

Grounding Global Flows: Constructing An E-Commerce Hub in Singapore

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Abstract

Much of the contemporary literature on cyberspace seemingly underestimates the extent to which technologically-mediated flows are grounded in physical places. In this paper, we use the general concept of “nodes in global flows” to explore the potential for particular localities to emerge as hubs within the rapidly-emerging world of electronic commerce (EC). This material grounding of EC can be attributed to three characteristics of the emerging WWEC: the social and symbolic dimensions of electronic flows, the key roles of logistics and distribution, and the necessity for supportive institutional and policy frameworks. Singapore provides us with an excellent case study with which to develop our argument, due to the wide-ranging efforts of the government to establish the city-state as a premier EC hub in the Asia-Pacific region. We profile and evaluate recent government initiatives to create this hub, and consider some preliminary evidence as to the current level of development of EC markets in Singapore. By way of conclusion, we consider some implications of our analysis for other IT-oriented economies in Asia.

Introduction

The late 20th century has witnessed the emergence of a global economy qualitatively different from its predecessors. This “new” global economy is characterised by the increased spatial and functional integration of economic activities, facilitated by significant improvements in transport and communication technologies (Hepworth, 1989; Dicken, 1998). These globalisation tendencies have allegedly produced rather different geographical organisations of economic and social life characterised by the domination of “global spaces of flows” and an emerging “network society” (Castells, 1989; 1996). Networks, in their social and business variants, are forming the backbone of today’s global economy. Strategic embeddedness in global networks has become a dominant mode of organising economic and social life across the world. More importantly, embedding into global networks has come to be posited as a highly effective development strategy for nations and/or regions, leading to the formulation of policies that facilitate linkage building across national boundaries (Stallings, 1995). In such a policy context, nodes and hubs play an increasingly critical role in urban and regional development for they act as the specific locales within a nation and/or region where key actors and institutions analyse, represent, relate and associate with global spaces of flows. This relational process then generates outcomes that reflect uneven and ever-evolving “power geometries” (Massey, 1994).

Among these penetrating global flows, there is no doubt that information flows via cyberspace are the most fluid, rapid and dynamic form. These electronic impulses and flows constitute the first layer of material support of the space of flows (Castells, 1996). Some writers (e.g. Toffler, 1980; Toffler and Toffler, 1995) celebrate the so-called “information revolution” as akin to a new Kondratiev long wave capable of fundamentally transforming the

social and institutional organisation of the global economy. In their extreme forms, these futurologists predict that the ease with which information flows through global cyberspace has eroded the power of the nation state and the role of place as the basic organising units of the world in which we live. Some ultra-globalists (e.g. Ohmae, 1990; 1995; O'Brien, 1992; cf. Weiss, 1998; Held et al., 1999) have conveniently concluded that the "end of geography" and the "end of nation state" are at hand. This is clearly a case of overstating the power and influence of technologies that are seen by these writers as embodying metaphorically "the very essence of contemporary cultural, economic, geographical and societal change. This brings with it, of course, the attendant dangers of relying on simple technological determinism in thinking about how new technologies are related to social, and spatial, change" (Graham, 1998: 167). As noted by Thrift (1996a), much of the literature on electronic and communications technologies has been infected by the virus of "new era thinking", a virus that is simply another variant of technological determinism. He argues that "in this form of determinism, the new technological order provides the narrative mill. The new machines become both the model for society and its most conspicuous sign" (Thrift, 1996a: 1471). As such, much of the contemporary literature on cyberspace seemingly underestimates the extent to which technologically-mediated flows are grounded in physical places via material flows and social relations (see a review in Kitchin, 1998a).

In this paper, we use the general concept of "nodes in global flows" to explore the potential for particular localities to emerge as hubs within the rapidly-emerging world of electronic commerce (EC). These nodes and hubs, and their dominant elites (social actors) form the second and third layers of material support for Castells' (1996) notion of the space of flows. We argue that the domination of abstract metaphors in the literature on information and communications technologies tends to obfuscate the intricate relations between these technologies, their social users, and material geographies. It is true that advancement in these technologies has greatly facilitated the emergence of EC and the possibility of participating in global flows by individuals and firms all over the world. It is equally true, however, that these "virtual flows" on a global scale do not preclude the important role of place in organising social life. As argued by Castells (1989: 170), "most of these flows are directional, and these directions have a socially specific, place-based component". Our analytical task in this paper, therefore, is to show how certain places can enhance their positions as "nodes" and "hubs" in the cyberspace of EC through tapping into the social dimensions of global flows, the role of logistics and distribution, and the role of policy initiatives. It is possible for some specific localities to ground global flows in EC by constructing nodes and hubs of a physical, materialised nature. We conceive of technological change as a highly contested process leading to multiple and overlapping development trajectories, not a set of pre-determined social and spatial outcomes: some places and

social groups benefit more than others from embracing technological change. In this regard, Singapore provides us with an excellent case study, due to the wide-ranging efforts of the government to establish the city-state as a premier EC hub in the Asia-Pacific region.

Tapping into Global Flows: Constructing Hubs and Nodes in the Virtual World of Electronic Commerce

Before we examine the case study of Singapore, it is useful to set up some conceptual parameters about the nature of constructing an EC hub and how it enables a place to become an important node in the global space of flows. In this section, we first engage critically with the debate on the rise of “placeless” transactions through EC. We then propose a more materialist view of EC through the so-called “grounding effect” whereby global flows of information and transactions are conceived as being grounded in specific localities and can only be executed through well established physical and logistical infrastructure. In this sense, it is possible for specific localities to tap into global flows through the provision of this infrastructure and its concomitant “software” (i.e. human resources). This possibility, however, is dependent upon the strategic capability of the state (local, regional or national) and related institutions in these localities in governing the processes of embracing EC.

The rise of “placeless” transactions through EC? The technological determinism view

The protagonists of cyberspace rhetoric proclaimed in the 1996 “Manifesto for the digital society” published in *Wired* magazine that “the Digital Revolution that is sweeping across society is actually a communications revolution which is transforming society. When used by people who understand it, digital technology allows information to be transmitted and transmuted in fundamentally limitless ways. This ability is the basis of economic success around the world” (Quoted in Graham, 1998: 168). This generalised logic of digital technology is seen not only as mediating every aspect of social and cultural life via the global reach of Internet access, but also as an opportunity for the globalisation of business and commercial activities via electronic commerce (EC). It is argued that as information and communications technologies allow virtual access to all forms of information, social and economic actors are becoming increasingly “liberated” from the constraints of space or the so-called “friction of distance”. These technologies enable their users to transcend the tyranny of geography as a major constraint on the global reach of human life. They are also deemed as eroding the role of place as the central unit of organising social life. In particular, Castells (1996: 394) remarks that “[information technology] futurologists often predict the demise of the city, or at least of cities as we have known them until now, once they are voided of their functional necessity”.

In the ruthless world of business, these essentialist views of information and communications technologies represent transactions via EC as “placeless” in two ways. First, they argue that from the perspective of consumers, transactions can be conducted via the Internet from anywhere, and by anyone who has access. EC empowers these cyber-consumers to transcend national regulations on products and services, and to make purchases on the basis of much wider access to information and choice. The common vision of EC is an ideal electronic market in which consumers interact directly with producers (Sarkar et al., 1998). Traditional retail centres and market places are increasingly threatened, and perhaps replaced, by global competition fostered through the widespread adoption of EC. The Internet becomes a vital pillar of the so-called new “Information Age” and “Digital Economy”. At the core of this “informational economy”, according to Castells (1993: 20), “the fundamental source of wealth generation lies in an ability to create new knowledge and apply it to every realm of human activity by means of enhanced technological and organizational procedures of information processing”.

Second, the recent rise of the “Amazon.com” phenomenon adds further support to the deterministic views held by essentialists because online companies are often perceived as embedded in cyberspace rather than in real physical places. Participation in online business or EC has been hailed as a universal passport to instantaneous access to a repertoire of global customers, thereby defying spatial constraints as the logical limit to capital. Consider a typical marketing slogan below:

Countless business opportunities are arising on the Internet and companies are having to transform themselves in order to take advantage of them. By the breaking down of national economic boundaries companies are having to rethink how they conduct their business, with those that are making substantial investments in Internet technology, moulding their business around it, already reporting substantial productivity gains... The physical size and location of companies are no longer major attributes to their success when conducting business on the Internet, because the Internet is not restricted by geographic barriers (Angelides, 1997: 405-6).

A natural outcome of this de-spatialisation and decentralisation of business and economic activities via EC is interpreted as the effective dissolution of the city itself as a place for geographical agglomeration of activities. Graham (1998: 168) argues that this view towards urban dissolution is based on the false assumption that “networks of large metropolitan cities will gradually emerge to be some technological anachronism, as propinquity, concentration, place-based relations and transportation flows are gradually substituted by some universalised, interactive, broadband communications medium (the ultimate ‘Information Superhighway’)”.

Cities as important places in global spaces of flows

Notwithstanding the above universalising assertions by technological determinists, there is another rich

strand of research in urban studies that has “rediscovered” the city as the powerhouse of the globalising world economy. Cities are perceived as being relatively more important as the key creative, control and cultural centres within globalising economic, cultural and social dynamics (Amin and Graham, 1997). In particular, this literature is associated with the development and dynamics of the “world city” or “global city” (see, for example, Friedmann and Wolff, 1982; Friedmann, 1986; Sassen, 1991; 1996a; Knox and Taylor, 1995). One of the main contributions of these studies has been to relate dominant socio-economic trends within these cities (e.g. deindustrialisation, the geography of capital flows, the expansion and spatial concentration of financial and producer services industries, labour market segmentation, class and ethnic conflict, socio-spatial polarisation) to an evolving urban hierarchy and the global economic forces that underlie it (Brenner, 1997; 1998). World cities are conceptualised as key strategic *governance* centres in national and international urban systems. Their importance is measured by their functions (in terms of economic activities and extent of control) and performance (in terms of competitiveness and market share). These urban regions are said to be hierarchically arranged on a global scale according to their differential mode of integration and articulation into the global economy. To others, world cities are “neo-Marshallian nodes” in the global spaces of flows (Amin and Thrift, 1992), spaces of representation and reflexive decision-making in a world of continuous and uneven change. These urban nodes act as “a collective ‘brain’, as centres of excellence in a given industry, offering for collective consumption local contact networks, knowledge structures and a plethora of institutions underwriting individual entrepreneurship” (Amin and Thrift, 1992: 577; see also Scott, 1988; 1996).

The location and concentration of information-intensive industries in these “informational cities” has enabled them to exploit global spaces of flows; they perform a range of roles in evolving spatial divisions of labour. Some cities act, therefore, as key *sites* of understanding and coordination amongst flows of energy and labour, commodities and capital, information and images, even though surplus value is increasingly being realised within more *deterritorialised* circuits of money and finance (Castells, 1989; Lefebvre, 1991; Sassen, 1991). Place remains highly important in facilitating capital accumulation and social (re)production in an era of intensified technologically-mediated flows on a global scale (Amin and Graham, 1997; Yeung, 1998a). In theoretical terms, capital depends on place for material conditions (e.g. infrastructure and resources) and social relations (e.g. business networks and labour processes) in order to reproduce successfully in an era of global competition. For example, although telematics has made possible the spatial decentralisation of economic activities and the overriding of conventional jurisdiction and boundaries, Sassen (1995: 31) argues that “there is also a space economy which reveals the need for strategic sites with vast concentrations of resources and infrastructure, sites that are situated in national territories and are

far less mobile than much of the general commentary on the global economy suggests”.

Even within the realm of financial globalisation in which financial services and their capital flows can supposedly be conducted effortlessly via EC, Martin (1994: 255) notes that “place remains fundamentally important to the structure and operation of the global financial system”. More than that, the production of financial instruments and services remains fundamentally local, “subject to a socially articulated and culturally constructed labour process. The economic and social geography of financial centres provides an essential geography of articulation from the local to the global and within the local which shapes the conditions for effective (i.e. profitable) financial production” (Pryke and Lee, 1995: 333). As shown in the case of the City of London, global cities constitute such places in which finance capital is embedded (Amin and Thrift, 1992; Allen and Pryke, 1994; Thrift, 1994; 1996b; Tickell, 1996; Clark, 1997). The social spaces in these cities are made up of complex networks of social and personal relationships that can be translated into external or territorial economies that capital can exploit only *in situ*. In other words, the realisation of these external economies by financial institutions can only be possible at the local level in the so-called “neo-Marshallian nodes” (Amin and Thrift, 1992). There is certainly a place for the geography of capital and global investment flows.

Others may argue that there is some evidence of the decentralisation of financial institutions made possible by information and communications technologies (Knight, 1995). It is, however, mostly back offices that are decentralised, not their primary functions (Martin, 1994; Sassen, 1995; 1996a; 1996b). The top world centres of financial activities such as London, New York and Tokyo show no signs of losing their overall dominance. They remain as the fundamental *nodes* through which financial institutions obtain their competitive advantage and realise their external economies. Capital flows and finance capital are not becoming increasingly “placeless” via EC. Far from that, they are instead being more entrenched in specific territorial localities to serve their global clients via EC on the one hand and to realise the benefits of local embeddedness on the other. As Pryke and Lee (1995: 331) argue, “the influence of place on financial production remains significant not only in the context of technical change that seems to reshape the very parameters of geography and interaction and to challenge the existence of financial centres and geographical concentrations of financial production, but in the context of competition between financial centres as well”.

Materialising global flows through hubs and nodes

How then does this “grounding effect” of EC take place within specific nodes in global spaces of flows? We focus here on three specific dimensions: (1) the social and symbolic dimensions of global flows; (2) the role of

logistics and distribution in EC and (3) the role of state initiatives. These dimensions not only show that the physical size and location of companies continue to be major attributes to their success when conducting business on the internet (cf. Angelides, 1997), but also demonstrate the possibility for specific localities to create sustainable competitive advantage through consciously constructing hubs and nodes in the world of EC. First, while it is true that EC is not as restricted by geographic barriers *vis-à-vis* their wholesale and retail predecessors, the operationalisation of EC requires significant *social and symbolic capital in specific localities*. This is because “the human construction of space and place is seen actually to ground and conceptualise applications and uses of new technologies” (Graham, 1998: 172). Nodes in the world of technologically-mediated flows exist as places of reflexivity, trust and reciprocity. These nodes have a material dimension because they are embedded in specific physical locations. As such, social relations of EC cannot exist in cyberspace alone; they need to be grounded in places and localities in which social actors have invested significant meanings through face-to-face interactions and material flows. For example, whereas they may be able to provide specialised services for consumers, it is questionable whether EC service providers (e.g. online reservation by airlines) can offer the social atmosphere and support that consumers expect from many traditional channels (e.g. travel agents). A recent survey of 23 small businesses in Australia has shown that while the gain of these firms from EC can only be described as “perceived benefits”, such benefits are marginal, and often circumstantial (e.g. inconsistent sales). Many sampled firms believed that either their offerings were not easily purchased over the Internet, or that they required some form of face-to-face interaction (e.g. consultations) in addition to their Internet presence (Poon and Swatman, 1999).

Second, the role of specific localities in the *provision of logistics and distribution* of EC products and services further enhances the importance of place in conducting cyberspace transactions. Despite the recent fervour with the “Amazon.com” phenomenon, it is hard to believe that such a highly globalised virtual EC bookstore operation can be viable without concomitant support through physical infrastructure in the form of logistical and distribution facilities. For every Amazon.com to excel in the world of global business, we need more of the services of global credit companies (e.g. Visa and American Express), global distribution companies (e.g. Federal Express and DHL), global producers (e.g. publishers and entertainment companies), local warehousing and Internet service providers. This, however, does not necessarily imply that every locality can become an important node in global spaces of flows via EC. Two factors explain why certain localities are better equipped than others are in engaging EC activities and thus becoming an important hub for such activities. On the one hand, geography continues to shape the EC trajectories of specific localities. This is the issue of path-dependency well explained in the existing literature on urban and regional development (see, for example Storper, 1995). Information and communications

technologies are not evenly distributed over space and EC still requires the physical transportation of goods and services (Kitchin, 1998b). To a large extent, the effectiveness of EC as a developmental strategy for specific localities depends on the efficiency of existing and future communications and transportation infrastructure of a given locality.

On the other hand, EC allows the decoupling of different functions in a given production chain (e.g. publishing industry) because electronic markets consist of both physical and information, or virtual, channels for marketing and distribution. Sarkar et al. (1998) have argued that the unbundling of channel functions as a consequence of lower coordination costs via EC is likely to contribute to the separation of physical distribution from other 'cybermediary' functions. In the early stages of the electronic market, many EC companies are unlikely to integrate forward or backward along the production chain. Instead, they may make use of services provided by other cybermediaries (e.g. gateways, directories, search services, online malls, and electronic publishers) as an efficient mechanism for supporting electronic exchanges and achieving economies of scale and scope. EC opens up more opportunities for small entrepreneurial producers to start their business by outsourcing channel functions to specialised cybermediaries. Though their physical distribution channel may be shortened, however, these EC companies are likely to continue to depend on integrated logistics companies (e.g. Federal Express) as their distribution systems. This decoupling process also produces complex and longer networks of information-specific intermediaries (e.g. some firms may locate products, other provide evaluations of related products, training, and settlement services, and so on). Localities can strive to become an important node if they are able to provide favourable social and institutional contexts for the development of these interfaces of physical and cyber networks bringing together consumers, producers, and their intermediaries.

Third, there is clearly a case for *policy and developmental initiatives* because nodes and hubs in the EC world do not develop randomly in specific places. Similar to much of the literature on networks, innovation and regional development (Saxenian, 1994; Storper, 1997; Cooke and Morgan, 1998; Scott, 1998; for a review, see Yeung, 2000a), the development of EC nodes and hubs requires sustainable initiatives by various actors from institutions at different spatial scales. These actors may come from business and trade associations, labour unions, civil and voluntary associations, and local, regional and national government agencies which are empowered to foster social and economic development and political stability. Together, they constitute the "associational economy" which defines the coming shape of global production, competition and political order. The institutional capacity or "institutional thickness" of these localities underscores this associational economy. Amin and Thrift (1994: 15) define "institutional thickness" as "the combination of actors including inter-institutional interaction and synergy,

collective representation by many bodies, a common industrial purpose, and shared cultural norms and values”. Institutional thickness determines the success of places in the global economy because global processes can be “pined down” in some places to become the basis for self-sustaining growth at the local level (Amin, 1999; cf. Lovering, 1999). Taking a more cautionary approach to regional development, nevertheless, Scott (1998: 110) argues that “not all forms of institutional thickness provide an automatic guarantee of economic dynamism. Indeed, institutional thickness can be a positive hindrance to development and growth where stubbornly dysfunctional attitudes and habits are firmly locked in to the local economic system”.

How then does institutional thickness explain the rise of certain places as important nodes in the global flows of EC? As noted earlier, world cities tend to have a “first-mover” advantage in constructing EC hubs by virtue of their well-established positions in the global economy. The advantages possessed by world cities, however, cannot be successfully reaped if they are not accompanied by a favourable institutional context. In this regard, the political economy of the institutional context becomes highly important because certain world cities have a unique configuration of state-business relations such that an enormous amount of resources can be mobilised and deployed for a common objective of developing a competitive node in the global economy. As EC has the potential to bypass specific localities in its global reach, and an EC hub requires substantial social capital endowments, and physical and logistical infrastructure, “holding down” global EC flows in specific localities becomes a political initiative that necessitates intense collaboration among public agencies, private business, and social actors. To understand the evolution and success of certain EC nodes, we need to go beyond an analysis of their economic functions and interconnectedness. More importantly, we need to examine the ways in which these economic dimensions are woven together with local politics and institutional relations to form complex power geometries. It is these power geometries that explain the success and failure of specific localities in constructing EC hubs as important nodes in global spaces of information and transactional flows. In the next section, we look into the experience of Singapore in constructing an EC hub in the Asia Pacific region.

The Experience of Singapore in Developing Capabilities in Information Technology and Electronic Commerce

Singapore is now a world city whose fate is dependent on events in New York, London, Tokyo, and connected nodes in the international economy. Its trading, investment and information links to distant countries are far more important than those to its immediate regional neighbours (Perry et al., 1997: 1).

We concur that Singapore’s experience in developing its IT and EC capabilities is perhaps quite unique. As a city-state in Southeast Asia, Singapore has been highly proactive in creating and sustaining its competitiveness

as a strategic node in global spaces of flows. Over time, different sets of *national* development strategies have evolved and significantly shaped its competitiveness as a world *city* (in Singapore's case, "national" is also "urban" as the majority of the 623 sq. km city is urbanised). We argue that the creation of city competitiveness in Singapore via constructing an EC hub is highly contingent upon the (national) state's capabilities to exercise power in the implementation of national development strategies; strategies that situate the city-state in a beneficial manner to global spaces of flows (see also Yeung and Olds, 1998). In other words, Singapore's experience in constructing an EC hub represents an extreme combination of political economy and city-state advantages to sustain particular national initiatives that are unlikely to be found in many other world cities (see Corey, 1993). Given that Singapore is a large Southeast Asian city and a relatively recent independent state, Singapore's experience is unique in its historical and geopolitical contexts, and it may not be used in a straightforward manner to derive lessons for the planning and management of other Asian cities (or nations). Lessons based upon Singapore's experience cannot, we would argue, be *necessarily* replicated elsewhere. In this sense, we want to avoid the problem of constructing paradigmatic examples for policy innovation elsewhere (e.g. the new urbanism literature). Amin and Graham (1997: 416; our emphasis) note that "an inevitable outcome of the rediscovery of the city within so many research strands and discourses has been the elevation of single or small groups of urban examples to be paradigmatic; that is, to offer apparent lessons for *all* other urban areas". In this section, we firstly discuss the political economy of creating sustainable national competitiveness in Singapore. We then examine Singapore's recent drive to become an IT and EC hub in the Asia Pacific region. We also provide an assessment of the current state of EC in Singapore today, and consider some of the social and cultural constraints to the adoption of EC that may be under-estimated by optimistic growth projections.

Creating sustainable national competitiveness in Singapore

To a certain extent, Singapore's fortune is always intertwined with the global economy. However, one distinctive feature of Singapore's urban competitiveness is that it is very much a city (in a territorial sense) coupled with a strong nation-state (in an institutional sense); a state with powers far beyond those of any local state. To an unparalleled extent in Asia, the city-state has relied heavily upon developmentalism to legitimise its political power and control. The state's decision to pursue the strategy of global reach has been relatively uncontested, in part because the state has generated a political discourse of survivalism and ruthless competition; a discourse currently propagated in association with most discourses on globalisation (Leyshon, 1997; Yeung, 1998a; Kelly, 1999). This discourse of survivalism and competition, backed by strict political control, has sustained Singapore's

competitiveness in the face of global competition, thereby legitimising the state's control over most aspects of social life. It has also enabled the bureaucracy, led by the dominant Peoples' Action Party, to bypass the local politics typical in many urban Western cities (see the case of England in Peck, 1995; Jones and MacLeod, 1999). Singapore is very much a city-state in which the global scale juxtaposes with the national scale (the city and its national state). It is a unique urban/national formation by virtue of the developmental role of a highly autonomous and sovereign state (Perry et al., 1997; Low, 1998; Yeung and Olds, 1998).

Ever since its independence in 1965, Singapore has relentlessly pursued a national development strategy that depends heavily on the influx of foreign capital in the form of direct investment and on the leading role of state-owned enterprises. This reliance on foreign capital worked very well in the first two decades of Singapore's industrialisation by plugging into the so-called "new international division of labour" (Rodan, 1989; Huff, 1994; Chiu et al., 1997). This strategy of courting foreign capital was perceived as "essential in view of the weak domestic technological base and the long lead-time needed to transform domestic *entrepôt* traders and small-scale entrepreneurs into a dynamic industrial entrepreneurial class able to compete in the global market" (Chia, 1997: 32). While the state was able to pursue a labour-intensive export-oriented manufacturing platform for industrialisation in the 1960s and the 1970s, the strategy met its favourable global conditions when major American and European manufacturers were looking for alternative low-cost production sites to relocate their labour-intensive operations. The competitiveness of the Singapore economy was heavily based upon the state's ability to exercise labour control and discipline, coupled with favourable political stability and geographical location. The city-state was transformed from an island of massive unemployment in the 1960s to an offshore manufacturing production site sustained by imported labour by the late 1970s.

By the late 1970s and early 1980s, Singapore was no longer competitive in attracting low-cost manufacturing assembly investment because cheaper production locations could be found throughout the world, notably in neighbour Asian developing countries. The strategy of low labour cost pursued since independence had also backfired when systematic distortions in the labour market resulted in severe labour shortage. The lack of investment in indigenous technological capabilities also contributed to low value-added activities by domestic enterprises. By the late 1970s, Singapore faced a "competitiveness crunch" in the changing international division of labour. To regain its competitiveness in the global space of flows, the state revised its national strategies in favour of promoting high tech and high value-added manufacturing and business services. The state firstly initiated a major industrial restructuring, the so-called "Second Industrial Revolution", through which labour wages were increased substantially to drive out labour-intensive manufacturing activities, and labour productivity and skills were upgraded to attract

world-class high tech manufacturing investments. The Second Industrial Revolution resulted in a shift in Singapore's industrialisation strategy from an offshore production location to a centre for the spatial agglomeration of high value-added and high-tech investments.

Since the mid-1980s, Singapore has also been actively seeking the location of the control and coordination functions of leading global corporations in order to develop the city into a truly international business hub, serving countries within and beyond the Southeast Asian region. Regional offices and regional headquarters of major global corporations are actively sought after and promoted. It is hoped that these regional operational headquarters bring in high value-added jobs and skills to the aspiring white-collar workforce in Singapore. The state has again taken the initiatives to attract these regional offices and regional headquarters through a clearly-defined set of strategies (see Perry, 1992; 1995; Perry et al., 1998a; 1998b; Yeung, 1998b). More recently in the 1990s, the state has begun to recognise that to remain competitive in the global economy, it is insufficient for Singapore to be just a nodal point for the influx of capital, skills and knowledge, but it is also vital to the future of Singapore to spread its "external wing" (Yeung, 1998c; 1999; 2000b). Learning from the experience of Switzerland and the Netherlands, the state wants to generate intra and inter-regional interdependencies for the domestic economy so that Singapore is less vulnerable to sudden downturn in its major markets in the Triad regions. A well-developed external economy can also sustain Singapore's long-term competitiveness by tapping into business opportunities and world-class pool of knowledge, skills and capital. Together, these three national development strategies are being implemented over time and in different phases to sustain the competitiveness of Singapore as a leading megacity in Southeast Asia.

National IT policy and the recent EC drive in Singapore

There can be little doubt about the state's determination to make Singapore an IT hub within Southeast Asia. Since the establishment of the National Computer Board (NCB) in 1981, Singapore has implemented a progressive series of national IT policies and initiatives. This evolution can usefully be divided into four phases (Choo, 1997; Corey, 1997: see Table 1). The first, from 1981 to 1985, saw the initiation of the Civil Service Computerisation Programme, designed to computerise the activities of government ministries and thereby improve productivity and service quality, while simultaneously starting to develop a pool of computer professionals in Singapore. The second period, from 1986 to 1991, was shaped by the National IT Plan of 1986 (NCB, 1986), which detailed the twin goals of developing an export-oriented IT industry, and improving business productivity through the application of IT, thereby representing a shift in policy focus from the public to the private sector. This

plan was constructed around seven key 'building blocks' (Corey, 1993; 1998): upgrading the telecommunications infrastructure, developing IT manpower, promoting an IT culture, building IT applications, fostering a local IT industry, engendering IT creativity and innovation, and encouraging coordination and collaboration in the implementation of the plan. Critical assessments by authors such as Corey (1993) suggest that the collaborative inter-agency approach co-ordinated by the NCB was highly effective in promoting and realising the strategies contained in the National IT Plan.

The third phase began in March 1992 with the publication of the IT2000 report, *'A Vision of an Intelligent Island'* (NCB, 1992). This new strategy drew on Singapore's previous IT achievements, and sought to integrate them with new applications of IT that would enhance the working, living and leisure environments of society as a whole. At the heart of this new vision was the idea of the 'intelligent island' built upon a National Information Infrastructure (NII) interconnecting computers in homes, schools and workplaces. In this phase, the policy emphasis shifted from the public and private sectors, towards the well being of the population as a whole. Five strategic themes were contained in the initial report, including improving the quality of life of Singaporeans, linking local and global communities, enhancing the potential of individuals and upgrading economic competitiveness. Most important in this context, however, is the explicit aim of developing Singapore into a 'global hub' (cf. Ministry of Trade and Industry, 1998). As Choo (1997: 52) relates with respect to this part of IT2000: "Singapore is repositioning itself as a nerve center and switching node for staging international and business operations. Its competitive assets will be an efficient and versatile information infrastructure and a workforce equipped with the skills and expertise to operate, manage and get the most out of the infrastructure". Singapore entered the fourth and current phase of its IT planning in 1996 when the IT2000 framework was reviewed under the "Restructuring for IT2000" initiative. The key dynamic here is the corporatisation of NCB functions that lend themselves to private sector adoption through public-private partnerships and strategic alliances (Corey, 1997). This shift in emphasis means that the NCB will no longer be the sole source of expertise for developing IT policy, and reflects the accumulated size and maturity of Singapore's contemporary IT industry. As a result, the NCB's promotional efforts for IT in Singapore will increasingly be focused on specific industry clusters.

The Electronic Commerce Masterplan, announced in September 1998, is part of this latest generation of national level strategies. The Masterplan aims to develop Singapore into a hub for electronically transacted business through a series of policy interventions, incentive schemes and education initiatives (*The Straits Times*, 1998). The target is to have S\$4 billion worth of products and services transacted electronically through Singapore, and 50 per cent of businesses to use some form of EC, by the year 2003. The first formal move to prepare for an era of EC was

however taken in 1996, when the NCB established the Electronic Commerce Hotbed (ECH) Programme, with the aim of 'jump-starting' EC in Singapore. The ECH initiative brought together 38 founding parties, ranging from financial institutions to academic, telecommunications and IT organisations to pursue two broad objectives; firstly, to make EC widely available, and secondly, to position Singapore as an EC hub. The main thrusts of the programme were fourfold: to establish and deploy common services such as secure payment systems, to showcase new and promising EC applications, to raise awareness and acceptance of EC among industry and the general public, and to address legal and policy issues. In January 1997, the EC Policy Committee was established to further explore these legal and policy issues. Chaired by the Monetary Authority of Singapore (MAS), the EC Policy Committee comprised members from 15 agencies, with the NCB providing secretarial support. In April 1998, the Committee completed its review and made its recommendation to the government, listing six guiding principles with regards EC development: (1) the private sector should take the lead; (2) the government should put in place a legal framework to provide certainty and predictability; (3) the government should provide a secure and safe environment for electronic transactions; (4) the government should use joint venture pilots and experiments to expedite EC growth and development; (5) the government should be proactive in pursuing innovative, liberal and transparent policies, and (6) international consistency, co-operation and interoperability should be encouraged (NCB, 1998).

After a period of public consultation, these policy recommendations were passed to the Electronic Commerce Coordinating Committee (EC3), which formulated the Electronic Commerce Masterplan of late 1998. To give some indication of the 'institutional thickness' that lies behind this initiative, EC3 comprised the Attorney General's Chambers, the Ministry of Finance, the Ministry of Law, the Ministry of Trade and Industry, the Monetary Authority of Singapore, the National Computer Board, the Public Service 21 Office and the Trade Development Board. The Economic Development Board, the Singapore Tourism Board and the Department of Statistics were also consulted during the planning process. Interestingly, the Masterplan explicitly recognises one of the grounding effects we described earlier with respect to the EC services sector. According to the plan, this will comprise business strategists, creative designers, system integrators, network operators and other "cybermediaries". It also notes the important contribution of the additional activity that can be generated for Singapore's port, logistics, financial and telecommunications services due to the multiplier effects of EC transactions. Overall, the plan has five main thrusts, accompanied by various implementation programmes, which we will now consider in turn.

(1) *To develop an internationally linked e-commerce infrastructure.* This is seen as crucial to strengthening Singapore's position as an EC hub, with the financial and logistics sectors being given a key role. The plan aims to develop and deploy, in partnership with industry, an efficient settlement system for Internet transactions between

businesses, covering international trade payment and multi-currency payment, within two years (i.e. by late 2000). Certain areas of EC infrastructure development are also singled out for special attention, including trust management, rights management, business to business trading platforms and business to consumer payment systems. Efforts will be made to link local infrastructure services to those overseas, for example through the cross-certification of certification authorities.

(2) *To jump-start Singapore as an EC hub.* This part of the plan focuses on the sectors in which Singapore already has an inherent advantage as a hub, including the financial, transport and logistics, and telecommunications infrastructure providers. In particular, the government aims to attract 25 of the world's top logistics, manufacturing and service companies to set up their EC operations in Singapore by 2003 (Compaq and Dell were early successes). Incentive schemes will be implemented to attract international and local companies to base their EC hub activities in Singapore. International publicity will be increased to create awareness of Singapore as an EC hub, in particular through promotion at trade shows. Certain innovative EC services will be actively identified and supported as 'flagship' success stories.

(3) *To encourage businesses to use EC strategically.* In this thrust, education and other support programmes are seen as essential to helping businesses exploit EC to enhance their productivity and competitiveness. This will be facilitated in several ways: large-scale training schemes for business people to use simple EC platforms; a usage promotion drive and financial incentives to improve adoption levels among SME's; manpower development through retraining schemes and new tertiary level courses; and support to help leading local EC providers succeed internationally.

(4) *To promote usage of EC by the public and businesses.* This thrust aims to extend the benefits of EC to the general public. Firstly, the government itself will help to promote the use of EC in Singapore through its electronic Public Services initiatives, with key public services being delivered electronically by the year 2001. Secondly, mass education schemes will provide training for the public. Thirdly, mass media schemes will be used to improve general awareness of EC and its implications.

(5) *To harmonise cross-border EC laws and policies.* This final thrust is designed to develop Singapore as a "trusted node" for EC. The necessary legislation will be developed, and periodically reviewed to ensure that Singapore laws are competitive, congruent and internationally consistent. Areas to be considered include intellectual property rights, data protection, consumer protection and taxation. Bilateral agreements will be sought with key trading partners, and efforts have already been initiated with Canada, Australia and Germany. Singapore will also participate actively in international fora such as ASEAN, APEC, UN and WTO to promote the harmonisation of

EC frameworks.

Assessing Singapore's progress towards becoming an EC hub

On paper at least, there can be no doubt that the Electronic Commerce Masterplan represents a thorough, comprehensive and wide ranging policy intervention in the drive to develop EC in Singapore. We now move on to consider how far Singapore has progressed thus far in its bid to become an EC hub. Figure 1 presents a stylized depiction of the EC environment in Singapore, reflecting the all-encompassing policy approach that has been adopted. In this section, we will firstly use the components of this diagram as a framework for assessing EC developments. Secondly, we briefly consider some preliminary evidence from large-scale surveys that attempt to quantify levels of EC in Singapore.

At the level of the general EC environment, largely associated with government policy, Singapore has made significant progress in developing legal frameworks, technical standards and incentive schemes for EC. In terms of legal frameworks, a major step was the enactment of the Electronic Transactions Act, an EC Policy Committee recommendation, which came into force in July 1998. This Act covers a broad range of issues pertaining to EC, including the authentication of the originator of electronic messages, the legal recognition of electronic signatures, the retention of records by electronic means, the formation and validity of electronic contracts, and the legal liability of service providers. Other developments include amendments to the Computer Misuse Act to give greater protection to critical computer systems, and an updating of copyright laws to protect multimedia works. With regards standards, Singapore has established a set of open, industry-led standards in the areas of network protocols, security, email and directories, EC, and information sources and exchange, all designed to facilitate the interconnection and interoperability of businesses via computer networks. The drive to establish standards is becoming increasingly international: in June 1998, the NCB signed the world's first international cross certification agreement with a transaction certification authority in Canada. Singapore has also instituted a range of incentive schemes to promote EC. For example, the Cluster Development Fund and Innovation Development Scheme (through the Economic Development Board) can provide funds for qualifying companies to develop their EC projects. The Approved Cyber Trader Scheme targets companies that use Singapore as a base from which to undertake international trading activities via EC. In a scheme targeted specifically at SME's, an S\$9m extension of the NCB's Local Enterprise Computerisation Programme offers grants of up to S\$20000 for the first 500 SME's that make the move into EC. In order to assist businesses in gaining information on the evolving plethora of EC policies and schemes, in August 1999 the NCB established a "one-stop" helpdesk to coordinate the dissemination of information (NCB,

1999). Again reflective of the breadth of institutions mobilized in Singapore's EC drive, some 14 ministries and statutory boards were listed as partners in the helpdesk initiative. In addition to financial incentives, a range of educational programmes has been initiated to raise awareness both among local businesses (such as the "eVision" workshop for CEO's and "ec.Think" think tank set up by Andersen Consulting and the NCB) and the general public (through "eSales" and roadshows to encourage online shopping).

The next domain presented in Figure 1 is that of infrastructure services, which is characterized by a high level of collaboration between government and business. Infrastructure services can usefully be subdivided into four components. First, network services provide the networks that enable EC. Such services are provided by Internet Service Providers, of which there are three in Singapore (Pacific Internet, Singnet and Cyberway) and broadband network access providers such as Singapore Telecom's Magix service and Singapore Cable Vision's cable modem service. It is perhaps worth noting that infrastructure providers are tightly regulated in Singapore, with all these services being controlled by Government Linked Corporations (GLC's). In addition, there are a wide variety of companies providing value-added network services (both local and foreign). Singapore's actual physical infrastructure is very advanced. Singapore currently has a direct Internet connection to the US Internet backbone (45Mbps as of mid-1999), and through the Singapore Telecom Internet eXchange (STIX) acts as an Asian Internet hub, connecting to over 20 countries in the Asia Pacific. Singapore's renowned "Singapore ONE" network provides for broadband access to homes, businesses, libraries and kiosks across Singapore. Second, there are also a wide variety of directory services on offer in Singapore, allowing customers to search for information and web sites. Some general purpose search engines such as Yahoo! have Singapore sites (<http://www.yahoo.com.sg>), and there are also a range of directory services that serve the local context, such as the Shopping Village which covers over 180 online retailers (<http://www.shoppingvillage.com.sg>), and the National Contact Information Service which provides contact information of people and organisations in Singapore (<http://www.ncis.ncb.gov.sg/>). The "Singapore Infomap" provides a useful directory of directory services (<http://www.sg>).

The third infrastructure services component is that of security services. While many tools are available commercially from vendors such as Microsoft and Netscape, the NCB's Infrastructure for Electronic Identification initiative (IEI) is a local initiative seeking to provide secure communication and identification through digital certificates and signatures. A company, Netrust, was established in July 1997 as a joint venture between the NCB and the Network for Electronic Transfers (Singapore) (NETS) to issue and manage digital keys and certificates. At the time this was Southeast Asia's first Certification Authority set up to provide a complete online identification and security infrastructure. Payments services constitute the fourth and final element of infrastructure services.

Several secure online payment systems are already in place in Singapore. For example, consumers can make low value online payments using a stored value smart card through NETS C-ONE service. Another NETS service, the Financial Electronic Data Interchange (FEDI) allows payment and collection instructions to be sent electronically in a manner similar to an inter-bank GIRO. An Electronic Commerce Hotbed initiative started in 1996 has made significant progress towards developing a Secure Electronic Transactions (SET) protocol to support secure credit card payments. In April 1997, the NCB, in partnership with Visa International, Citibank and IBM, Brel Software and Mentor Internet Solutions announced the world's first secure Visa card payment over the Internet. It is hoped that SET will become the global standard for credit card transactions, and an increasing number of banks and businesses are becoming involving in piloting the protocol in Singapore. In addition to these moves to develop open standards, a range of companies now offer secure payment system solutions for the particular requirements of their clients.

The third level of the EC infrastructure (Figure 1) is that of commerce solution providers (CSP's), of which there are a wide variety in Singapore. Such CSP's offer complete EC solutions to businesses that do not have the capability, or choose not to, implement their own EC services. Some CSP's create and host EC websites for merchants that sell directly to consumers (see for example, AsiaOne Commerce - <http://www.ecomz.com/>), while others provide services for electronic transactions between businesses (see BookNet for example - <http://www.booknet.com.sg/>). Overall, there already appears to be a well-developed and sophisticated infrastructure for EC in Singapore, supporting a wide range of specific EC applications, ranging from the government sector (e.g. electronic filing of tax returns), through retailing and leisure (e.g. online shopping with Cold Storage supermarkets) to the financial sector (e.g. Internet banking and share trading). This growing infrastructure not only provides ever-increasing levels of high-skill, high-wage employment in itself, but is also designed to make Singapore an attractive location for companies to establish their own EC operations.

The central test of Singapore's EC drive will be to see how the developing infrastructure stimulates actual levels of EC. Results from an NCB survey conducted in early 1999 provide some indication of the current level of business-to-business EC in Singapore (see <http://www.ec.gov.sg>). Over 1000 companies of varying sizes were surveyed across three manufacturing and five service sectors. Overall, just nine percent of companies were currently using some kind of Internet-based EC, with a further 28 percent expressing an interest in doing so in the following six months. However, the level of usage varied between different sectors and size categories. While 15 percent of manufacturers of electronic products were already using EC, less than five percent of firms in other sectors such as aircraft manufacturing, courier services, chemical and chemical products manufacturing, and storing and

warehousing services were doing so (see Figure 2). In terms of firm size, 17 percent of companies with over 100 employees were using EC, compared to only eight percent of small and medium sized firms with less than 100 staff (see Figure 3). The volumes of business undertaken electronically by firms are still quite small, with over 90 percent of firms undertaking less than S\$100000 of business each month in terms of both Internet sales and procurement. Interestingly, some 45 percent of the firms already using EC procured over 50 percent of purchases from overseas suppliers. Of the firms planning to adopt EC in the next six months, only 6.5 percent thought they would procure over 50 percent of electronic purchases overseas. Taken together with anecdotal evidence from the press, the survey suggests that EC is entering a transitional stage in Singapore: while the level of penetration among large multinational companies in certain manufacturing sectors (namely electronics) is quite high, EC is now starting to attract the attention of small and medium sized local firms in a variety of sectors.

Preliminary research by Saw (1999) into the uptake of EC by insurance and computer product SME's in Singapore illustrates some of the social and cultural constraints that may make the 50 percent penetration target of the Masterplan difficult to achieve. Saw categorises these constraints under eight interrelated headings, ranging from issues such as individual preference and awareness, to factors such as need, cost and corporate culture (see Table 2 for a summary). These findings add more detail to the conclusions of the large-scale EC survey that of the companies already or planning to use EC, security issues were seen as the main barrier to uptake, while for those with no current plans to adopt EC, the lack of need for electronic transactions was the main factor. A 1999 Department of Statistics survey of 2000 companies suggested that EC transactions in Singapore in 1998 were worth S\$1.2bn, up from S\$723m in 1997, with a projection of S\$1.5bn for 1999. Overall, however, the survey found that only four percent of businesses were engaging in EC with their suppliers and partners, and only two percent with end consumers (*The Straits Times*, 1999). Business-to-business EC accounted for 97 percent of total transactions by value, which chimes well with a consumer survey of 1500 adults in Singapore that found only two percent had ever made a purchase over the Internet (see <http://www.ec.gov.sg>). Such regular surveys, themselves another element of the Masterplan, will continue to provide the best guide as to how the implementation of EC policy is proceeding in Singapore, and whether adoption is effectively permeating the consumer and SME marketplaces as planned.

Conclusion

We propose that the emergent WWEC will not have the spatially homogenising effects that some ultra-technologists predict. Instead, as with previous techno-economic systems, the WWEC will be characterised by

distinctive and constantly evolving patterns of uneven development. Place, in the abstract sense, and cities, in their material form, will remain of the utmost importance, as there will continue to be a need for centres of co-ordination and control, or hubs and nodes, in the intensifying world of electronic flows. At a conceptual level, we have proposed three arguments why this is so. Firstly, there are socio-cultural aspects to EC that are embedded in particular places and contexts. For example, innovative new uses and applications of EC will not likely emerge in a vacuum, but from intense interactions between knowledge workers in places that already have accrued considerable social capital in terms of leading-edge IT developments. Secondly, the effective operationalisation of EC does not simply require an electronic link between two parties, but in many cases also relies upon a whole range of EC service providers (logistics, distribution etc.) and cybermediaries (online gateways, search services etc.). Thirdly, the development of EC also requires a particular policy context that ensures stability, reliability, security and transparency. Thus, there may be significant “first mover” advantages for cities (or regions) that are able to combine their existing IT knowledge base and logistics and distribution functions with an institutional and policy framework that is supportive of EC.

As we stated earlier, due to its unique political economy, there may be problems associated with using Singapore as any kind of transferable role model. However, as our analysis of Singapore’s policy drive to become an EC hub has shown, several aspects of policy formulation and implementation may be suggested as being indicative to “best practice” (see also Choo, 1997). We make four main points in this regard. Firstly, and most simply, we argue that there is a powerful argument for co-ordinated national policy intervention to stimulate and facilitate EC development, and that increasingly such policies will need to be oriented towards international harmonisation and standardisation. Although some will see any kind of policy intervention as unnecessary and distortive, without some form of central co-ordination, EC markets may develop in a piecemeal and ineffectual manner. While Singapore is peculiarly well placed to implement such schemes, these are issues that all states will have to address in the near future. Secondly, the Singaporean case illustrates that a broad-based and integrated set of EC policies is desirable. This goes way beyond providing a legal and regulatory framework for electronic transactions, and includes areas such as developing secure payment systems, co-ordinating standards, nurturing IT skills, building business and public awareness, attracting both foreign investors and local uptake through incentive schemes, and fostering support services. The Singaporean ideal is to develop the complete environment from which an EC hub may emerge. Thirdly, we suggest that Singapore illustrates the kind of progressive “institutional thickness” that is necessary to mobilise such initiatives. While the NCB has played a crucial co-ordinating role, the success of EC policy formation in Singapore arguably rests on the large number of parties that have been

consulted, covering a broad range of ministries, statutory boards, foreign multinationals, local businesses and educational establishments. This pluralistic approach, although undeniably strongly marshalled by state institutions, has speedily produced a coherent policy framework well in advance of other countries in the region. Finally, we suggest that the Singapore case indicates that EC hub development should not purely be left to either state institutions or the private sector, but ultimately relies on sustained and effective collaboration between the two domains. Thus, while it may well turn out that Singapore has already gained an unassailable head start in EC development in the Asia-Pacific region, there are elements of policy “best practice” that authorities in other states may do well to emulate.

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Table 1: Four phases of national IT policy in Singapore.

Period	IT Plan	Target Groups	Strategic Goals	Enabling Technologies
1980-1985	Civil Service Computerisation Programme	Public sector: Gov't ministries, departments	Raise productivity Improve service Develop IT manpower	Transaction processing Data modelling Database management systems
1986-1991	National IT Plan	Private sector: IT industry, local companies	Develop local IT industry Promote business use of IT IT R&D	Software engineering Expert systems Electronic data interchange
1992-1995	IT2000	Industry sectors Communities Individuals	Increase national competitiveness Improve quality of life Personal development Community development Develop global hub role	Broadband networks Multimedia Telecomputing
1996-	Restructuring for IT2000	Industry clusters Government General population	Public-private partnerships Strategic alliances Hub development IT goods and services exports	Internet

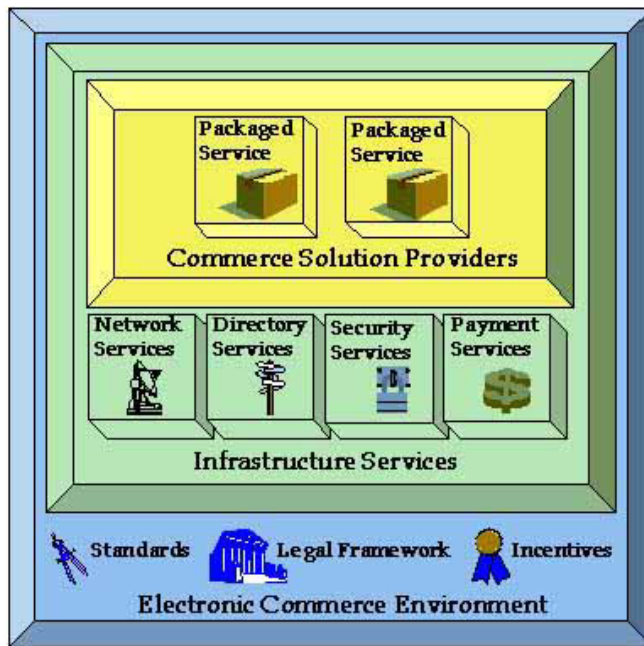
Source: Adapted from Choo, 1997: 50, and Corey, 1997: 192.

Table 2: Constraints on the uptake of EC by SME's in Singapore

Factor	Characteristics
Individual preference	Personal unfamiliarity with IT and electronic networks Personal preference for other forms of communication Personal concerns over reliability and security of electronic networks
Company culture	Resistance to change in dominant forms of communication Collective preference for more traditional forms of communication Continued preference for paper based systems of communication
Awareness	Lack of awareness of different types of electronic networks Lack of awareness of potential uses of EC
Need	Business not deemed to require EC EC not used by competitors or customers
Social factors	Personal touch deemed crucial to business Face-to-face contact more important than electronic networks EC not seen to build trust in relationships
Cost	High cost of installing relevant hardware High cost of hiring qualified staff to maintain and update networks Widespread availability of cheaper alternative communications
Purpose	Perceived as only being useful for non-urgent functions Perceived as only being useful for large volumes of information Perceived as only being useful in long-standing relations where trust has been established
Compatibility	Concerns over compatibility with customers and suppliers Concerns over compatibility with overseas parties

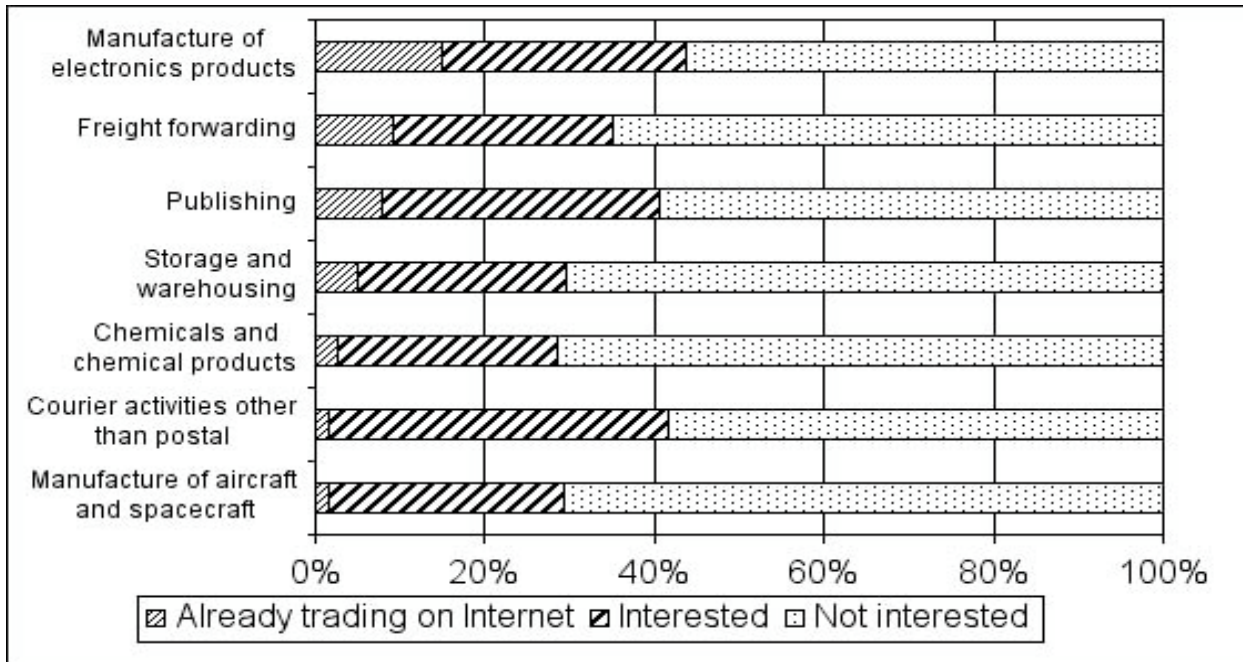
Source: Adapted from Saw (1999, pp.86-87)

Figure 1: Graphical representation of Singapore's EC infrastructure.



Source: downloaded from <http://www.ec.gov.sg/>

Figure 2: Interest and usage of business-to-business EC by industry in Singapore.



Source: NCB Business-to-business EC survey 1999 (<http://www/ec.gov.sg/>)

Figure 3: Interest and usage of business-to-business EC by company size in Singapore.

