁷ Part of this growth was driven by MIMOS’s broader research and development plans. Alongside computer

⁶ “Chapter 4: The internet backbone and service markets in Malaysia” <http://studentsrepo.um.edu.my/1937/7/CHAP4.pdf> By 1994, the network had established nodes in sixteen major cities: Damansara, Petaling Jaya, Shah Alam, Bangi, Melaka, Seri Gading, Johor Bahru, Ipoh, Pulau Pinang, Alor Setar, Kuantan, Kuala Terengganu, Kota Bahru Kuching, Kota Kinabalu, and Kuala Lumpur (Open University Malaysia, 2015).

⁷ “Chapter 4: The internet backbone and service markets in Malaysia” <http://studentsrepo.um.edu.my/1937/7/CHAP4.pdf>

networking, MIMOS was also tasked with deploying computers in the government sector, “to improve efficiency, productivity, and quality of government management and services.” In particular, the plan was to develop an “Open Systems Programme” that would allow sharing of resources and software between different computer systems in the public sector. In addition, MIMOS’s “Computers in Education” program was designed to bring information technology to schools, designing and creating “Sistem ComIL” a specially created personal computer for teaching and learning (Mohamed, 1991a). For Dr. Mohamed and MIMOS, JARING, education, and the computerization of the public sector went hand in hand. Together, they would contribute to the goal of creating stronger society, “socially, economically, and politically” (Mohamed, 1991a). JARING was in this sense part of a broader vision for strengthening Malaysia through technology.

In addition to research, development, government, and education, JARING was also to serve business needs. Since RangKoM had remained an experimental network, it had not been open to business users. JARING, on the other hand, was developed with them specifically in mind. In 1994, the Prime Minister convened the National IT Council (NITC) formed as a think-tank and advisor to the government on information technology developments. This committee, chaired by the Prime Minister and consisting of the cabinet ministers, business executives, and the Chief Secretary to the Nation, gave MIMOS the responsibility for managing and servicing the government computer network and facilities. This Council’s first aim was to guide the development of Malaysia’s IT industry (Shukor 1994).

Under the direction of the NITC, JARING not only attracted more subscribers, but began to actively promote the use of networking in various industry sectors. In 1993, JARING began a “promotion drive” designed to attract corporate users. Although these businesses were not allowed to directly use the network for commercial purposes, “they are able to obtain useful information on a wide range of subjects that will benefit them in their commercial activities,” Dr. Mohamed reported, “For example, a company can use Jaring to access various international databases to keep track of the latest developments on certain products and technologies. The company can also keep track of what users are saying about its products over the network” (Shukor and Zanaria 1993). In 1996, MIMOS itself was corporatized,

pushing it towards further commercialization of its network. This involved developing services such as IP over fibre, multi-protocol label switching, and voice over IP services that were aimed at commercial users (Mahizzan, 2020). “MIMOS began to pursue commercializing many Internet-based applications,” Rafee (2020) recalls. JARING was becoming less a “technical solution” and more a “platform to policy and business” (Rafee, 2020).

By the mid-1990s, JARING was imagined as the centrepiece of a “national information infrastructure” that would support multimedia communication across Malaysia. This included enhanced network access for research and development institutions, educational institutions, and government agencies. The “Seventh Malaysia Plan,” spanning the years 1996-2000, anticipated expanding JARING facilities nationwide for both the public and the private sector. The government allocated RM400 million to roll out a further 100 JARING nodes and to increase the number of users to 400,000 (Prime Minister’s Office of Malaysia, 1996, pp. 332-333). MIMOS also worked with the National Library to establish its network infrastructure, using JARING to connect the library to government departments, databases, and institutes of higher learning (Prime Minister’s Office of Malaysia, 1996, p. 409). JARING also offered connections to range of databases that supported private enterprise including SIRIMLINK, PALMOILIS (for Palm Oil), Southern States Investment, the Trade and Technology Data Exchange Centre, and the Malaysian Science and Technology Information Centre (Prime Minister’s Office of Malaysia, 1996, p. 507). Networking was envisaged and developed as a practical tool for promoting the independence of some of Malaysia’s most critical industries (see Mohamed, 1991b).

By the end of the 1990s, Malaysia’s Internet connectivity and capacity had grown rapidly. The country’s networks had become a model for other developing nations and were a key aspect of the Malaysian government’s vision for building a cohesive and prosperous society. At least some of JARING’s engineers also took this seriously – Rafee Yusoff, for example, reflecting on his time at JARING reported that he had “moved on to bigger things... sustainable development, shared prosperity, national transformation, combatting poverty, enabling marginalized and distressed communities... but I must say, my stint at MIMOS-JARING has been key to how I

now shape my views on development” (Rafee, 2020). JARING became a model for how to implement national developmental priorities and goals at the social as well as the technological level. In particular, the links between “Vision 2020” and JARING suggest how electronic networking was bound to a national vision of fostering a harmonious and unified society. Networks would underpin not only economic prosperity but also allow forms of communication and interchange that were consonant with Mahathir’s social goals.

Malaysia was certainly not the only nation in which the development of electronic networks has been associated with social or political goals. Even in the United States, the ARPANET emerged in part from J.C.R. Licklider’s vision of a vast “intergalactic network” of information sharing (Flichy 2007). No doubt Malaysia’s networking pioneers were exposed to some of these ideas. Nevertheless, Malaysia’s situation was quite different – a developing, postcolonial economy in Southeast Asia rather than a superpower in the midst of the cold war. As such, Dr. Mohamed and his colleagues adapted such visions to their own circumstances, creating networks that fit their own (and Malaysia’s) ambitions.

Discussion

One downstream “spinoff” from Malaysia’s electronic networks was the nations’ most visible and ambitious information technology project. This was the creation of the “Multimedia Super Corridor,” (MSC) a special economic zone and hub for multimedia and information and communication technology companies. According to Mahathir, once again the MSC was not only concerned with technology:

We are talking about changing the way we live and work within the MSC. This special area will be a global ‘test-bed’ for the new roles of Government, new cyber laws and guaranteed, collaborations between Government and companies, companies and companies, new broadcasting and new types of entertainment, education, delivery of healthcare, and applications of new technologies... The MSC will be the R&D centre for the information based industries, to develop new codes of ethics in a shrunken world when everyone is a neighbour to everyone else, where we have to live with each other without unnecessary tension and conflicts (Mahathir, 1996).

Plans for the MSC, initiated in 1995, were first drawn up by the MIMOS founder Azzman working with Telekom Malaysia. Although the MSC had far larger ambitions than electronic networking, the success and expansion of JARING played a key role in convincing Mahathir that technological investment and development was necessary and effective in securing Malaysia's future.

At the core of the vision of MSC was a vision of liberation and prosperity driven by technology, a "multimedia utopia" as Tim Bunnell has put it. As I have argued here, a similar vision drove the development of RangKoM and JARING. Although, as Bunnell points out, such utopic visions of technology are hardly unique to Malaysia (Silicon Valley is the key exemplar), Malaysia's version does have some unique features. First, as Bunnell points out, the MSC should be understood partially as an anti-colonial or decolonial activity, providing Malaysia with the "indigenous capacity" to "ensure technological and economic autonomy" (Bunnell, 2002). The origins of RangKoM and JARING in MIMOS link it to this same vision of freeing Malaysia from dependence on the West (particularly western micro-electronics firms). Second, RangKoM and JARING were based on a techno-social vision of creating an ethical society based on strong values. These networks were implemented with the belief and hope that they would strengthen community connections, at least partly through created shared prosperity. Third, networking was not only a decolonial activity but a positively patriotic and nationalistic one, seizing opportunities for Malaysia to take technological leads, at least within the region. By the mid-1990s, Malaysia's success in networking, even compared to its wealthier neighbour, Singapore, could be stated as a point of pride.⁸

Leong likewise argues that the MSC was born from the "uniquely Malaysian manifestation of the imbrication between the nation and the Internet" (2004, 69). The MSC was a peculiar product of Malaysia's colonial past and its early relationship to technology. But this also meant that the MSC was tied to specific combinations of

⁸ National University of Singapore established a connection to BITNET in 1987 and a connection to the Internet in 1990. This was expanded into a network called TechNet open for academic and research beginning in 1991. However, the first publicly available Internet provider (SingNet) came online in 1994, two years after JARING (Straits Times, 2015). Given this, an argument could be made that Malaysia began with a headstart in Internet connectivity in the 1990s (on networking in Singapore see Stevens, forthcoming).

ethnicity and values (particularly Islamic values) that were associated with technology in Malaysia. This “values-based knowledge society” rested on an imaginary of an independent (decolonized) and unified Malaysia. My argument here is that the roots of this imaginary predates the MSC and can be found in the earliest forms of electronic networking in Malaysia, RangKoM and JARING.

Malaysia’s visions and values associated with networking have left their mark on the nation’s informatic practices. Even if networks themselves are updated and upgraded, practices and institutions have persisted. Subsequent high-technology projects such as the MSC have continued to be invested with nationalistic visions of development and social cohesion, rather than opposition and dissent. The MSC came with a “Multimedia Bill of Guarantees” that included a government pledge not to censor Internet. In practice, however, this was enacted and enforced in ways that were fully consistent with national interests (Weiss, 2012, p. 21; Rodan, 2005, p. 152). Speaking in 1997, opposition member Dr. Tan Seng Giaw, reminded the Malaysian parliament of the role the MSC would play: “as we appreciate this new technology, we shall not forget traditional values” (Parliament of Malaysia, 1997, p. 57).

This persistence of “traditional values” alongside high technology suggests an explanation of why networking in Malaysia continues to only partially live up to the promises of “liberation” that online life and speech is supposed to offer. Indeed much of the work on the development of the Internet in has focused on this “paradox” between a liberating technology and an authoritarian state. Cherian George (2006), Meredith Weiss (2012), Sara Chinnasamy and Mary Griffiths (2013), John Postill (2014), Tan and Ibrahim (2008) and others have examined the political impact of the development of the Internet and other information and communications technologies in Malaysia, particularly their impact on political discourse, elections, and democratization. There is general agreement that relatively uncontrolled and uncensored domains of cyberspace (especially online media and new media) have triggered shifts in political discourse in Malaysia. However, this is tempered by caution that the government retains a strong powers to monitor, curtail or punish speech, even online. George, for example, argues that although Malaysia refrained from placing “prior restraints” on online communication, therefore offering a degree

of political freedom, the government also “made clear that writers and publishers in cyberspace would enjoy no immunity from prosecution if they broke the laws of the land ” (George, 2005, p. 911).

But there is no necessary reason why the Internet should be associated with freer speech or political opposition. Such an argument is built on the cyberlibertarian notion that electronic networking (and specifically the Internet) provides an extra-governmental space for resistance and opposition. Historians, including Fred Turner (2008) and others, have shown how such impulses animated ideas of networking in the United States from the 1960s onwards. However, such ideas were not necessarily imported alongside the technology itself. Beginning from the alternative premise that electronic networking can encompass very different local politics and ideas offers a resolution to the seeming “paradox” noted above. Malaysia’s networking pioneers never imagined “liberating” systems that stood in opposition to government or national interests. Rather Malaysia’s “multimedia utopians” were engaged in building networks to strengthen and enact a government-led vision of a “fully developed,” decolonized and cohesive society.

Declaration of interest

The author declares no conflicts of interest exist.

References

Andaya, B. W. and Andaya, L.Y. (2016). *A history of Malaysia*. Macmillan.

AusAID (2004). “ASEAN and Australia: 30 years of development cooperation” Australian Agency for International Development, Canberra, Commonwealth of Australia. https://www.asean.org/wp-content/uploads/archive/asean_australia.pdf

Barker, J. (2015) Guerilla engineers: the Internet and the politics of freedom in Indonesia. In: Sheila Jasanoff and Sang-Hyun Kim, eds. *Dreamscapes of modernity: sociotechnical imaginaries and the fabrication of power*. Chicago: University of Chicago Press.

Bernama. (1996). The National Library Launches Education Network [Perpustakaan Negara Lancar Rangkaian Jaringan Ilmu] Bernama, 26 January.

Bunnell, T. (2002). Multimedia utopia? A geographical critique of high-tech development in Malaysia's Multimedia Super Corridor. *Antipode* 34, no. 2: 265-295.

Chinnasamy, S. and Griffiths, M. (2013). Looking back at Malaysia's GE2008: an Internet election and its democratic aftermath. *IAFOR Journal of Media, Communication and Film* 1, no. 1: 59-74.

Chon, K. (2021) *Asia Internet History Projects*. Available at: <http://internethistoryasia.jinbo.net/home.html>

Chong, Y. (2003). The man synonymous with IT in Malaysia. *The Star*, 22 March.

Davis, S., Straubhaar, J., Fuentes-Bautista, M., Spence, J. (2017) The social shaping of the Brazilian Internet: historicizing the interaction between states, corporations, and NGOs in information and communication technology development and diffusion. In: Goggin and McLelland, eds. *The Routledge Companion to Global Internet Histories*. New York: Routledge: 122-134.

Drabble, J. H. (2000). *An economic history of Malaysia, c. 1800-1990*. Palgrave Macmillan.

Driscoll, K. and Paloque-Berges, C. (2017). Searching for missing 'net histories.' *Internet histories* 1, nos. 1-2.

George, C. (2005). The internet's political impact and the penetration / participation paradox in Malaysia and Singapore. *Media, culture & society* 27, no. 6: 903-920.

George, C. (2006). *Contentious journalism and the Internet: towards democratic discourse in Malaysia and Singapore*. University of Washington Press.

Flichy, P. (2007) *The Internet imaginaire*. MIT Press.

Goggin, G. and McLelland, M. (2017) *The Routledge Companion to Global Internet Histories*. New York: Routledge.

Hauben, M. and Hauben, R. (1997). *Netizens: on the history and impact of Usenet and the Internet*. Wiley-IEEE.

Hill, D.T. and Sen, K. (1997) Wiring the warung to global gateways: the Internet in Indonesia. *Indonesia* 63: 67-89.

Ishahara, S. and Morita, A. (1992) *The Japan that can say no: why Japan will be first among equals*. Frank Baldwin, trans. Touchstone.

Jasanoff, D. and Kim, S. (2015). *Dreamscapes of Modernity: sociotechnical imaginaries and the fabrication of power*. University of Chicago Press.

Jomo, K.S. (1993). *Industrializing Malaysia: policy, performance, prospects*. Routledge.

Leong, S. (2014) *New media and the nation in Malaysia: Malaysianet*. London: Routledge.

Logan, S. and Suwamaru, J. (2017) Land of the disconnected: A history of the Internet in Papua New Guinea. In: Goggin and McLelland, eds. *The Routledge Companion to Global Internet Histories*. New York: Routledge: 284-295.

Mahizzan, M. F. (2018). Romancing the Net. Facebook post.

<https://www.facebook.com/notes/mahizzan-mohd-fadzil/romancing-the-net-part-16-dr-mohamed-awang-lah-father-of-malaysian-internet/10155780837598580/>

Mahizzan, M.F. (2020) Email interview with Mahizzan Mohd Fadzil. [date]

Mahathir, M. (1991). *Malaysia: the Way Forward (Vision 2020)*. Malaysian Government Publication.

Mahathir, M. (1999). The official visit to MIMOS. 1 November. Technology Park Malaysia, Kuala Lumpur. Koleksi Arkib Ucapan, Ketua Eksekutif.

Mailland, J. and Driscoll, K. (2017). *Minitel: Welcome to the Internet*. MIT Press.

Mohamed, A. L. (1987). "RangKoM – the Malaysian Computer Network" International Academic Network Workshop, Princeton, New Jersey, 9-11 November.

Mohamed, A.L. (1988). "Towards an educational computing network in Malaysia."

Mohamed, A. L. (1991a). "Towards an Information Age." Seminar on "The Way Forward: Malaysia Year 2020," Kuching, Sarawak, 22-24 August.

Mohamed, A.L. (1991b) Software industry development strategies: some possible collaborative opportunities in Malaysia. PIKOM Industry Conference. Kuala Lumpur: Persatuan Industri Komputer Malaysia.

Mohamed, A. L. (2015) "Jaring in Memory" [JARING Dalam Kenangan] Facebook posts. <https://www.facebook.com/notes/mohamed-awang-lah/jaring-dalam-kenangan-bahagian-3/10205940589208780/>

Mohamed, A. L. (2020). Email interview with Mohamad Awang Lah. [date]

McKusick, M. K. (1999). "Twenty Years of Berkeley Unix – From AT&T-Owned to Freely Redistributable." In: DiBona, Chris, Ockman, Sam, Stone, Mark, eds. *Open Sources: Voices from the Revolution*. O'Reilly.

MIMOS (2020). "Milestones" Webpage. Available at: <http://www.mimos.my/about-us/the-company/milestones/>

Medina, E. (2011). *Cybernetic revolutionaries: technology and politics in Allende's Chile*. MIT Press.

Open University Malaysia. (2015). History of the Internet in Malaysia. [Sejarah Internet Malaysia]. Available at: <https://www.majalahsains.com/sejarah-internet-malaysia/>.

Peters, B. (2016). *How not to network a nation: the uneasy history of the Soviet Internet*. MIT Press.

Parliament of Malaysia (1997). Parliament Official Statement: Community Council [Penyata Rasmi Parlimen Dewan Rakyat]. 29 April. 9th Parliament, 3rd volume, 1st week.

Postill, J. (2014). A critical history of Internet activism and social protest in Malaysia, 1998-2011. *Asiascape: digital asia* 1, nos. 1-2: 78-103.

Prasanna, R. (1993). Communicating through Jaring. *Computimes*, 11 November.

Prime Minister's Office of Malaysia. (1996). Seventh Malaysia Plan [Rancangan Malaysia Ketujuh]. <https://www.pmo.gov.my/dokumenattached/RMK/RM7.pdf>

Rafee, Y. (2020). Email interview with Rafee Yusoff. [date].

Rahmah, H. and Arfah, Y. (1999). Diffusion of Internet – A double-edged sword? Preliminary findings in Malaysia. Paper presented at “Internet in Vietnam” workshop, Hanoi, 29 September - 2 October.

Rodan, G. (2005). *Transparency and Authoritarian Rule in Southeast Asia: Singapore and Malaysia*. Routledge.

Shukor, R. (1994). Prime Minister to Chair NITC. *Computimes*, 1 December.

Straits Times. (2015). 35 years of ICT. *Straits Times*.

<http://graphics.straitstimes.com/STI/STIMEDIA/Interactives/2015/10/35-years-of-ict/supercharging-singapore/the-1990s.html>

Salman, A. et al. (2013). “Tracing the diffusion of the Internet in Malaysia: Then and Now. *Asian Social Science* 9, no. 6: 9-15.

Shukor, A. and Zanaria, S. (1993). Mimos to embark on Jaring promotion drive. *Computimes*, 14 January.

Stevens, H. (forthcoming). *Television and the aspirations of the infrastructural state*. In: *Infrastructure and scale: ordinary and extraordinary constructions across Asia*. Hirsh and Mostowlansky, eds. University of Hawaii Press.

Sharifah, S-M. (1995). "The development of the information technology sector in the Malaysian public sector." Pacific Asia Conference on Information Systems.

Tan, J.-E., and Ibrahim, Z. (2008) *Blogging and democratization in Malaysia: a new civil society in the making*. Selangor: Petaling Jaya.

Tarling, N. (2004) *Nationalism in Southeast Asia: if the people are with us*. London: Routledge.

Tremblay, J. (2018) *Internet Kampung: community-based Internet in post-Suharto Indonesia*. *Indonesia* 105: 97-125.

Turner, F. (2008). *Counterculture to cyberculture: Stewart Brand, the Whole Earth Network and the rise of digital utopianism*. University of Chicago Press.

U.S. Department of State (2016). US Relations with Malaysia. Factsheet, 25 February. <https://2009-2017.state.gov/r/pa/ei/bgn/2777.htm>

Weiss, M.L. (2012). *Politics in cyberspace: new media in Malaysia*. Friedrich-Ebert Stiftung. <http://library.fes.de/pdf-files/iez/09068.pdf>

Zaharom, N. (1994) Commercialization and control in a 'caring society': Malaysian media 'Towards 2020.' *Sojourn* 9, no. 2: 178-99.

Appendices

None.

Tables

None.

Figures

Figure 1: Architecture of the RangKoM network. Source: Mohamed, 1987.



