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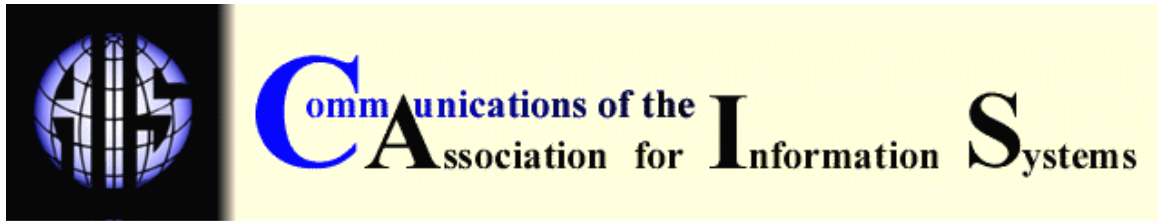
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GLOBAL DIFFUSION OF THE INTERNET III: INFORMATION DIFFUSION AGENTS AND THE SPREAD OF INTERNET CAFÉS IN INDONESIA

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ABSTRACT

The paper identifies characteristics of early adopters of the Internet café business in a developing country. The study is based on innovation diffusion and entrepreneurship theory and uses a combination of in-depth interviews and survey methodologies. The data, obtained in Indonesia, show that most early adopters are highly educated, have previous IT-related work experience, and score high on the 'entrepreneurial readiness' variable. Students and youngsters are the main market segments. Early and late adopters alike are innovative. Innovation diffusion depends on adequate infrastructure and awareness among potential customers. Policy recommendations include increasing government commitment to infrastructure development to provide more equitable access to information in society.

Keywords: entrepreneurs, Internet diffusion, Internet cafés, Indonesia

I. INTRODUCTION

In poor countries, public access to the Internet represents an important means for opening small-scale businesses' and ordinary citizens' gates to modern information. Today in Indonesia, Internet cafés constitute the point of access for 2/3 of Internet users [Kristiansen, Furuholt and Wahid, 2003]. Just as ICT became a profitable activity in modern societies [Melody, 1985], the establishment of Internet cafés represents employment and profit opportunities for entrepreneurs in developing economies.

Public access points to the Internet fall into three groups: (1) telecentres, (2) Internet or cyber cafés, and (3) information access points (IAP). These three differ in ownership, financing, and variety of services. Telecentres operate mostly as not-for-profit organisations, relying on sources of external funding, including government institutions, multilateral agencies, and non-

governmental organisations. By our definition, telecentres include Internet access in public libraries. Internet cafés normally represent business opportunities for the owners and are based on service fees above costs [Salvador, Sherry, and Urrutia, 2003]. Internet cafés may offer bar or dining services or ordinary kiosk businesses. Information access points are terminals for short-term rent in shopping malls, airports, and other public sites. IAPs are common in developed areas of the world. Although telecentres are common in some developing countries (e.g. in Africa and South America), Internet cafés are the principal means of accessing the Internet in others, such as Indonesia.

In spite of the increasing importance of Internet cafes, very limited research has been reported on their diffusion, even in areas, like Indonesia, where they represent a major means of access to digital information and communication.

Compared with 'more advanced non-Asian countries', Asian countries have been laggards in the adoption of ICT and the use of the Internet [Wong, 2002, p. 172]. Within Asia, a significant digital divide also exists between Japan, South Korea, Taiwan, Singapore, and Hong Kong on the one hand and other developing Asian countries, included Indonesia, on the other. We also see an increased concentration of information flows to urban and geographically central areas of developing countries [Wong, 2002; Mwesige, 2003]. Economically disadvantaged countries and rural and peripheral districts fall further behind in human resource development, economic progress, and political participation. Reasonably priced public Internet access could contribute to reducing the 'digital divide' and 'information poverty' in economically lagging regions of the world.

Indonesia is in the focus of our research. It is the fourth most populous country in the world, occupying a vast territory with huge poverty problems and economic and socio-cultural disparities. In Indonesia, we see that Internet use and Internet cafés spread mainly in the larger cities in the centrally located island of Java. Facilitating the spread of information technology and related Internet access, especially to the 'outer islands' and lagging areas of the country, remains a strong need. In the Indonesian cultural and business context, innovations with relatively low capital entry barriers generally spread fast in an area as soon as profitability is proven. Potential 'copycats' are abundant among the many unemployed and skilled people, and economic plagiarism is culturally accepted [Kristiansen, 2003]. In spite of its multitude of ethnic groups, languages, and cultures, Indonesia can be classified as a 'high-context' [Hall and Hall, 1990] or collectivist culture [Hofstede, 1980]. People in such cultures generally want to maintain an image that is similar to the group, and they easily follow new ideas and trends that are accepted by leaders or role models in their societies. In spite of the observed digital divide and the geographical concentration of information flows and Internet cafés in Indonesia, the Internet café innovation can be expected to spread more quickly throughout the country for the following reasons:

1. Business entrepreneurs are abundant, ready to implement new business ideas with proven success from other localities. Entrepreneurial intentions are high in Indonesia, and young people with a university education tend to regard self-employment and business start-ups as prestigious activities that are within the reach of skilled people with a solid social network [Kristiansen and Indarti, 2004]. Unemployment rates are high, meaning that millions of people have to be entrepreneurial simply to survive. Economic growth rates below targets and continuous high population growth contribute to a further escalation of unemployment (from 40 million in 2003 to 42.5 million in 2004) among the 220 million population [Jakarta Post, 2003].
2. Because the technological composition and scale of Internet café operations can be adjusted, capital entry barriers are relatively low. Second-hand equipment may easily be applied, and a business may start with only a hand-full of computers.
3. Potential Internet café customers are present at many locations. Students and youngsters are traditionally the pioneers in Internet adoption and use, and there are many of them in most of the

country's 33 provinces. Approximately 12 million students are enrolled in senior secondary and tertiary education [www.bps.go.id]¹. State universities are established in all provincial capitals, and approximately 1,300 private institutions of higher learning are spread throughout the country. Junior and senior high schools are found even in smaller towns and villages in remote areas, and their students constitute a substantial potential market for Internet use. Literacy rates are high among the population (85-90%) and increasing numbers of young people can read texts written in English. In rural areas the population is mostly living in villages comprising several thousand people, potentially reaching a threshold level for the establishment of small Internet cafés, as long as infrastructure is available. A lack of computer literacy can be overcome by competent guidance from café owners and employees.

Two main research questions form the core of this paper:

First, we aim to identify main characteristics of pioneering Internet café entrepreneurs in a developing economy. Pioneering Internet café entrepreneurs, also called 'information diffusion agents', are those who start an Internet café at an early stage of Internet café diffusion within a region. They are principal vehicles in the diffusion process, but their efforts have to be analysed in relation to Internet café technology, the market for Internet café services, and the general economic, social, and cultural context.

Second, we want to find out what lessons can be learned from innovators and early adopters of the Internet café business operating within centrally located and relatively well-developed areas of Indonesia. What are the main contextual elements that could be improved and accommodated in a strategy for diffusing that innovation into more rural and remote areas of the country?

The research is based on a combination of qualitative and quantitative methods. We conducted in-depth interviews with Internet café entrepreneurs and users and carried out a survey among Internet café owners at three different, but relatively central, locations in Indonesia.

The remainder of the paper falls into five parts. The next section offers an overview of the development of the Internet and Internet cafés in Indonesia. Section III presents the theoretical basis for our empirical analyses, mainly innovation diffusion and entrepreneurship research. Data collection and methodology are described in Section IV, followed by the empirical analyses in Section V. The conclusion discusses prospects for further research and policy recommendations.

II. DEVELOPMENT OF THE INTERNET AND INTERNET CAFÉS IN INDONESIA

Numerous studies deal with the use and spread of the Internet [Madden et. al., 2000; Kiiski and Pohjola, 2002, Grubestic, 2002]. Most cross-national work on this topic has been limited to OECD countries, while some studies focus on the developing world [Zhu and He, 2002; Wilson and Wong, 2003]. A study of Internet diffusion in nearly 40 countries was carried out by The Mosaic Group through The Global Diffusion of the Internet (GDI) Project [<http://mosaic.unomaha.edu/gdi.html>]. The most significant determinant explaining global inter-country differences in the Internet usage rates seems to be per capita income. Other determinants of statistically significant value include telephone and personal computer densities [Beilock and Dimitrova, 2003] and Internet access cost [Kiiski and Pohjola, 2002].

Indonesia has 0.11 Internet hosts² per 1,000 people, compared with 13.45 in neighbouring Singapore [Wong, 2002] and 417 in the US [Roycroft and Anantho, 2003]. The estimated annual per capita expenditure on ICT-related services is 9 USD in Indonesia and 2,348 USD in Singapore. The disparity of ICT adoption among countries is wider than the disparity in their GDP per capita, indicating that the digital divide is increasing [Wong, 2002].

¹ Badan Pusat Statistik, Central Bureau of Statistics, Indonesia. Accessed in Jan., 2004.

² Internet host is computer connected to the Internet that provides services such as Web pages, e-mail boxes, or data routing.

In spite of modest ICT expenditures and a low number of Internet hosts, use of the Internet in Indonesia is growing quickly. The number of Internet service provider (ISP)³ licenses issued increased from one in 1994 to 180 by the end of 2002 [Purbo, 2002; APJII, 2003]. In 1996, Indonesian ISPs connected to the Internet via 15 separate international connections. To increase the efficiency of connections, the Association of Indonesian Internet Service Providers (APJII) formed a task force in 1997 for one joint Indonesian Internet Exchange (IIX)⁴ [Alam, 2000]. After the establishment of the IIX, the use of the Internet in Indonesia grew rapidly and the number of Internet subscribers⁵ increased from 134,000 in 1998 to 667,000 at the end of 2002 [APJII,2003]. Interestingly, from 2001 to 2002 the number of home subscribers decreased but the number of corporate subscribers increased, from 10,539 in 2001 to 39,589 in 2002.

The number of Internet users increased by more than 770% between 1998 and 2002, from 512,000 to 4,500,000. The APJII predicted that the number of Internet users in Indonesia would exceed 7.5 million by the end of 2003 [APJII, 2003].⁶ Given Indonesia's large population of 220 million, the density of Internet users is still low, slightly more than 2%, and lower than the density of phone lines (3%) [Directorate General of Post and Telecommunications, 2001]. Figure 1 shows the growing number of Internet users, subscribers, and ISPs. As can be seen, many ISP license holders are not operational. Most of them are speculating on future market and infrastructure development and many aim for the growing corporate market [Pamuji, 2003; Jakarta Post, 2004b]. The number of subscribers in Figure 1 includes both individual and corporate customers.

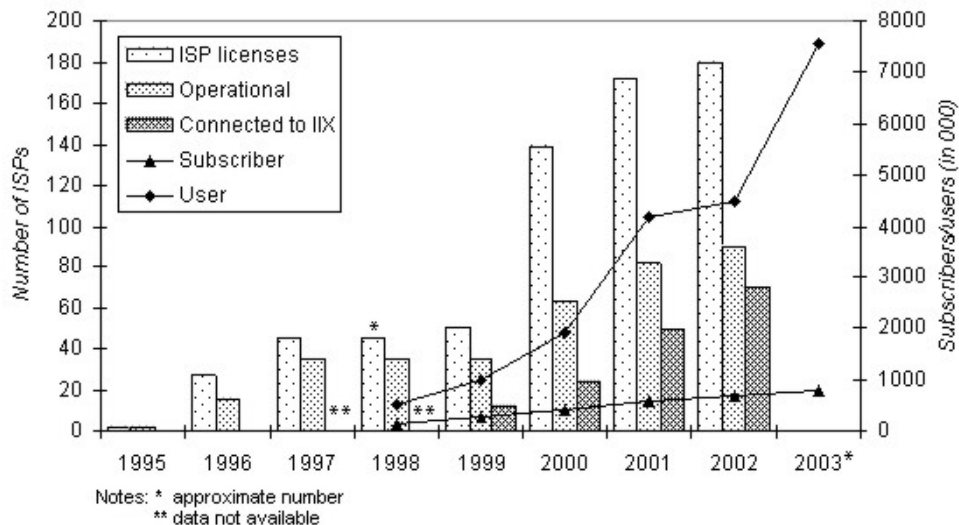


Figure 1. Number of Internet Users, Subscribers, and ISPs in Indonesia

Widespread public use of the Internet explains why the number of Internet users grew faster than the number of subscribers. Expansion of Internet access in poor areas is generally facilitated by arrangements for public use. Although fewer than 10% of Internet users in developed countries make use of Internet cafés [Liff and Laegran, 2003], two-thirds of Internet users in Indonesia gain their access through Internet cafés. These venues make computers available at various rates and connection speeds, enabling customers to search for information and communicate electronically

³ An ISP (Internet Service Provider) is a company that provides access to the Internet, e-mail accounts, and other services.

⁴ An Internet Exchange (IX) is a physical infrastructure facility allowing multiple ISPs to exchange Internet traffic.

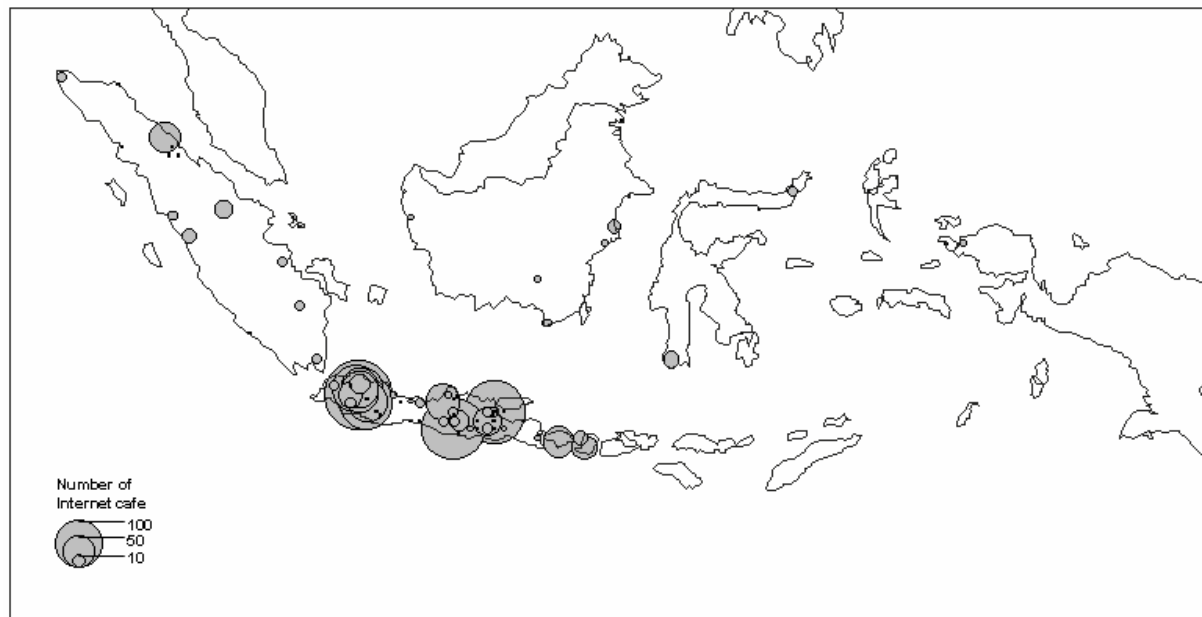
⁵ An Internet subscriber is someone who subscribes to Internet access from an ISP. An Internet user is an individual who uses the Internet but is not necessarily a subscriber.

⁶ The number of Internet users exceeded 8 million in early 2004 [Jakarta Post, 2004a].

via e-mail and on-line chat. Internet café employees provide valuable guidance in Internet use and information access to inexperienced users. In poor areas, Internet cafés offer an economically feasible means of accessing the Internet. Users pay not for equipment or leased lines, but only for the time they spend on-line.

Internet cafés in Indonesia are located primarily in the larger cities, around universities, and at tourist sites. The spread to smaller towns and villages has been slow. Rural areas lack committed business entrepreneurs. Few residents are sufficiently aware of the Internet to create demand. The telecommunication infrastructure does not always allow Internet services to be offered at prices that are affordable for low-income individuals yet high enough to yield a profit for investors. However, solar and satellite technology development is in progress, potentially supplying Internet access through kiosks or cafés also in remote areas of poor countries [James, 2003; The Economist, 2002]. For example, villagers with neither electricity nor telephone connections in remote areas of India and Laos are gaining Internet access. In addition to technological development, further spread will also depend on the attractiveness of the services that Internet connectivity can provide.

Known as *warnet* (*warung internet*), Internet cafés in Indonesia showed remarkable growth around the year 2000. Basuni [2001] estimates approximately 1500 Internet cafés were in operation in the country in 2001. In 2002, Purbo [2002] found that the number was 2,000. In our study, a combined list of Internet cafés from several sources supports this number. The cafés are highly concentrated and nearly all are found in the larger cities such as Jakarta, Surabaya, Bandung, Semarang, and Yogyakarta on the centrally located and densely populated island of Java. Other major concentrations of Internet cafés are located in the industrial city of Medan in Sumatra, west of Java, and the tourist sites of Bali and Lombok, located east of Java. The present distribution of Internet cafés is illustrated in Figure 2.



Sources: <http://www.natnit.net> , and field observations in Yogyakarta, Surabaya, and Lombok.

Figure 2. Map of Internet Cafés in Indonesia.

To reduce their dependence on the large-scale Indonesian telecommunication services, Internet café associations struggle to expand their own network and implement self-financed and

community-based networks [Purbo, 2002]. The Indonesian Internet Café Association (Awari) was founded in May 2000, and many regional associations sprung up (such as Awayo in Yogyakarta and Awaram in Mataram). They promoted the implementation of WLAN (Wireless Local Area Network) to provide access that is cheaper and faster (11-54 Mbps) than fixed line networks. (For an overview of various connection types, see Appendix 1. A structural overview of Internet café connection types is presented in Figure 3. Thanks to these efforts, the cost of Internet use in cafés in the largest cities of Java is relatively low, around 3,000 rupiah (USD 0.35)⁷ per hour. In contrast, Internet access costs approximately 25,000 rupiah (USD 2.94) in areas with less developed infrastructure and business competition, like certain areas of Lombok, and costs 4 USD per hour in Africa (Uganda) [Mwesige, 2003]. Prices are influenced by the quality and extent of infrastructure and by competition, which is influenced by demand for telecommunication services.

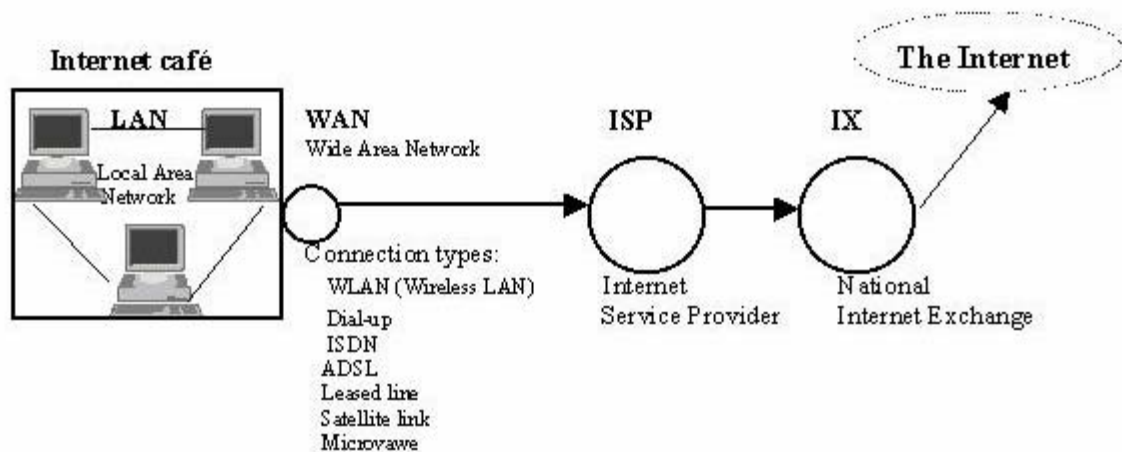


Figure 3. Internet Café Organisation and Connection Types

III. A THEORETICAL FRAMEWORK

The diffusion of innovation is the process by which a new technology or practice spreads through a population of potential adopters [Rogers, 1995]. Many previous studies concluded that the process is determined both by the attributes of the technological applications as perceived by the potential adopters and by the characteristics of different users [Corrocher, 2003]. Hägerstrand [1967] argued that the diffusion of innovation is a function of communication, and thereby normally influenced by physical distance. However, current research pays considerably more attention to social relationships among entrepreneurs and potential adopters who do the communicating. Therefore researchers' awareness is increasingly focused social structures and social prestige within specific geographical and cultural contexts of innovation diffusion [Redmond, 2002].

Based on our review of studies of entrepreneurship and innovation diffusion, we postulate that the speed and pattern of diffusion of the Internet café innovation is dependent on four factors:

⁷ 1 USD = 8,500 Indonesian Rupiah (IDR), November 2003

- the technology;
- the entrepreneurs who could implement the innovation at a new location;
- the local markets for Internet cafés; and
- the economic, social, and cultural contexts of the technology, entrepreneurs, and markets.

The four factors will be discussed below and some hypotheses will be derived under each. Figure illustrates the conceptual basis of the research.

THE TECHNOLOGY

In most innovation diffusion research, characteristics of the innovation itself or the associated technology receive primary attention. Five characteristics of the innovation influence its rate and pattern of adoption diffusion paradigm within studies of IT and society [Rogers 1995]. Potential adopters are more likely to accept an innovation if they perceive positively its (1) relative advantage, (2) compatibility, (3) trialability and (4) observability, and are not hindered by its (5) complexity. Measures of these qualities are used frequently in empirical research and, in most cases, explain between 50% and 90% of the variance in the rate of adoption [Rogers, 1995, p. 206]. A considerable body of IT acceptance literature arose as a consequence of Rogers' pioneering innovation diffusion paradigm within studies of IT and society [Kendall et al., 2001; Eastin, 2002].

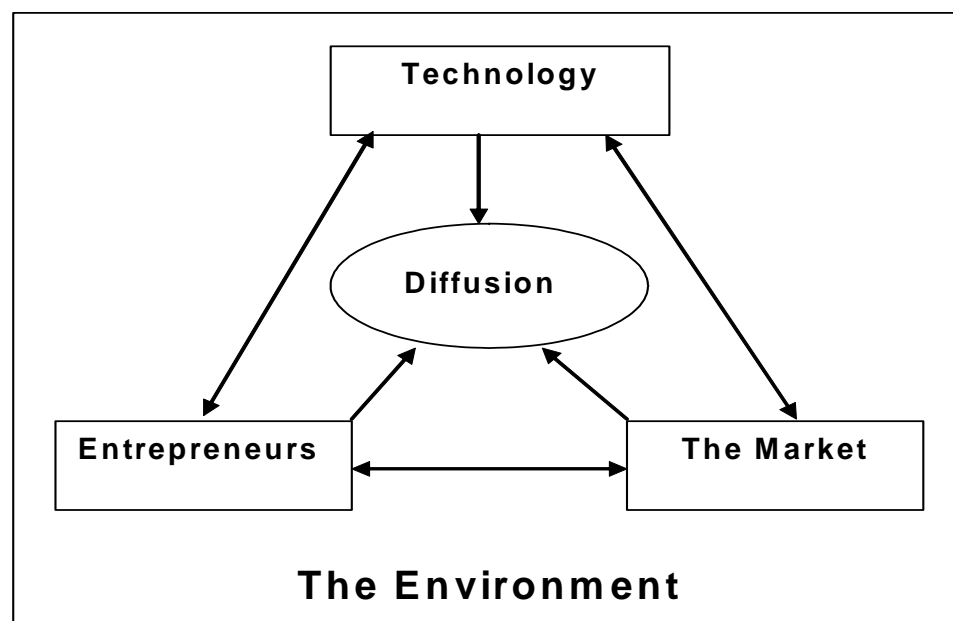


Figure 4. A Conceptual Model

The *relative advantage* of a business innovation is the perceived or calculated benefit of implementing that technology. Potential adopters will consider an innovation based on their

assessment of costs and benefits of adoption. However, the value of adopting an innovation at early stages of diffusion may be hard to quantify. Since advantages are often tacit, and total costs may be unknown, entrepreneurs may differ in their assessments of costs and benefits. *Compatibility* is the degree to which an innovation is perceived as being consistent with potential adopters' values, past experiences, and needs [Rogers, 1995, p. 37]. The term refers not only to technical features but also to socio-cultural values, traditions, and needs of potential adopters and their customers [Weiss and Dale, 1998]. Potential diffusion agents, or entrepreneurs, make assessments of innovations based on their objectives and perceived norms of conduct in the society. Usually, innovators and later adopters of tradition-breaking innovations differ significantly in their personality characteristics [Foxall, 1996; Gallivan, 2003].

Because of differences in their experiences, knowledge and skills, entrepreneurs or adopters will also perceive *complexity* differently. Complexity is normally a measure of the difficulty entrepreneurs perceive in adopting the technology and gaining the access to markets. The more technically knowledgeable and competent a person, the less complex they perceive the innovation to be [Kendall et al., 2001]. *Observability* is the degree to which benefits of the new technology are visible to potential adopters. *Triability* of innovations is the extent to which potential adopters can try a new technology before making an adoption decision. Being able to try out a new technology before deciding whether or not to adopt is an important benefit, especially for early adopters. Laggards can more easily learn from experiences among early adopters in their vicinity.

In most cases, it is not the objective qualities of the innovation that determines the speed and pattern of Internet café diffusion, but the entrepreneurs' or diffusion agents' perception of it. Market potential and contextual qualities strongly influence individual perceptions of technologies and business opportunities, probably more than measurable qualities of the innovation. We shall keep in mind the technology characteristics mentioned above in later discussion of the market and the environment. As a basis of our technology-related hypotheses, however, we shall more strongly emphasise the continuous change of technology and the related capital raising requirements in the innovation process.

Like many other innovations, the Internet café concept and technology are multifaceted and rapidly changing. Internet café proprietors in varying locations or times may use different technologies and business models. The currently popular WLAN technology is altogether different from the previously dominant dial-up connection, and a high-tech IT service-centre is unlike an Internet-connected games business. We shall include in the innovation diffusion perspective the question of *reinvention* and shall challenge the assumption that late business starters or 'laggards' are technologically less advanced than early adopters. On the contrary, we postulate that reinvention is a continuous process in the Internet café business and that both innovators, early starters, the late majority and laggards [Rogers, 1995, p. 42] will have to be innovative. Late adopters are not merely copyists but may bring about substantial new innovations in the industry [Brown, 1981]. Consequently, we set forth the following hypotheses:

Hypothesis 1: Since Internet technologies are continuously changing, all Internet cafés, both early and late established, will exhibit innovative change.

Hypothesis 2: Early adopters of the Internet café concept will have to expand and re-invest to keep pace with technological development and maintain a competitive position. They are therefore expected to require a higher level of capital reinvestment in comparison with later business starters.

THE ENTREPRENEURS

In addition to technological qualities associated with the innovation, innovation diffusion studies often include personal characteristics of adopters or potential adopters, such as demographic variables and education [Rogers, 1995]. Sinha [1996] found that in India the level of education influences entrepreneurial intention and promotes business success. Cummings [1996]

concluded that in many Asian countries, such as South Korea, Singapore, Taiwan, Malaysia, Thailand, and China, the extensive provision of education facilitated access to information and encouraged the entrepreneurial drive. In a technologically demanding business like computer and telecommunication operations, we can expect education to impact innovativeness and business performance substantially. Starting an Internet café is a relatively complex process in our study context, and entrepreneurs need substantial technical competence. Rogers [1995] distinguishes between knowledge as awareness, 'how-to-do-knowledge', and knowledge of the underlying principles of the technology. For the supplier of Internet services, all three levels of knowledge requirements must be fulfilled, and we shall therefore expect that the Internet cafés pioneers are technically well skilled.

Previous work experience is important. Many empirical studies of entrepreneurship find relationships between work history and variety of experiences, on the one hand, and innovative capacity and propensity to succeed, on the other [Burt, 1992; Sanchez and Perez, 1998]. From China, Murphy [2000] found that returned migrants use their experiences and new ideas for business creation to promote changes in their local environments. These mobile people represent dynamic agents of information transfer, creativity and entrepreneurship. Given the complexity of the Internet café technology and limited options for observability and triability at a certain location, early adopters will probably gain from geographical mobility and especially from the opportunity to obtain IT- related skills from other localities.

The amount and availability of entrepreneurs in a particular trade is also influenced by general psychological qualities and individual attitudes of potential innovators, such as the need for achievement, self-efficacy, and entrepreneurial intention [Kristiansen and Indarti, 2004]. The speed and pattern of Internet café diffusion depends on diffusion agents' perceptions of the technology and its business opportunities rather than on the technology's objective qualities. Bandura [1977, p. 3] pointed out that "people's level of motivation, affective status and actions are based more on what they believe than on what is objectively true". Ajzen [1991] argued that intentions mainly depend on perceptions of personal attractiveness, social norms and feasibility. Shapero and Sokol [1982] claimed that entrepreneurial intentions are dependent on individual perceptions of desirability and feasibility, and on the propensity to act.

A person's belief in his or her ability to perform a given task, called self-perception or self-efficacy, is crucial in the development of entrepreneurial intention [Ryan, 1970; Cromie, 2000; Kristiansen and Indarti, 2004] and, thereby, entrepreneurial behaviour [Kim and Hunter, 1993]. A person must have self-confidence to state that they possess the necessary leadership skills to be an entrepreneur. We believe that such self-confidence can be a predictor of early adoption of the Internet café innovation. Similarly, a high regard for one's mental maturity and social skills helps a person successfully establish a business based on a new innovation [Markman and Baron, 2003; Pajares, 2002]. Social networks help entrepreneurs reduce risks and transaction costs and improve access to business ideas, knowledge, and capital [Aldrich and Zimmer, 1986]. Perceived access to information and financial capital makes a clear difference between success and failure, both in the start-up and the running of a business. This perception seems to be true especially in developing economies, where both information and capital are generally in short supply [Barr, 2000; Kristiansen, 2002; Marsden, 1992; Steel, 1994; Meier and Pilgrim, 1994]. Rogers [1995] underscored the need for information and knowledge, especially in the decision-making phase of innovative actions. In the empirical analyses, we shall combine these individual qualities in a variable termed 'entrepreneurial readiness'.

Based on this theoretical discussion of entrepreneurial characteristics, we set forth the following three hypotheses about the function of diffusion agents in our study:

Hypothesis 3: Early adopters are more highly educated than later adopters.

Hypothesis 4: Early adopters have more advanced technical skills than later adopters.

Hypothesis 5: Early adopters have a higher level of 'entrepreneurial readiness' than later adopters.

THE MARKET

Brown [1981] made a distinction between a firm, or technological, innovation and a consumer innovation. The Internet café concept is actually both: it is a new idea for the supplier as well as for the users of that service. In the consumer behaviour and marketing science literature, a number of models describe diffusion speed and patterns. The external influence model assumes that adoption is driven by information from sources that are external to the adoption community. In this perspective, effective imitation among the members of the social system is irrelevant [Dos Santos and Peffers, 1998]. The external influence model may fit the early adopters of the Internet café innovation studied in our research. The internal influence model, on the other hand, assumes that adoption is driven by communication within a specific community or social system; intra-community imitation is the force of diffusion [Venkatraman, Loh and Koh, 1994]. The internal influence model may fit better for later adopters of the Internet café business and for the users of the cafés. From the users' perspective, the Internet café presents a variety of services and meets multiple needs. From a study of users of Internet cafés in Gujarat, India, Joshi [2001] found that more than 80% of the cyber café users are men, are young (15-35 years), and are students or highly educated. They used the Internet cafés mostly for accessing information and news and for communicating with others via e-mail.

Early business entrepreneurs often find that customers are slow to accept the technology; therefore, the potential benefits of early adoption can hardly be realised as early profitability [Dos Santos and Peffers, 1998], and technological followers are at an advantage. The number of customers needs to reach a critical mass before business becomes profitable. Davis [1989, p. 320] introduced the terms 'perceived usefulness' and 'perceived ease of use' to explain acceptance and rejection of information technology. Perceived usefulness is 'the degree to which a person believes that using a particular system would enhance his or her job performance'. Perceived ease of use refers to 'the degree to which a person believes that using a particular system would be free of effort'. Both concepts support the idea that young persons are the likely early contributors to creating a critical mass, or threshold level, for the introduction of the Internet café innovation in a new area.

Davis' original model has been modified and further developed by Venkatesh et al. [2003] into the Unified Theory of Acceptance and Use of Technology (UTAUT). This model includes the influence of gender and age on performance, effort expectancy, and behavioural intention. This model supports the observation that young people in Indonesia are generally eager to learn, fascinated by technological progress, and easily amused by web plays and chatting. Young people are also likely to be in a position to use Internet café facilities to enhance performance at a later stage in their lives. Tourists are another valuable market segment for Internet cafés in Bali, Lombok, Yogyakarta, and other areas of Indonesia. Many visitors from abroad use the Internet, can afford access, and are in need of communication with the external world.

Purchasing power and general consumer awareness also influence the market for Internet café services. In his study of Internet users in Uganda, Mwesige [2003] found that they are typically young and educated, with a reasonable disposable income, and the necessary technical and communication skills to be online. Many people, especially in rural areas of Indonesia, still lack the income and the awareness necessary to constitute a profitable market for Internet café businesses. Awareness creation is generally much faster in urban areas, where innovations also generally spread more rapidly in outward-oriented and 'modern' milieus, and where communication networks are manifold. A 'modern' milieu is characterised by people's exposure to progressive ideas and propensity to change behaviour, instead of being tradition-bound and conformist. Likewise, a modern economic context is relatively wealthy and based on various sources of income, while a traditional society is poorer and based dominantly on agricultural earnings [Escobar, 1995]. Young and educated people in urban areas are more likely to have

both the awareness and the purchasing power necessary to create a sufficiently large market for Internet café services.

We conclude this section by presenting the following hypothesis:

Hypothesis 6: The early Internet café market is characterised by young customers, who are well educated and relatively wealthy.

THE ECONOMIC, TECHNOLOGICAL AND SOCIO-CULTURAL ENVIRONMENT

Several economic, technological and socio-cultural qualities of the environment influence the diffusion of the Internet café innovation. As mentioned earlier in this paper, per capita income is an important factor explaining Internet diffusion globally. In Indonesia, where the Internet is predominantly accessed publicly through Internet cafés, low incomes may still hinder the development of a profitable market, especially in rural areas.

Physical infrastructure influences the availability and attractiveness, and hence adoption, of the Internet [Wolcott et al., 2001]. A comparison of Internet diffusion in Turkey, Pakistan, India and China [Wolcott and Goodman, 2003] showed that China is considerably more successful in enabling Internet availability for its citizens. One reason is China's ability to roll out extensive high-capacity nation-wide telecommunication infrastructure. Bazar and Boalch [1997] and Arnum and Conti [1998] also documented that telecommunication infrastructure plays a crucial role in the spread of the Internet.

Kling [1999] argued that Internet use is influenced by technological as well as social access. Technological access refers to infrastructure and the physical availability of computer hardware and software, whereas social access refers to the mix of professional knowledge, economic resources, and technical skills required for the use of IT. People's capabilities and eagerness to change and adopt new innovations are influenced by their socio-cultural contexts [Shapero and Sokol, 1982]. Social norms and cultural values, however, are probably more predictive of entrepreneurial intention and the adoption of new innovations in collectivist cultures than in individualistic societies. Hofstede [1997] characterized Indonesia as a collectivist society, where collectivism refers to the tendency to be willing to sacrifice personal interests for the attainment of collective well-being. Individualism, on the other hand, is defined as the degree to which people prefer to act as individuals rather than as members of groups. Using Hofstede's [1997] cultural dimension framework, La Ferle, Edwards, and Mizuno [2002] found that culture plays a determining role in the spread of the Internet. Adoption is slower in collectivist societies than in individualistic ones. Begley and Tan [2001, p. 549] state that "cultural values may hold sway more powerfully in societies that emphasize conformity rather than prize individuality". Begley and Tan [2001] included Indonesia in the group of East Asian countries where culture-level social status predicted entrepreneurship interest significantly. In our case, neither Internet technology nor the café culture is consistent with traditional Indonesian customs and values. It can be expected that the service will be first implemented in 'modern' parts of the society: urban areas that are close to universities or that contain a substantial number of professionals working in globalised enterprises.

The combination of and inter-play between technological, economic, and socio-cultural characteristics of the environment leads us to the last hypothesis for empirical analysis:

Hypothesis 7: Internet cafés spread first in urban areas characterised by advanced infrastructure and a population with reasonable incomes and 'modern' values.

IV. DATA COLLECTION AND METHODOLOGY

The paper is based on a survey of Internet cafés in Indonesia. Three geographical areas were selected for study: Yogyakarta, Surabaya, and Lombok. Yogyakarta is a university city where a large proportion of the population is students at the 100 institutions of higher learning found in the

small province. Surabaya was selected because of its dominant role as an industrial city in Indonesia with a high number of modern manufacturing and service industries. On the island of Lombok in the province of Nusa Tenggara Barat (NTB), tourism is a dominant industry. The three study areas are economically relatively well developed and centrally located within Indonesia. However, Lombok differs from the urban, Javanese study areas. Compared with the cities of Surabaya and Yogyakarta, its infrastructure is less advanced and its lifestyle is a more traditional..

The selection of Internet café owners to be included in the survey was made on the basis of an overview of the total population of Internet cafés in these three locations. This overview was obtained from various sources, of which <http://www.natnit.net> was the most complete, listing approximately 1500 Internet cafés in Indonesia. We corrected the list during fieldwork when we found that some cafés were closed down and others were newly established. We excluded from our survey a small number of Internet cafés owned and operated by larger institutions, like universities and private or government companies. Our final survey pool included 130 cafés in Yogyakarta, 100 in Surabaya, and 30 in Lombok.

Having conducted preliminary interviews with several owners and users of Internet cafés in Yogyakarta, we developed a questionnaire in Indonesian as the main research instrument. We tested the questionnaire in a pilot study in December 2002, and refined the instrument before the final data collection in January 2003. Respondents are all owners of the sampled Internet cafés. The questionnaires were distributed using a "drop-and-collect" procedure. Two or three days after delivering the questionnaires, we collected them from the Internet café owners. While collecting the questionnaires, we checked the completeness of information provided and gave a souvenir to those who returned the filled-in forms.

A clustered-proportional sampling was used to select respondents. The area of Yogyakarta city was divided into five geographical clusters based on main lines of demarcation. A north-south distinction was made using the railway as divider. The northern area was divided into three clusters, and the southern into two based on the main road partitions. We distributed 66 questionnaires randomly to around 50% of the total population of cafes in each cluster. We received 44 responses, of which 43 were usable. A similar procedure was deployed in Surabaya, dividing the town into four geographical clusters partitioned by main highways. We distributed 50 questionnaires and received 41 responses, 39 valid. The island of Lombok was divided differently: one educational cluster that is in the vicinity of educational institutions in the capital town, one shopping-mall cluster, and one tourism area cluster. Approximately 30 Internet cafés are in these three clusters. We distributed the questionnaires to 50% of the total population in each cluster and received 11 responses, all of them valid. On average, our response rate was 73%.

To complement the data from the questionnaires, we conducted in-depth interviews with five Internet café owners and 20 users in Yogyakarta and Lombok. The qualitative information helped us interpret some of the quantitative data.

In all, ninety-three Internet café owners responded to our survey. The average age of the Internet cafés is 3.4 years, varying between one and eight years. We asked about the year of establishment. Nine cafés were in operation before 1999, 63 were started in 1999 and 2000, while 21 are 'late starters', established in 2001 and 2002. Table 1 shows descriptive statistics from the survey.

V. EMPIRICAL ANALYSES

From previous findings in innovation diffusion research we expect to find an S-shaped diffusion curve for Internet cafés at the locations studied in Indonesia. The varying speed of diffusion is

Table 1. Descriptive Statistics of Internet Cafés and Entrepreneurs

	<i>n</i>	%		<i>n</i>	%
<i>Location of cafés</i>			<i>Age (years)</i>		
Yogyakarta	43	46.2	<= 25	14	15.7
Lombok	11	11.8	26-30	35	39.3
Surabaya	39	41.9	31-35	19	21.3
			36-40	9	10.1
			> 40	12	13.5
<i>Café start-up time</i>			<i>Work experience</i>		
Early starters (before 1999)	9	9.7	Never	31	33.7
Medium starters (1999-2000)	63	67.7	Yes	61	66.3
Late starters (2001-2002)	21	22.6	Public	7	11.1
			Private	33	52.4
			Self-employed	23	36.5
			Non-IT related	35	59.3
			IT related	24	40.7
<i>Gender (Entrepreneur)</i>					
Female	10	10.8			
Male	83	89.2			
<i>Education level</i>					
Elementary school	1	1.1			
Junior high school	1	1.1			
Senior high school	9	9.7			
Diploma III	10	10.8			
Bachelor	64	68.8			
Master	8	8.6			

illustrated in Figure 5. We observe a slow spread of the cafés in Indonesia in the late 1990s followed by a faster diffusion in 1999 and 2000 and a slower spread again in 2001 and 2002.

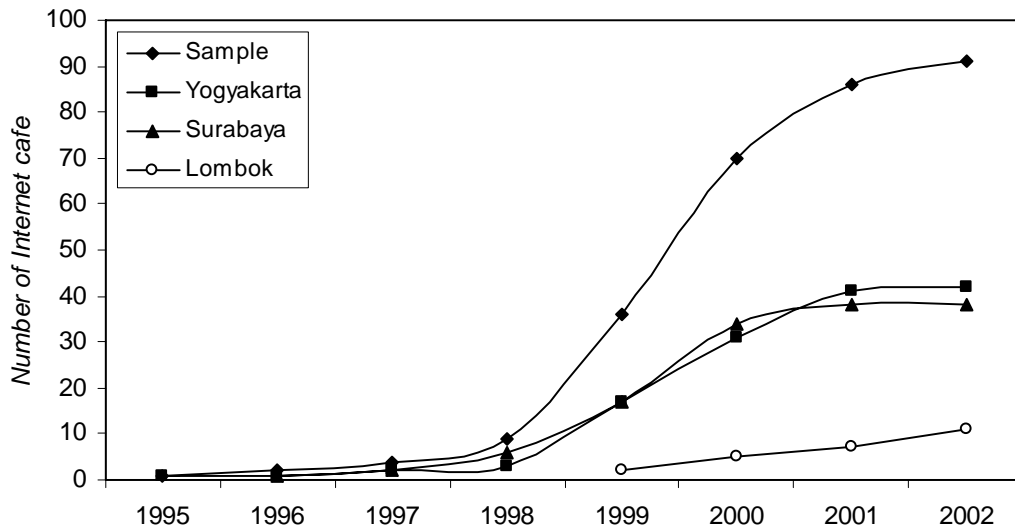


Figure 5. Diffusion Curves for Internet Cafés in the Study Areas

Traditional diffusion studies typically divide the adopters into innovators (first 2.5%), early adopters (next 13.5%), early majority (next 34%), late majority (next 34%), and laggards (last 16%) [Rogers, 1995, p. 252, Wolcott et al. 2001, p. 10]. In the following analyses, early starters (10% of respondents) correspond to innovators and early adopters in traditional diffusion studies. Medium starters (67% of our respondents) correspond to the early and late majorities, and our late starters (23% of respondents) correspond to the 'laggards' category. We compared the three groups in their use of technology, entrepreneurial, and market characteristics, and contextual qualities, as discussed Section III on theory. The distinction among the three groups is based on the time of establishment. We shall return to a discussion of analytical challenges related to similar time categorisation for various locations.

TECHNOLOGY

Table 2 shows the initial connection technology. Two-thirds of early starters initially used dial-up links, whereas less than one-fourth of the late starters used that technology. Altogether, 37 cafés started up using dial-up connection. Of these, 20 later changed to the more advanced technologies, while the remainder still use dial-up. Only one of six early starters continues to use dial-up connections. Among the late-starters, WLAN is the dominant connection technology (57.1%). Using a Chi-square test, we found significant differences ($\chi^2 = 12.34, p < 0.10$) in the types of initial Internet connection among early, medium and late starters.

Table 2. Initial Connection Technology

	Dial-up (%)	Leased line (%)	WLAN (%)	Others (%)
Early starters (before 1999)	66.7	0	11.1	22.2
Medium starters (1999/2000)	44.1	15.3	37.3	3.4
Late starters (2001/2002)	23.8	9.5	57.1	9.6

Our in-depth interviews with the Internet café owners indicated that the quality of the physical connection, measured as speed and reliability, is the most important consideration in the choice of technology. As stated by 'Yan', who opened his Internet Café in Mataram in 2000: "Nowadays, customers compare access speed, and the quality of infrastructure is very important. The advantage of this Internet café, compared to my competitors, is the connection. I am the only one who use my own leased line connection and I can guarantee connection stability". Price also matters, especially in the present competitive environment, which has an abundance of new establishments and a stagnant market. Several cafés using dial-up connection in Yogyakarta closed down in 2001 and 2002 because their rates were not competitive. The use of a more advanced technology for Internet connection (i.e. WLAN) among most of the later starters indicates that they are not copyists but bring innovative changes. A leading Internet café owner in Yogyakarta explained how competition and a relative deterioration of connection speed over time caused 15 café owners, of which several were late starters, to collaborate and jointly lease an advanced bandwidth connection from Broadband Network Asia.

The above discussion supports our first hypothesis: The Internet café technology is in incessant change, and later adopters are also innovative.

Our second technology hypothesis relates to required capital investments. Using the one-way ANOVA statistical analysis, Table 3 shows a significant difference in initial capital investment between medium and late starters ($F = 3.298, p < 0.05$), which cannot be explained by inflation. The technical requirements of computers increased, while the price of computers with up-to-date technology was relatively stable during that period (1999/2000–2001/2002). Our in-depth interviews indicate that investments increase over time because of a higher number of computers per café, improved quality, and the provision of additional services in the cafés. According to 'Pieter', the manager of a family-owned Internet café established with 7 computers in Yogyakarta in 1997:

We had to enhance the business gradually during the years. In 1999 we invested in 13 new computers and upgraded the old ones with more RAM and better communication equipment. With this infrastructure it's possible to offer computer games as well, our only additional service so far. The next step will be to upgrade from dial-up connection to faster, and more expensive, communication technology, like WLAN.

The average initial capital investment for all cafés in the study is 104.33 million rupiah (USD 16,500) (standard deviation: 70.72). The average number of computers per café is 15. Several businesses, however, were initiated with investments below 30 million (3,500 USD). The lowest reported start-up capital investment was 20 million rupiah (USD 2,350). Table 3 depicts the initial and accumulated investments for the three groups of starters.

Table 3. Capital investment

	Initial investment (million rupiah)	Accumulated investment (million rupiah)	Level of reinvestment (%)
Early starters	84.0	180.0	160.0
Medium starters	93.2	126.0	47.7
Late starters	138.5	151.7	11.2

As can be seen from Table 3, early starters have the highest level of reinvestment, which reflects the ratio between accumulated reinvestment and initial capital instalment. Using one-way ANOVA, we find that there is a statistically significant difference between the early starters and the two groups of later starters ($F=10.179$, $p<0.01$). We find support for our second technology hypothesis: Early adopters have to expand and re-invest to keep pace in technological development.

THE ENTREPRENEURS

As can be seen in Table 4, the level of education is very high among the café entrepreneurs in our study. All early starters are university educated. However, the vast majority of later starters also have tertiary education, only partly substantiating hypothesis 3, which states that early adopters have a higher level of education than later adopters. Differences in levels of education among the three groups of starters are small and statistically insignificant. We therefore conclude that higher education is a distinctive characteristic of all Internet café starters. Our data show that higher education of diffusion agents is not necessarily related to engineering or technical training. Educational backgrounds from other disciplines are also common. Intelligence, rationality, a broad perspective, and a general understanding of society may be as valuable as technical education for diffusion agents [Rogers, 1995]. The lack of formal IT education can probably be compensated by an eagerness to learn and the capacity to enter into the field of IT expertise. 'Agus', of Chinese origin, used to sell perfumes before starting his Internet café in Yogyakarta in 1999. He is a non-IT graduate from Gadjah Mada University and lacked any IT experience before start-up. His ability to learn compensated for his weak initial competence: "Initially, I did a survey of Internet cafés to learn and I'm still learning, mainly from my colleagues".

Table 4. Entrepreneurial Characteristics

	University education (%)	IT-related work experience (%)	Entrepreneurial readiness
Early starters	100	66.7	4.3
Medium starters	85.3	35.1	3.8
Late starters	90.5	33.3	3.8

Regarding technical skills, the entrepreneurs report that they obtained the competence necessary for starting and running their Internet café business from self-learning (70%) and practical experience (13%), not from formal education. Around two-thirds of all business starters had previous work experience. The difference in work experience between early and later starters is significant. As depicted in Table 4, two-thirds of early starters have IT-related work experience, compared with around one-third of the medium and late starters. A high number of the early starters also have work experience from other geographical areas. These findings support hypothesis 4, stating that early adopters have more advanced technical skills than later adopters.

In our questionnaire, we included five questions on which the respondents marked their level of agreement on specific items (1=strongly disagree; 5=strongly agree). The five questions concern perceived leadership skills, mental maturity and social skills, social networks, and access to sources of information and financial capital. Answers to the five questions are combined in a multiple-item scale to reduce measurement errors [Krueger et al., 2000] and ensure that the assumption of interval level measurement is more tenable than for single-item scales [Remenyi et al., 2000]. The combination of the five items constitutes a variable that we have termed 'entrepreneurial readiness', which is closely related to the variable entrepreneurial orientation that has been used in other studies [Swierczek and Ha, 2003; Covin and Slevin, 1989]. Average scores are depicted in Table 4.

We find that the entrepreneurial readiness score for early starters are substantially higher (4.3) than for medium and late starters (3.8). Applying a one-way ANOVA analysis, we conclude that the difference is statistically significant ($p < 0.10$) and supports hypothesis 5, which states that early adopters have higher entrepreneurial readiness than later adopters.

THE MARKET

We included questions about main target market groups and the current exact market shares that various segments represent. The first is a measure of the entrepreneurs' perceptions of market groups at start-up. For example, among early starters, 88.9% regarded students as a main market segment and 55.6% view youngsters as a main target market. The second measure is of groups' present real market shares, which total 100%.

Generally, the target market groups were the same for the early, medium and late Internet café starters. Students dominated throughout, and youngsters contributed substantially to the intended market for around 50% of the café entrepreneurs. Professionals and tourists created important target market segments for around 30% of the cafés. Students and tourists constituted slightly larger target market groups for early starters than for late starters. Table 5 indicates percentages of café owners that targeted the various market segments at start-up time.

Table 5. Main Target Market Groups

	Students (%)	Professionals (%)	Tourists (%)	Youngsters (%)
Early starters	88.9	33.3	33.3	55.6
Medium starters	88.4	39.3	27.1	47.5
Late starters	76.2	33.3	23.8	52.4

Figures for the real current market segments are somewhat different from the figures in Table 5, which depict the intended target markets of the entrepreneurs, and are not comparable. For all the three start-up groups, students presently represent the main market segment (an average of 59.3% of total market), while the current market segments of professionals, tourists, and youngster represent 13.5%, 9.0% and 14.4% respectively. (Other types of customers comprise 3.8%.) 'Hernawan', a café manager in Yogyakarta, told us that his Internet café was established at that specific location because "...it is close to university campuses and boarding houses. Students are our target market. I have a philosophy: I will never die when there is gold.

Yogyakarta is the mining field. It depends on us to utilise it. There are many students in Yogyakarta.”

In conclusion, young people (defined as students and youngsters) constitute approximately 75% of the current market for the studied Internet cafés, and most of them are well educated. Hypothesis 6, stating that the early Internet café market is characterised by young customers, who are well educated and relatively wealthy, is partly supported. We lack statistical data, however, to substantiate the part of the hypothesis concerning relative wealth. This issue will be followed up in a user survey. Qualitative data indicate that Internet café users are far wealthier than average Indonesians.

Our in-depth interviews with users of Internet cafés in Yogyakarta and Lombok identify four main reasons customers visit the cafés: (1) communication through e-mail, (2) chatting, (3) searching for information, and (4) entertainment. Entertainment includes downloading music, visiting pornographic sites, playing Internet games, and gambling. In Yogyakarta and Surabaya, many Internet cafés stay open 24 hours to meet the customers' demands. The following customer cases from Yogyakarta and Lombok are typical. 'Adhian', a male 20 years old university student spends approximately eight hours per month in his favourite café. The price (25,000 rupiah / USD 3), he says, "is affordable and normal." 'Tia' (18) just finished her high-school education and is still jobless. She loves chatting, and the cost, 50,000 rupiah (USD 6) per month, is "reasonable," according to her.

THE ENVIRONMENT

When analysing the spread and use of the Internet in a complex and heterogeneous society like Indonesia, one must take into consideration region-specific cultures, community characteristics, and the social embeddedness of Internet café entrepreneurs and their customers. The country includes more than 300 ethnic groups with different languages, traditions, and identities. Differences in living standards and socio-cultural conditions are huge between urban and rural areas and between 'inner' and 'outer' islands. Our aggregate data on Internet café locations in Indonesia clearly reveal the concentration in larger cities and 'inner islands' (Java and Bali), as was illustrated in Figure 2.

In our survey, Surabaya is the most typical example of a centrally located, modern, industrialised city with a decent living standard for a substantial share of its three million residents. With a population of 500,000, Yogyakarta is a unique combination of modern values, represented by the large share of young students, and rich cultural traditions of the Sultanate capital. Lombok is a part of the 'outer islands', yet geographically close to Bali. The island is still predominantly rural and exhibits traditional value systems and lifestyles. Its capital city of Mataram, however, is increasingly a centre of education with a leading provincial university, several private colleges, and a high number of government and private secondary schools. Certain parts of the island received a substantial influx of foreign tourists. All selected Internet cafés in our study are located within the capital or tourist areas.

Table 6 depicts the dominance of Surabaya as the choice of location for early starters of Internet cafés. Combining the early and medium starters, we find that entrepreneurs in the two Javanese cities represent 93% of all Internet cafés established before 2001 in our sample.

Table 6. Location of Internet Cafés

	Yogyakarta (%)	Surabaya (%)	Lombok (%)
Early starters	33.3	66.7	0
Medium starters	45.9	45.9	8.2
Late starters	52.4	19.0	28.6

Within the three study regions, we find support for the hypothesis that a 'modern' environment is important for the choice of location. In Surabaya, most of the cafés are found in the south-western part of the city, around the large university campuses. Similarly, in Yogyakarta we see a geographical concentration of the cafés in the northern areas of the city, close to the universities. According to one Internet café owner in Yogyakarta, "the awareness of people here to use the Internet is high, and this is conducive for the business." In Lombok, apart from a few cafés at typical tourist sites, the majority of Internet access points are found around the institutions of higher learning in the modern part of the capital city. Most students in Indonesia come from wealthy families and create a local environment around universities characterised by above-average purchasing power.

In-depth interviews with business starters clearly point to the importance of awareness and infrastructure. 'Ali', an owner of an Internet café in Yogyakarta originates from the city of Palembang, Sumatra. He was asked if he would like to open another Internet café in his hometown.

No, I wouldn't. Unlike Yogyakarta, awareness among people to use the Internet there is low. Yogyakarta people are more open compared with Palembang people and generally have a higher educational level than people in Palembang. In addition, the infrastructure for running the Internet is limited there.

The monthly cost of a 64 Kbps leased-line connection in Mataram is six million rupiah (USD 700), compared with two million (USD 235) in the larger Javanese cities. According to both owners and users of Internet cafés in Lombok, diffusion of that innovation is still slow there due to the high price, the low-speed, and unreliability of connections.

Altogether, our findings support hypothesis 7 stating that Internet cafés spread first in urban areas characterised by advanced infrastructure and a population with reasonable incomes and 'modern' values.

VI. CONCLUSION, PROSPECTS FOR FURTHER RESEARCH, AND POLICY RECOMMENDATIONS

This paper has searched for characteristics of early Internet café entrepreneurs in Indonesia and for lessons learned that may be applied to diffuse Internet cafés into more peripheral and less developed areas. Unequal information access among social groups and geographical areas leads to increasing gaps in economic productivity and political participation [Arunachalam, 2003; Keskinen, 2001]. ICT is crucial for enterprises, communities and individuals to participate successfully in the global economy [Hollifield and Donnermeyer, 2003]. Those who want to be competitive must have access to information and emerging knowledge and skills. Public access to information and to the Internet increases transparency of governance and promotes the development of e-government in poor countries, both of which are important elements in fighting corruption and the moral hazard related to information asymmetry [Transparency International, 2003; BAPPENAS, 1999].

Public Internet access points could contribute substantially to enhanced information availability, especially in economically poor areas of developing countries. Two-thirds of Internet users in Indonesia gain their access through Internet cafés. The main objectives of this study, therefore, have been to contribute to a discussion of the role of information diffusion agents in the Internet café business and to learn from early adopters' experiences in order to develop strategies to bridge the information divide.

Most of the Internet café entrepreneurs in the study are young and almost 90% of them are males. The vast majority of the early entrepreneurs used dial-up connection technology, while later starters prefer the newer WLAN technology. Capital entry barriers are relatively low in the business. Some café owners succeeded with little more than a 2,000 USD investment.

Our study is grounded on previous innovation diffusion and entrepreneurship research. Because our aim is to explain differences among diffusion agents more than among technologies, the common five technology qualities in innovation diffusion research (relative advantage, compatibility, trialability, observability and complexity) are emphasised less than characteristics of entrepreneurs, markets and environments. In the analyses, a distinction is made among three groups of business starters or diffusion agents, based on their time of establishing the Internet cafés. We have partly followed Rogers' [1995] differentiation between innovators and early adopters, early and late majority, and laggards. Hypotheses were formulated to test differences between early, medium and late starters and to find variances between diffusion patterns in more and less centrally located and 'modern' areas of Indonesia.

THE HYPOTHESES

Hypothesis 1 states that since Internet technologies are continuously changing, all Internet cafés will exhibit innovative change. We found that late starters are also innovative in their choice of technology and that their initial investment is high compared with early starters. The common distinction between 'innovators' and 'laggards' is blurred when examining Internet café technologies in the Indonesian context. Our second hypothesis, that early adopters need to expand and re-invest to maintain a competitive position, is verified. Obviously, competition becomes tougher and capital requirements higher at well-established sites in the café business, and we presume that many entrepreneurs could find alternative and more profitable locations for their Internet cafés outside of the pressure areas. A remaining question is why entrepreneurs remain at high-pressure locations instead of moving to new areas of emerging markets.

Hypotheses 3, 4 and 5 are related to qualities of the entrepreneurs. We found that education at a university level is a distinctive characteristic of all Internet café starters, not just the early starters. However, we found statistically significant differences in IT-related work experience and entrepreneurial readiness among the groups of starters. It takes more of both to be an early starter. We believe that potential business starters with IT competence and entrepreneurial readiness could easily be attracted to an alternative location, even in the periphery, if business preconditions were met. This assumption is based on the fact that geographical mobility is generally high among young and educated people in Indonesia, and that many early starters of Internet cafés already have work experience from other regions.

Hypothesis 6 addresses market characteristics, stating that the early Internet café market is characterised by customers who are young, well educated, and relatively wealthy. We found only small differences among the three groups of starters and that young people, mostly well educated, represent 75% of current customers for the Internet cafés. High school and university students constitute a particularly important market segment. Given the high numbers of young and educated people from relatively wealthy families even in smaller towns in rural or peripheral areas of Indonesia, we believe that a sufficient demand for Internet café services could easily be established at many more locations. Potential entrepreneurs could be encouraged to establish their Internet café business at new locations, if infrastructure so allowed and if supported by some deliberate awareness creation among potential customers.

Our last hypothesis deals with the environment. Our statistical data support the assertion that Internet cafés spread first in urban areas having advanced infrastructure and a population with reasonable incomes and 'modern' values.

OTHER RESEARCH FINDINGS

The research indicates some differences between early, medium and late starters, especially in entrepreneurial readiness and previous IT-related work experience. Similarities among the groups are more apparent than the differences, however. Early, medium, and late starters are similar in levels of education, technological adaptability, and targeted and real market segments.

In spite of the S-shaped curves reflecting the innovation diffusion process at two of the three study locations, at a national level Internet café business starters in Indonesia can still be

regarded as pioneers in the dissemination of the new technology and accompanying information. It should be underscored that our categorisation of diffusion agents or business starters is based on a national and not an intra-regional comparison of start-up times. For instance, most pioneering entrepreneurs in Lombok are classified as late starters. We emphasised the relative advancement of all the three study regions within a national context, while searching for a strategy for diffusing the Internet café innovation into more rural and remote areas of the country. We found that connection speed and reliability are increasingly important for the establishment and competitiveness of Internet cafés, and conclude that the price and quality of ISPs in remote areas represent main obstacles in the diffusion process.

LIMITATIONS

Our empirical analyses contain certain limitations. In spite of the short time span under scrutiny (the oldest Internet café is only eight years), we have predominantly based the analyses on the distinctions among three groups of starters. The combination of the limited total sample ($n=93$) and a relatively low percentage of 'early starters' (10%) makes this group small for statistically significant conclusions. Variances between entrepreneurs who start their Internet café business at various points in time could be analysed better if a larger sample of respondents were available. Also, the study would gain from a larger representation of study areas and a combination of local and national criteria for the categorisation of business starters into groups. For example, an early starter in a peripheral area would be a late starter nationally.

FUTURE RESEARCH

This study generated additional ideas for further research. More elaborate studies could be made of the market for Internet café services. Using Internet cafés to spread of information could be a profitable business, as long as public infrastructure is available and the market is sufficiently large. Competent entrepreneurs are available, even outside of Java and major cities, due to the relatively high levels of education, high unemployment rates, and geographical mobility. Therefore, the further spread of Internet cafés is dependent on infrastructure and market development. We already initiated a study of motives and behaviour of current and potential Internet café users at various locations. Only by knowing more about the demands of Internet café customers can we obtain a more comprehensive understanding of information access through the Internet. In addition, more research is needed on the relationship between the socio-cultural environment and the function of information diffusion agents and their customers.

RECOMMENDATIONS

This study recommends government intervention in infrastructure development and awareness creation for a more equitable spread of public access to the Internet. Diffusion agents are available, as long as the market and the infrastructure allow them to operate. Internet cafés multiply rapidly as soon as profitability is proven at a certain location. They popped up very quickly in our three study areas as soon as the first ones were filled with customers. Government agencies could play a stronger role in the creation of demand for Internet use, even in peripheral areas with low incomes per capita. People should be provided opportunities to observe and try information technology and modern information access points. This approach could be made through institutions in rural communities, such as secondary schools and local government offices. Finally, in spite of ongoing privatisation, government institutions should take a responsibility for equitable IT infrastructure development over the vast Indonesian territory, making the Internet accessible at reasonable prices even in peripheral areas.

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EDITOR'S NOTE: The following reference list (and references in the text) contains the address of World Wide Web pages. Readers who have the ability to access the Web directly from their computer or are reading the paper on the Web, can gain direct access to these references. Readers are warned, however, that

1. these links existed as of the date of publication but are not guaranteed to be working thereafter.
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APPENDIX 1. INTERNET CONNECTION TYPES

Connection	Speed	Price (rupiah)/month *	Description **
Dial-up	56 Kbps	Rp 1.500.000 (USD 176)	Dial-up connections use traditional copper lines and modems, over a public telephone network, to transmit signals between computer devices. Dial-up connections offer the slowest transmission speeds.
ISDN	64 Kbps ++	Rp 2.500.000 (USD 294) (64 Kbps)- Rp 7.000.000 (USD 824) (128 Kbps)	Abbreviation of <i>integrated services digital network</i> , an international communications standard for sending voice, video, and data over digital telephone lines or normal telephone wires. ISDN support data transfer rates of 64 Kbps (64,000bits per second).
ADSL	1.5 Mbps ++	Rp 5.000.000 (USD 588) (for 64 /512 Kbps)	Short for <i>asymmetric digital subscriber line</i> , a technology that allows more data to be sent over existing copper telephone lines. ADSL supports data rates of from 1.5 to 9 Mbps when receiving data and from 16 to 640 Kbps when sending data.

Connection	Speed	Price (rupiah)/month *	Description **
Leased line	64 Kbps-2048 Kbps	Rp 4.700.000 (USD 553) (64 Kbps) – Rp 82.100.000 (USD 9,659) (2048 Kbps)	A permanent telephone connection between two points set up by a telecommunications common carrier. Unlike normal dial-up connections, a leased line is always active. The fee for the connection is a fixed monthly rate. The primary factors affecting the monthly fee are distance between end points and the speed of the circuit. For example, a T-1 channel is a type of leased line that provides a maximum transmission speed of 1.544 Mbps.
WLAN	11-54 Mbps	Rp 800.000 (USD 94) (64 Kbps, for the first 100 hours plus Rp 187/minute overtime) – Rp 1.280.000 (USD 151) (128 Kbps, for the first 100 hours and Rp 320/minute overtime)	Acronym for <i>wireless local-area network</i> . A type of network that uses high-frequency radio waves rather than wires to communicate between nodes.

Notes:

*) Monthly price varies from ISP to ISP.

**) The descriptions are mainly copied from Webopedia (<http://www.webopedia.com/>).

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