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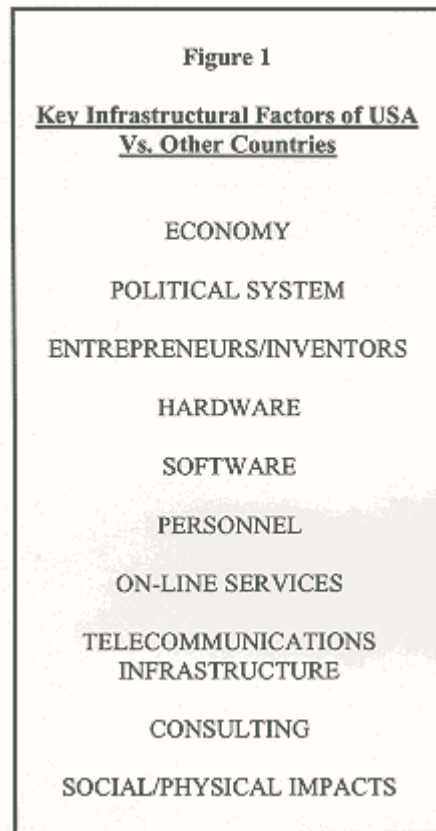email: palviap@cc.memphis.edu

Introduction

The majority of the technological innovations that ushered and augmented the industrial era originated in Europe. Hundred years later the same can be said about information technology advances being made in the US. However, as the industrialized nations lurch in to the information age, and as the NICs try to transform themselves from pretenders in to contenders, there is a growing threat that pretty soon we will have cybercolonies of the cyberpowers (some old, some new). The US superiority is threatened continuously from all directions (e.g., peripherals-Asian Tigers, software development-India, supercomputer-India, mainframes-Japan, application software-Germany, high level consulting-Germany).

The question that intrigues us is: are there other countries that have developed the necessary excellence in infrastructure (e.g., hardware, software, communications, and personnel) that can spearhead the challenge to the US and can become a formidable cyberpower in the next decade? If so, then what are the policy implications for governments and organizations around the world, in particular the US? From our discussions with IS/IT professionals from over 25 countries, visits to some of the organizations in those countries, and archival analysis of publicly available information, we are convinced that the cyberhegemony of US is seriously challenged. While our analysis is based primarily on European Union (EU) countries (especially Germany), we will draw from other countries to make our arguments. One thing to keep in mind is not the status quo of these countries, but how the various governments and organizations are positioning themselves for the future.

It is worthwhile to comment that the challenges posed by other nations should not be necessarily viewed in a negative light. As long as the US also maintains its levels of excellence and accomplishments, the combined efforts of the various countries may in fact be a blessing for the entire global community; they will only accelerate the progress of the world based on exciting technological innovations.

The Challenges

We examine the following ten infrastructural elements (figure 1) to compare the US position vs. other countries. Only brief comments are included in this abstract.

Figure 1

**Key Infrastructural Factors of USA
Vs. Other Countries**

ECONOMY

POLITICAL SYSTEM

ENTREPRENEURS/INVENTORS

HARDWARE

SOFTWARE

PERSONNEL

ON-LINE SERVICES

TELECOMMUNICATIONS
INFRASTRUCTURE

CONSULTING

SOCIAL/PHYSICAL IMPACTS

Economy: The economies of the European Union countries as well as many Asian countries (Naisbitt 1996) are strengthening and posing strong challenge to the US. Germany is the strongest economy in Europe, and with 80 million citizens, will wield considerable influence. Besides the four Asian tigers and Japan, China and India promise to be the centers of economic activity in the next millennium. The political and economic integration of various regions, large populations, and regional patriotism and trade barriers may all put the US into a disadvantageous position.

Political System: The political systems of many countries of the world, in the last few years, have shifted from controlled economies to freer forms of government. The transformation of the former Soviet Union, Eastern European nations, and many Eastern countries (e.g., India, and to limited degrees China and other far east countries), have unleashed enormous amounts of investment in the technological sectors both from within and outside. They appear to be irreversible trends. We may have just seen the tip of the iceberg, and there is certainly more to come.

Entrepreneurs/Inventors: While many inventors were American, many of these people had received their formative education and training in their native countries. For example, the CEOs of Compaq, Apple, Intel, Borland, Sun Microsystems, Novell, etc. are first generation Europeans or Asians. While it is the strength of the US to attract people of exceptional quality from around the world, this may suffer due to pending immigration reform, and prospering conditions and incentives in other countries.

Hardware: While the US has lead in computer hardware (especially microprocessors), this advantage is diminishing. One can argue that non-proprietary PCs, mainframes, supercomputers, and peripheral equipment have become commodity items, and no country derives a distinct advantage by manufacturing them. Besides, Taiwan and South Korea have become global forces in PCs and India has made major

inroads into the supercomputer industry. Moreover, many countries have the microelectronics based capability to develop new and complex hardware (e.g., Germany, Netherlands, France).

Software: The greatest strength of the US lies in software innovation by companies like: Microsoft, Lotus 1-2-3, Oracle, Novell, and the dashing Netscape. However, global competition is on the rise. A global leader is SAP of Germany. It provides a solution to large corporations to transparently manage their most important asset: information. Another company is Dassault of France. Very successful software companies are mushrooming in India, Brazil, Ireland, Russia, and Singapore.

Personnel: Many European countries have excellent educational systems. Germany has a distinct advantage over US, due to their schooling system which places heavy emphasis on practical training. They hold scientists, engineers, and economists in high regard. Russia and India provide large pools of relatively inexpensive scientific talent. India has thus been a leading story as a recipient of IS/IT outsourcing contracts. The acute necessity of skilled programmer/analyst in the US can be attributed to inadequate curriculum, planning, and lack of real-life training for the graduates.

On-Line Services: The past year has seen Internet and related companies climb to dizzying heights. While the online companies started in the US, this is no longer the case. For example, America On-Line also happens to be owned by Bertelsmann, a German Company. Internet providers are springing all over the world.

Telecommunications Infrastructure: The presence and integration of fibre optics and wireless technology is commonplace in the European countries and Japan. The use of cellular phones and wireless networks is common place in Asian and Latin American countries. In some areas in the integration of wireless technology, the US is far behind. The RBOCs inherited outdated cable wires, and do not have big incentives to usher in the area of fibre optics and wireless technology. Another example of the European lead is the use of interactive TV for information retrieval on almost all subjects (e.g., sports, travel, weather, and business).

Consulting: The Germans have entered into IS consulting in the form of Cap-Gemini, which is fast becoming a global player. The many IS/IT outsourcing vendors in India, Ireland, Singapore, etc. also provide consulting services. Consulting is driven by expertise; our previous examples suggest that IT expertise is being rapidly accumulated by many nations.

Social/Physical Impacts: In order to use computer based technology more gainfully, we need to examine and assimilate newer methods which improve our well-being and minimize adverse impacts. In Europe, in particular Scandinavia, many researchers and companies have invested time and resources in studying the impact of information technology. This has directly resulted in their adoption of form and functionality in the design of furniture and peripherals. As a result of ergonomical features, Nokia is becoming a leading world vendor of computer monitors.

Conclusion

The Japanese showed to the world that innovations can be adapted and translated into economic success, and a country can then build on this success to become a technological leader. One would therefore anticipate that the policy and decision makers in the US would be proactive in preventing history from repeating itself. We have shown that the threat is even greater this time, because high quality competition in IS/IT is coming from a multitude of countries extremely capable of usurping the lead from US. It is imperative, for the government, industry, and academic leaders to recognize the growing competitive challenges and devise strategies to overcome them. A few of the strategic responses include: planning, policy formulation, education, infrastructural improvements, incentives, competition, and control/coordination mechanisms.

References

Available upon request from the authors.