Information Technology and Knowledge Economy: A New Development Agenda for Fiji[1]

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Everywhere one goes today, one hears nothing but the `e' word: e-mail, e-business, e-commerce, e-education, e-shopping, e-sex, e-booking, e-banking. More recently has come into vogue another buzzword - `m-commerce' or `m-business' – mobile phone business, again essentially an electronic form of business. Any reputable newspaper one picks up – the Wall Street Journal, the NY Times, the Financial Review, Asian dailies – there would be something amiss if there is no coverage of the `e' or the `m' matter.

The rate at which the electronic-revolution has taken over the world has far surpassed any other technological takeover. The industrial revolution took many decades to grip the world – in fact, starting around 1750, it took the industrial revolution well over 150 years to become global. The electronic revolution, on the other hand, has within 2 decades taken over almost every aspect of modern living. Consider, for example, the following scenario of 20 years back:

Setting: 1980, Fiji:

> *A Lautoka City civil servant with a child finishing high school, wishing to study at USP: for enrolment, the father writes a letter addressed to USP for an application form. To post it, the civil servant strolls out of the office to the post office, stands in the queue for 10 minutes, purchases a stamp, licks it, places it on the envelope (which may have meant either using the office envelope or going to the bookstore on the way to the post office to purchase one, using another chunk of office time), and drops it in the postal box. He returns, and is back in his office 1 hour later. In the meantime, there is a queue at his office for people requiring the services of this officer (the office service counter closes at 2.30 so that the officers can send the funds to the bank which closed at 3pm – the cane farmer from Tavarau at the back of the queue is told to return the next day as the counter is closed). At the PO, after some hours, postal officers sort the mail and direct them to their destinations – from Lautoka, it is bound to Suva by a truck. It reaches Suva PO the next day, where the mail is off-loaded, sorted, and placed in the USP mail bag. The USP mailmen drive to the city, cursing the rain and the city traffic, and take the mail to USP where they sort them and pass them to the admissions office, where one officer opens the letter, passes it to the next, who then places an enrolment form in an envelope, writes the address, and places it in the outward tray for another employee to pick up, weigh, stamp and place it in the bin destined for the PO. Assuming all efficiency, the enrolment form is on its way to Lautoka 5 days after the letter is written. Reaching its destination, the form is filled (some white ink wasted), and the process repeats itself. All in all, by the time the application is processed, it would have taken over a month – more likely over 2 months – many hands, many hours utilised, much frustration, quite some dollars changing hands, and a lot of inconvenience to many. But mission is accomplished.*

Now consider the following scenario:

> *Date: possible now, but sometime in near future in Fiji:*
>
> > *Dad in the government office accesses the site of the university, downloads the application form and takes it home for the child to complete. He then mails it to USP; the process continues. Total time taken would be same as above less the time taken requesting for and receiving the application form*

Consider yet another scenario:

> *Date, possible now; certainly sometime in the near future in Fiji:*
>
> > *Child comes home from school, switches on the computer, dials into the University web site, registers online. At the*

[1] This paper reproduces a Public Lecture by the same title given at the Centre for Development Studies and South Pacific Computer Society, University of the South Pacific, on 4 April 2000. The paper was published as a Working Paper at the University of the South Pacific. The lecture was a part of advocacy of the Government's ICT policy to the University community by the author, who then was the Minister for National Planning in the Government of Fiji.

university, the application is received, enrolment criteria matched against the student's achievements, all done electronically, data processed, and decision conveyed to the student electronically.

In all cases, if the son is accepted, the child and the father (taking time off from work) travel to Suva, stay with a relative, search for accommodation, purchase furniture and basic accommodation items, and set up the child in the new abode. A week later and thereafter the mother begins to worry whether the child has sufficient food, clean clothes, etc., and the father worries on whether the child is studying or is at the nightclubs.

Now consider this scenario:

The new school year begins, the child, still in Lautoka, visits the local university centre, and watches a screen where a lecture being delivered at the main campus is playing – in real time…The student studies from Lautoka.

Or yet consider another scenario:

The student connects to the lecture site, live, from his room at home.

Are these imaginations only?

Twenty years ago in Fiji, if someone stated that one could insert a card into a machine and get cash at 5pm or 10pm, one would have been laughed out of the gathering. And if one suggested that one could pay his electricity bill without going to the payment center and standing in the long queues - by merely switching on the desktop in the office, connecting to his bank account through the internet and transferring the necessary sum to the electricity company account – society would have packed one off to the nut-house.

Now, the novelty of carrying bank cards for the ATM is fast wearing out. The trend now is in carrying miniature phones, or even handheld organisers. And the future? Perhaps these would be devices with which one could buy anything from coke and candies at vending machines to books to ordering groceries from the neighbourhood grocer – without even switching on the notebook or the desktop. For, now mobile phones are rapidly being connected to the Web for not only sending and receiving e-mails, but for functions like calling up weather reports, stock quotes,

movie listings, etc. One prediction is that in the US by the end of this year 15m phones will be equipped to use the internet (Hafner, 2000: 9). It is estimated that by the end of this decade, there will be 1 billion mobile phone users (What's a Cell Phone…"). The market is responding rapidly to take advantage of this huge potential consumer base.

Hafner reports that there are many companies which have been testing such innovations. Nokia is one such company which in February displayed at a computer exhibition in Germany a mobile payment system called PayPal.com. With this one starts by opening an account on the company's web site after which the person can send money to anyone with an e-mail account address – once the money is sent, the amount is charged to a credit card or bank account. The recipient retrieves the money by filling out a form attached to the payment, registering the recipient for the service. PayPal.com then credits a bank card, deposits the money to a bank account or sends a cheque. This service began in October 1999; by March 2000, 350,000 users had signed up and an estimated 10,000 sign up each day!

Traditional mode of banking has changed by leaps and bounds – from the ATM to e-banking to m-commerce

Japan's Asahi Evening News reports that in early March the Web retailer Amazon.com announced expanded offerings to attract the growing chain of shoppers using mobile phone and other wireless Internet devices.

Consider another scenario: suppose you are on your way to the office and felt like a meal. You take out your mobile-cum-internet phone, connect to your favourite café falling on the way, check the menu, and order your choice for a particular time. You would have not only booked yourself a seat, but the meal would be ready and you would have paid for this as well! Too distant in the future? Well, try one of the café's in the international departure terminal at the Narita airport now: the waitress walks to you, punching your order into an electronic gadget which is connected to the kitchen – before she disappears, another waiter gets you your coffee together with the bill…. A dinner date could soon be an e-dining date, or an m-dining date.

Already electronic devices are in use in upmarket diners. Amanda Hesser (2000: 9), for example, reports that miniature cameras focussing on each table, with the chef seeing whether you have finished your soup, and are ready for the entrée, are increasingly coming into use in some New York restaurants. With digital cameras, not only would the chefs be more efficient with service, but owners could log onto their computers from other cities where they are on business or vacation, and see into

their dining rooms. With e-dining, your likes and dislikes could all become the database of the restaurateur – and if it is a chain, the next time you book a table in an outlet in a city hundreds of miles away on a business trip, the chef will know whether you like a dash of ginger or not! No fuss.

Orwell's 1984 coming a decade+ later, one may suggest. For, if there is a digital camera, there may well have been a mic in one of the orchids on the table, or underneath the table. But why this trouble, for the camera could itself be complete with a powerful microphone.

The point is that these are all not only possibilities or even probabilities; they are fast becoming realities now. Whether these are positive or negative, the fact remains that the way of doing business has rapidly changed. And more likely than not, this trend will not be reversed.

And it is not only the 'wanna-be' types or new uni graduates who are getting into this craze of purchasing on-line. Ranging from small stores to billion dollar transnational companies, businesses across America and Europe are rapidly utilising electronic means to not only promote and sell their products, but also to do their own purchasing. General Motors Corp, Ford Motor Co., and Daimler-Chrysler AG, for example, announced in February that they will join forces to create the largest internet-based procurement firm, involving over $US240 billion in annual purchasing over the internet. Nissan Motor Co. also announced a few days later that it will also join this venture. So has Renault SA of France. ('Nissan to…', 28 February 2000: 5).

Small counter stores are also changing their operations. The CNN, for example, recently profiled a small Manhattan owner-operated counter sale cheese shop. The ageing owner, on the advice of his son-in-law, set up a web site which led to a many fold increase in orders – not only from cheese lovers in Manhattan, but globally! So much so that the owner, unable to keep up with supplying the orders – and presumably also take care of banking – that he closed the site itself!

There is no question that the electronic revolution has potential for, and in many cases already is, totally transforming life and living in modern society.

Consider the recent Sydney Nursing home case where attendants bathed residents with kerosene in February this year. Technology can prevent this; an electronic health care support facility would not only have detected any such abuse much earlier, but may have prevented it from occurring altogether.

Medicine and health care is rapidly adopting electronic management and service delivery. Consider the scenario: one needs an organ

transplant. The care provider goes 'shopping' for the 'body part' by sending out all relevant patient information through the Internet to organ donor coordinating organisations. An accident has occurred thousands of miles away; the victim, who was part of an organ donor programme, dies and the organ, which matches the patient here, is available. Within a day or so, the transplant can possibly take place.

From such critical scenarios to less critical ones involving knowledge sharing, alert for new virus strains, to drug purchases – all rather instantaneously – are all on the door step.

Modern capitalism can not be defined now without reference to the electronic revolution. Take, for example, the fact that with capitalism, the family size changes, traditional social support mechanisms disintegrate, and the aging population rises. Can the e-revolution come to aid?

Take the case of Japan. Out there is a rapidly rising proportion of people living longer – one in every 6 Japanese is over 65 - thereby placing an increasing pressure on the social security and health care services. Profit possibilities emerge. A rapidly aging population would require more convenient shopping, say shopping from the home.

This is precisely what the Seven-Eleven Japan Co., the nation's biggest convenience store chain, is planning from April this year. In partnership with Mitsui & Co., the electronic giant NEC, and the nursing care company Nichii Gakkan Co., the Seven-Eleven chain of 8,200 outlets, will offer online shopping for senior citizens, starting with 250 outlets in Tokyo. Citizens will place orders using portable terminals (NEC); the nursing care staff of Nichii Gakkan will pick up the items from the store and deliver them to the customer's home ('Seven-Eleven…' 2000: 9).

The possibility to profit from such innovations are significant. Why not, one may ask, in a population of 22.6m people (over 65 years) as the market size?

What about the working people?

Consider the following: a modern office job. The mid-level executive, with long hours, weekend work, perhaps the spouse also equally stressed. Can they not connect to the nearby supermarket, go through the stock it has, place an order, even pay for it for home delivery or for pickup at a certain time on the way home after peak hours? No traffic jam headache, no rush, no cash, all groceries in the bag! For the supermarket, this will mean cash in the account, space-economy, less security needs, and proper stock control. In fact, one can conceive clearly the changing nature of supermarkets.

In the US, online sales were valued at $5.3 billion for the 4th quarter of 1999 ('Electronic Retailers…'); for entire 1999, it was over $15b. Sales expected in 2003 is around $80b (WSJ, 16/2/00: A23).

Retail e-business has been one of the easiest to conceive of. It is just a step up from TV mail-order business, but the big difference being that the customer can go back to read the fine prints of the labels, while on the TV there is no rewind function (at least not as yet).

But together with this, do the advertiser and the TV commercial also disappear?

Every aspect of life is being changed by the electronic revolution. From eating to dating to promoting to selling to purchasing; from entertainment to fashion; from work to vacation, and from schooling to job searching. New partners emerge, old ones disappear. New forms of personal security arise, and privacy is destroyed. Jobs are being created and jobs are being lost. New companies are formed hourly, and collapse almost equally rapidly.

Take the music industry, for example. Why should one purchase the CD of the top ten on the chart if one could listen to the songs over and over again on Fijivillage.com?

Indeed, why should one take the trouble of going to a retail outlet, purchasing a CD, and hoping no friend of his pinches it when one can sit down in one's study room and download the material? Together with online downloading, e-sales of CD have, as recent evidence from the US shows, led to some lost ground for the traditionally popular record stores. Even recording companies can clearly bypass the retailer, offering e-sales directly ('Retailers sing blues over downloaded music'; The Japan Times, 1 March 2000: 1, 6). And what about the musician? Why should he take the trouble to getting discs cut and losing a significant portion of the revenue to the recording company, the advertisers, the promoters, and the retailers, when he can peddle the music online for customers to download?

The electronic revolution will change the nature of competition. Old forms of agents will disappear, and new forms emerge. Small companies could provide major threats to large companies. Strategic partnerships could result in mega-corps. For the neo-classical economist, the old world of neat models of perfect competition and oligopoly now come for re-examination. One view is that the ideal world of perfect competition which neo-classical pioneers like Stanley Jevons, Leon Walrus, and Karl Menger are known for, is now at last becoming a reality. The case can be illustrated by the tendency of prices for `homogenous' products to equalise, so much so that the sellers tend to become price takers rather than set-

ters. One now finds web-trading in all the markets – the product market, finance market and the labour market. It may appear at first glance, that the webmasters have become the real neo-classical auctioneers. Purchasers surf the web for what they desire, compare prices and settle for the best. So would sellers.

The key characteristics of the perfect competition world – price taking, perfect resource mobility, and perfect information - all seem much closer now than a decade ago. And with this, general efficiency gains for all – the very ideal which neo-classical writers have been trying to convince all to embrace – appear within grasp.

But what about the ideal of product homogeneity? If there is anything which should give discomfort to the neo-classical economists, it is the fact that product homogeneity is becoming remoter than what it was. Is it monopolistic competition, then? But if this is so, then one may bid farewell to efficiency gains as well. The opposing view is embedded in this very data. That while we see some of the neo-classical characteristics closer, the long term trend would be a yet greater concentration and centralisation of economic power.

It is certain that the electronic revolution will see many things new and different. Firms will be borne and equally rapidly disappear. But one thing is getting clearer: that the electronic revolution has produced an opportunity for small ventures to spring up, even small as an owner-operated electronic marketing outlet.

Individuals, and small collections of them, without multi-million dollar startup capital, are now establishing e-businesses. Writes Suein Hwang of The Wall Street Journal: 'For years venture capital here [Sand Hill Road, Silicon Valley] underwrote the development of technologically advanced products to be used by - and marketed to – a highly specialised group of customers. Now, just about anyone with a Web site and a product or service to sell on that site can qualify as a high-tech entrepreneur worthy of venture capital financing' (2000: A1). And it does not have to be a highly qualified computer programmer or hardware specialist. Citing the case of a 31 year old with a degree in political science and law heading the e-commerce of an investment company and sitting on boards of numerous new e-startup ventures, Hwang suggests that the market is opened to the non-computer specialists now.

What the record to date suggests is that the small enterprise has been making a mark in the circulation sphere. And they could even be providing small-scale producers, as against the mega-producers, a better market opportunity. But would this trend be sustainable? On the basis of Yale's Economics Professor, Robert Shiller's book, *Irrational Exuber-*

ance (Princeton University Press, 2000, which came out just last month), Russell Mokhiber and Robert Weissman question the trend: 'is the booming market for real, or is it a naturally occurring Ponzi scheme?' Charles Ponzi, a crook in the 1920s, told people he had a business that made money exploiting mispricing in international postage reply coupons; there was no such market. But people, willing to make a fast buck, put in their money on promises of a spectacular rate of return on their investments. The initial investors were paid off handsomely, but with the money he received from the second round of investors. The second group of investors were paid off from the funds from the third round of subscribers. The scheme ballooned into a multimillion dollar market. Finally, the bubble burst, leaving the last round of investors completely out of pocket. Shiller believes that the current craze about Internet investments is perhaps fed by irrational exuberance, feedback loops, herd behaviour, and epidemic madness.

Theoreticians have a whole new world of research possibilities – not only on the testing and re-testing models, but also on the impact of these developments for small nations like ours.

The possibilities engendered by the electronic revolution, in short, are immense. Whether all are to the ultimate good of human society is a matter for debate, and another occasion. The fact today is that we in Fiji can not either change or reverse this reality of electronic revolution, nor can we influence the pace of it. The electronic revolution is going on and Fiji will be a part of it.

The present government sees the new Fiji as one which will be based on the generation and utilisation of knowledge. For us, the new Fiji will be knowledge based. Knowledge-economy, or in the electronic lingo – the k-economy – is what could be driving Fiji during the next few decades.

Not that we are even close to being the pioneers. Countries like Singapore and Malaysia are at least a decade or so ahead of us. In Malaysia, for example, Vision 2020, aiming to achieve the post-industrial advanced society status without going through the long `developed society phase, was premised on the growth of knowledge industry. By 1994, Malaysia had responded to the electronic revolution by taking the following initiatives:

- creating a Multimedia Super Corridor (MSC), a 700 sq km area marked for attracting world–class companies to use as a regional hub,
- the establishment of the National IT Agenda (NITA), a comprehensive framework for Malaysian development in the Information Age;
- the establishment of a Demonstrator Application Grant Scheme (DAGS) which provided a vehicle for government grants to promote the growth of projects which demonstrate the application and usefulness of IT in facilitating development (called demonstrator applications); and
- identifying 5 key areas of focus: e-sovereignty, e-learning, e-community, e-economy, and e-public services (see NITC, 2000).

Demonstrating to the international community that it is serious about this, Malaysian Government hosted the Second Global Knowledge Conference in March this year. This World Bank endorsed conference placed for the first time a non-developed nation at the centre stage of the electronic revolution.

The World Bank has without doubt recognised the significance of the electronic revolution. Its 1998/1999 World Development Report, for example, was titled Knowledge and Development. Introducing the report, James Wolfensohn, the President of the World Bank, wrote:

> The Information revolution makes understanding knowledge and development more urgent then ever before. New communications technologies and plummeting computing costs are shrinking distance and eroding borders and time. The remotest village has the possibility of tapping a global store of knowledge beyond the dreams of anyone living a century ago, and more quickly and cheaply than anyone imagined possible only a few decades ago. And distance education offers the potential to extend learning opportunities to millions who would otherwise be denied a good education (1999: iii).

True indeed!

If small island nations like Fiji were disadvantaged by the tyranny of distance, would this continue to constrain us much longer? The electronic revolution has made distance less relevant. It makes geography almost irrelevant. Operating 24 hours a day, every day, it removes the limitations of time also.

The new knowledge economy presents many opportunities for Fiji. At last we can loosen the constraints of our remote location, and be truly a part of the global community.

Fiji has a well educated, English speaking population. It is ideally

placed in terms of times zones to benefit from the growing world wide industry of back office processing. Lower level tasks from European or US businesses are transferred at the end of their working day via the Internet, and are processed during the day in Fiji in time for the next day of work in the established business centres. This is just one of a number of export orientated services that are made possible by the use of the Internet and electronic business. It offers the potential for Fiji to create thousands of new jobs, at different skill levels, from basic data processing to technical ones like accounting to complex software to web page design, to ventures like music and movie industry processing.

Imagine a studio in Yaqara where digitally transferred films shot in Hollywood are downloaded for editing. Or where new music is downloaded in the studio, and discs cut and sent to the Sydney market before the music maker wakes up in the US!

Three decades ago, emerged the new international division of labour – the internationalisation of commodity production where the third world was seen as a source of cheap labour to be used in component production and assembly for first world MNCs. Now the e-revolution is giving rise to the internationalisation of service production – and the third international division of labour. Just that this time, it will be the third world's skilled workforce which will be producing services for the first world MNCs. A marked shift of power is in the offing. Small wonder, then, that Bill Clinton made a point of visiting Bangalore, the heart of East Asian IT industry last month.

The government of Fiji recognises the possibilities which the e-revolution has. We have proposed a law for an audio-visual industry in Fiji; the Bill establishing an Audio-Visual Commission was read in the Parliament today.

And law is important. While the Audio-Visual Commission Bill is a start, a lot more will be done on the legal side. For, the electronic revolution has created nightmares on the legal side.

From hacking – like the 6-9 February hacking, starting with Yahoo.com, then to eBay, Amazon.com, CNN, E*Trade and other sites – to illegal transactions (like money laundering), to illegal online gambling to massive tax evasions and avoidance, and to thefts of credit-card numbers from online retailers – like the December 1999 snatching of 300,000 numbers from music retailer CD Universe - are now all within easy reach; thanks also to the electronic revolution (see Sager, et al). Once e-business becomes the norm hacking and electronic sabotage would have similar effects as a closure of sea lanes of communication would have had 30 years ago.

One cartoon I saw recently had a teenage wearing a cap inscribed 'I am the king', one leg on a skateboard and a laptop in his hand zooming past a burly warrior with bazooka's and grenades, saying: 'make way, dude'! The new guerrilla war will not be fought in the jungles; it will be conducted from workstations at homes and offices!

How will law respond? From tax laws to criminal laws to civil/commercial laws to international laws – all face major challenges.

Indeed, there are many challenges facing Fiji today. But perhaps the two greatest challenges now are in ensuring that our infrastructure is well geared to gain from the electronic revolution, as well as to ensure that the gains are well distributed.

Let us, first, see where we stand in respect of the infrastructure for the K-E.

In Fiji, we already have increasing numbers of people participating in the electronic economy. Data on some key variables have not been collated; indeed on assuming office, we found a total lack of relevant data on this fast emerging sector. Our government has now begun compiling relevant statistics and drawing up a policy paper on the K-economy.

Let me provide some tentative figures on the extent to which we have begun participating in the K-economy.

It is estimated that today we have approximately 18,000 PCs in use. On average, this works to 1 pc for every 8 households. But of course, this is a very crude estimate; of the 18,000 PCs, 1,217 are in use in government. Telecom Fiji estimates that there are 5,500 computers with households. This works to one PC for every 27 family. Computer penetration in Fiji needs to be increased.

Compare this with some targets. Singapore has endeavoured to have a computer per household. But not only computers for letter processing and games; the government there has launched a $S25m ($F48m) campaign to get all Singaporeans online!

In the US state of Maine, the Governor Angus King announced in February the proposal to give a lap-top to each student to keep as their own. This will mean that each of the 16,000 children entering 7th grade – class 7 of our system - next year will have a computer each. Together with this is appropriate allocation to train teachers and to tie technology to learning ('A Laptop…' 2000: 9). Once US Presidential hopeful, John McCain had even proposed to permanently ban sales tax on Internet purchases ('Economics According to …').

In India, to increase PC use by 25% per year, the government is contemplating eliminating taxes on hardware and software (Kirpalani and

Clifford, 2000: 26). India has even created a new separate Ministry of IT.

Even companies are in the race to network their employees. On 3rd February Ford Motor Co. announced that it will offer a desktop computer, a printer and internet access to its 350,000 employees worldwide for a monthly fee of $5 – all estimated to cost between $50-$150m [earning the company a cool $21m per year for perhaps a fraction of what it may pay the ISP]. Delta Airlines also has similar plans for its 72,000 employees - at a $12/month (Kerwin, et al, 2000: 41).

Provision of desktops and internet connections will sooner than later become important items on the log of claims of unions

It is estimated that today we have about 3,700 Internet users in Fiji. Of this, 613 are government users. USP and other regional organisations would also have a heavy user concentration. The important matter at this stage is not the number, but the trend in use. Telecom Fiji, for example, had a mere 60 dial-up accounts in 1995. At the end of 1999, it had 3,312 accounts. The growth, as the following table shows, is exponential:

Date	Dial-up Connections
Dec. 1995	60
Dec. 1996	409
Dec. 1997	1,080
Dec. 1998	2,061
Dec. 1999	3,312

In terms of businesses, at the end of 1999, there were 62 corporate access accounts with Telecom Fiji. These accounts have multiple end accounts that are managed by individual organisations. Telecom Fiji estimates about 5,500 end accounts associated with the 62 corporate accounts, USP having the bulk of it estimated at 4,000 alone.

Other indicators also show a huge growth in the electronic industry. Mobile phone service, for example, began in 1994. Today there are 23,300 phones in circulation.

But critical of it all is the number of IT personnel in the country. In 1986, Fiji had a registered IT personnel of 79. This was 0.1% of the total formal employment. In 1997, Bureau of Statistics records show that the number rose to 620, comprising 0.54% of formal employment. Table 2 provides data on IT employees in Fiji.

Other countries are fast recognising the need to realign the labour market. In Singapore, for example, at the end of 1999, 92,000 people worked in information and communication technology, including IT suppliers, telecommunication vendors and end-users. This figure is expected

by Singaporean authorities to rise by around 12% per year in the next 2 years, reaching 114,000 by 2001 and to 250,000 by 2010 ("Web workforce…').

In Fiji, recent trend is encouraging. While comprehensive data is still being compiled, USP statistics can give an indication of the trend. In 1992, 281 students had enrolled in Maths and Computing Science courses (by full-time equivalent student status). By 1999, the figure shot up by 223% to 909; of the 909 about 68% are privately financed students. In terms of % of total USP enrolment, as shown in Table 3, Maths and Computing Sciences has seen an increase from 9.2% in 1992 to 15.7% in 1999.

Table 2: Information Technology Employees, Fiji.

	1986	1987	1988	1993	1996	1997
Professionals & Technical Assoc. Prof.						
System Analyst	11	22	6	30		
Statistical & Mathematical Technicians	68	65	78	133		
Professionals						
Computer systems designers & analyst					75	108
Computer programmers					76	100
Other computer professionals					41	12
Technical Assoc. Prof.						
Supervisor, computer assoc. prof.					29	19
Computer assistants					49	56
Computer equipment operators					212	325
Total IT employees	**79**	**87**	**84**	**163**	**482**	**620**
Total Paid Employment	**79,854**	**78,159**	**77,529**	**103,664**	**110,081**	**114,749**
% of total paid emplnt	**0.1%**	**0.11%**	**0.11%**	**0.15%**	**0.44%**	**0.54%**

Data from FIT and other tertiary institutions producing IT personnel is still being compiled. Preliminary data indicates that USP's Fiji centre has around 5000 course units per year, since 1996, in its continuing education computer classes now held in Suva, Lautoka, Nadi, Rakiraki, Labasa, Tavua and once even in Kadavu. Similarly, preliminary data from FIT indicates that this year there is a course enrolment of about 3,000 in FIT's computer related courses. There also are numerous private `computer training schools' throughout Fiji. There as yet is no comprehensive

data on the number of students who pass through this system.

Enrolment in Maths/ICT, USP

	EFTSU	% of Total USP Enrolment	Course Enrolment
1992	281	9.2	
1993	364	10.9	
1994	433	11.1	
1995	545	11.9	4,498
1996	686	13.2	5,582
1997	733	13.9	5,707
1998	869	15.1	6,739
1999	909	15.7	6,522

(Source: USP Statistics)

In high schools, the government is also placing a heavy emphasis on computer education. Formally, computer education in high schools was first introduced in 1995 when 13 schools ran computer classes. This year, Fiji has 59 schools with computer classes of which 26 are in the central division, 5 in the northern division and 28 in the western division.

The Education Commission, which is currently sitting, has as one of its terms of reference, an evaluation of the potential of IT in education. We are eagerly awaiting the recommendations of the Commission.

On the education front, the USP only last week launched the USP-NeT2000, a project which, if led and managed well, has the potential of transforming USP into a pioneering tertiary distance delivery institution in the world.

I do note, however, that the USP's current Strategic Plan has placed the following 5 areas as its top priority: agriculture, sustainable development/environment management, marine studies, teacher education, and tourism. IT doesnot feature as a priority. The plan does state USP's commitment to fully utilising communications and information technologies for the benefit of learning, teaching and research. The plan also acknowledges that the University expects its graduates to be familiar with information technology to ensure that they are able to use this technology in their societies to its full potential. It, therefore, intends to provide its students with these skills.

Is this sufficient? I hope that this question will merit some thought by the USP community in near future.

For the Government, there is a very clear need for an added emphasis on IT and knowledge industry. The Government is demonstrating this commitment by identifying IT, together with health, education, housing, infrastructure, law and order, agriculture and poverty alleviation, as a priority for expenditure allocation during the next 3 to 5 years.

The Government, for the first time, is engaged in drawing up a comprehensive policy on the k-economy. Funds have been approved for my ministry to conduct a feasibility study on this. Within 2 months – well within the time for consideration by the sector committee on this for the Development Plan, we expect to have a paper assessing the potential for Fiji to develop knowledge based industries, identifying potential growth areas, and constraints.

And potentials, constraints and challenges, there are many.

It is not only the school education curriculum, or the number of IT specialists in the market, that we are referring to. There is a whole set of requirements for a vibrant K-E, ranging from an institutional environment to a market which is responsive to the needs of the K-economy. But before I dwell on the market, let me briefly discuss the government's own engagement with electronic revolution.

Government can be a large user of IT and network based systems. Some years back the then government began a computerisation project for government departments. It seems, however, that no one was sure of what was being done. There was a multi-million dollar accrual accounting project which was initiated, then abandoned. Then came what was known as the Financial Management Information System (FMIS) project. By August 1999, a total of $12.75m was spent on these projects. Today, apart from a lot of computers on many desks, there is not much to be seen around the government as an outcome – memos are still drafted by hand or dictated to PA's, processed, read, re-edited, re-read, etc.. There is no centralised data system with real-time data, financial or otherwise. Auditors have raised numerous queries on these projects. The Parliamentary Public Accounts Committee, in its latest report (Parliamentary Paper 6/2000: 9) strongly recommended an investigation into the whole FMIS project. Before this, the cabinet had decided to have an investigation in the government's computerisation program; the Office of the Auditor General is now carrying out this work.

There are good examples of e-governance as well. Last September, the Customs Department went online with a new system called ASYCUDA++ (Automated System for Customs Data) which will reduce the customs clearance time by two-thirds. Similarly, the immigration system is working well. Then there are those where there are mixed results in terms of IT utilisation, like the tax systems.

Fiji government has still not moved to e-governance. Significant amounts of funds are currently being spent in collecting and compiling data; the next step, we hope, would be electronic access to these by, progressively, decision makers, and then the public for the information which is considered to be in the public domain. There is a large potential for the Government to increase the amount of services it delivers over the Internet – from information to application forms to approvals.

The examples cited above show that while the e-revolution has a lot of potential for ensuring a more efficient government, it also highlights the fact that there is a huge potential for abuse and squandering of funds. The bottom line is that one can not do without the services of skilled staff and managers; officers who are well versed in e-matters. This also, obviously, has a major bearing on re-training and continuous training of staff, both in the public and the private sectors.

Other than the availability of skilled personnel, another constraint emerges from the market behaviour in Fiji itself. Take the hardware industry, for example. Are computers affordable in Fiji today? About 48% of all workers earn less than $6,500 per annum in Fiji. A UNDP report suggests that this might even be the poverty line for the country. In a situation like this, can we afford to let the k-economy be the mainstay of Fiji?

I am certain that the computer hardware industry needs a thorough shake-up. If Fiji is to participate gainfully from the knowledge economy, the hardware and the software industries must play their part. For, the cost of wares is a cost of doing business. And where prices of units and components are out of tandem with affordability, computer penetration will remain low and potentials get muffled. The same applies to service. This must keep pace with the demands of businesses. If it takes 5 months to get a component replaced – that too, by supposedly leading dealers in Fiji – as I experienced with my new laptop purchased around mid last year - then one might as well forget the K-economy.

The hardware and software industry in Fiji has to be competitive. Our experiences with the commercial side of this industry – coming particularly at the change of century date time – has not been too positive. But the same applies to most public experiences over the Y2K changes internationally! While our experience with USP was most heartening, the commercial computer industry in Fiji must re-gain its lost pride in Fiji.

But the computer industry is just one element in the new k-economy. There are other components as well.

Could one do with a computer without a connection to consistent power supply? In Fiji about 35% of households are still unconnected to

electricity. Many schools are also without 24-hour electricity supply. It is not only connection to electricity that is critical; it is a steady and reliable supply. Power cuts and surges have become all too common in Fiji over the past few months. Another requirement is phone connection. Again, while the connection rate has been high during the recent years, the nation as whole is far from being connected.

Related to this is the grossly inefficient mobile phone network in the country. While one can easily use ones Fiji mobile phone in certain other countries, Australia and NZ for example (a facility called Vodafone roaming, courtesy of Vodafone), if one were to go out past Galoa one would easily hop into the no network range. Or even 10 minutes by air out to Levuka – ones mobile phone becomes useless.

Yet another is the efficiency of ISPs in Fiji. This is an area which we are looking at now. The arrival of the Southern Cross cable at the end of the year, thanks to a large investment by FINTEL, will create huge capacity, with a large expansion in available bandwidth that will increase connection speeds. In this respect, Fiji will truly have world class standards of communications infrastructure. Domestically, however, there are numerous complaints about the ISP's ability to handle the market efficiently. The cost of Internet access is relatively high in Fiji. In the UK a number of companies have just announced plans to offer unlimited Internet access for free - no call charges, no monthly charge, with the providers' costs being met by the profits of advertising and e-commerce.

The Fiji Government is committed to working with stakeholders to ensure that the cost of Internet access is not prohibitive, and does not become a constraint to the growth of the k-economy in Fiji. For, if we do not address the basics, ones elaborate plans for launching Fiji into a new era will remain a beautiful plan only. The government on its part is doing its best to ensure that the supporting environment is present for allowing benefits of the electronic revolution to not only benefit Fiji, but also benefit all in Fiji.

Indeed, a major problem emerging with the electronic revolution is the widening disparity, both within a nation, as well as between the first world and the third. During the Second Global Knowledge Conference held in March, the Malaysian PM, Mahatir Bin Mohamad spent a good part of his speech talking about the divide between and within countries enabled by the electronic revolution. If Mahatir is considered eccentric, consider World Bank's Wolfensohn:

> … with [the information superhighway] opportunities come tremendous risks. The globalisation of trade, finance, and information flows is intensifying competition, raising the danger

> that poorest countries and communities will fall behind more rapidly than ever before. In our enthusiasm for the information superhighway, we must not forget the villages and slums without telephones, electricity, or safe water, or the primary schools without pencils, paper, or books. For the poor, the promise of the new information age – knowledge for all – can seem as remote as a distant star. To bring that promise closer to reality, the implications of the information revolution must be thought through with care and made part of the development agenda (1999: iii).

The e-revolution must, indeed, be made a part of the development agenda. The academia stands ideally to help create the K-E agenda for the region generally (consider the Government of Tuvalu, which has to rely on a business with Canadian interests to manage its Internet domain name `TV'), and for Fiji specifically. The Government of Fiji is doing its part. If the academia began focussing on it as well, Fiji and indeed the entire region stand, to gain significantly by it. The significance of the electronic revolution is far reaching, both, positively and negatively. These matters must be addressed sooner than later; they can not be ignored. Nations throughout the world are now fast embarking on creating this new agenda. I have referred to Singapore, India and Malaysia. But browse the Internet – from the OECD nations to the US; from the largest to the smallest are now actively engaged in this process.

In Fiji, we need to create a K-E agenda. We can not stand on the sidelines. Indeed, the choice is simple: either we be part of it or forever grumble about our backwardness in international forums and foreign embassy cocktails.

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